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| 3GPP TS 24.501 V19.1.1 (2024-12) |
| Technical Specification |
| 3rd Generation Partnership Project;  Technical Specification Group Core Network and Terminals;  Non-Access-Stratum (NAS) protocol for 5G System (5GS);  Stage 3;  (Release 19) |

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## 3.1 definitions

for the purposes of the present document the terms and definitions given in 3GPP TR 21.905 [1] and the following apply a term defined in the present document takes precedence over the definition of the same term if any in 3GPP TR 21.905 [1]

4G-GUTI a GUTI defined in 3GPP TS 24.301 [15]

5GMM-IDLE mode in this specification if the term is used standalone a UE in 5GMM-IDLE mode means the UE can be either in 5GMM-IDLE mode over 3GPP access or in 5GMM-IDLE mode over non-3GPP access

5GMM-CONNECTED mode in this specification if the term is used standalone a UE in 5GMM-CONNECTED mode means the UE can be either in 5GMM-CONNECTED mode over 3GPP access or in 5GMM-CONNECTED mode over non-3GPP access

5GMM-IDLE mode over 3GPP access a UE is in 5GMM-IDLE mode over 3GPP access when no N1 NAS signalling connection between the UE and network over 3GPP access exists the term 5GMM-IDLE mode over 3GPP access used in the present document corresponds to the term CM-IDLE state for 3GPP access used in 3GPP TS 23.501 [8]

5GMM-CONNECTED mode over 3GPP access a UE is in 5GMM-CONNECTED mode over 3GPP access when an N1 NAS signalling connection between the UE and network over 3GPP access exists the term 5GMM-CONNECTED mode over 3GPP access used in the present document corresponds to the term CM-CONNECTED state for 3GPP access used in 3GPP TS 23.501 [8]

5GMM-IDLE mode over non-3GPP access a UE is in 5GMM-IDLE mode over non-3GPP access when no N1 NAS signalling connection between the UE and network over non-3GPP access exists the term 5GMM-IDLE mode over non-3GPP access used in the present document corresponds to the term CM-IDLE state for non-3GPP access used in 3GPP TS 23.501 [8]

5GMM-CONNECTED mode over non-3GPP access a UE is in 5GMM-CONNECTED mode over non-3GPP access when an N1 NAS signalling connection between the UE and network over non-3GPP access exists the term 5GMM-CONNECTED mode over non-3GPP access used in the present document corresponds to the term CM-CONNECTED state for non-3GPP access used in 3GPP TS 23.501 [8]

5GS services services provided by PS domain within the context of this specification 5GS services is used as a synonym for EPS services

5G-EA 5GS encryption algorithms the term 5G-EA 5G-EA0 128-5G-EA1 128-5G-EA2 128-5G-EA3 5G-EA4 5G-EA5 5G-EA6 and 5G-EA7 used in the present document corresponds to the term NEA NEA0 128-NEA1 128-NEA2 128-NEA3 NEA4 NEA5 NEA6 and NEA7 defined in 3GPP TS 33.501 [24]

5G-IA 5GS integrity algorithms the term 5G-IA 5G-IA0 128-5G-IA1 128-5G-IA2 128-5G-IA3 5G-IA4 5G-IA5 5G-IA6 and 5G-IA7 used in the present document corresponds to the term NIA NIA0 128-NIA1 128-NIA2 128-NIA3 NIA4 NIA5 NIA6 and NIA7 defined in 3GPP TS 33.501 [24]

access stratum connection a peer to peer access stratum connection

- between the UE and the NG-RAN for 3GPP access;

- between the UE and the N3IWF for untrusted non-3GPP access;

- between the UE and the TNGF for trusted non-3GPP access used by the UE;

- within the TWIF acting on behalf of the N5CW device for trusted non-3GPP access used by the N5CW device;

- between the 5G-RG and the W-AGF for wireline access used by the 5G-RG;

- within the W-AGF acting on behalf of the FN-RG for wireline access used by the FN-RG; or

- within the W-AGF acting on behalf of the N5GC device for wireline access used by the N5GC device

the access stratum connection for 3GPP access corresponds to an RRC connection via the uu reference point the creation of the access stratum connection for untrusted non-3GPP access corresponds to the completion of the IKE\_SA\_INIT exchange (see IETF RFC 7296 [41]) via the NWu reference point the creation of the access stratum connection for trusted non-3GPP access used by the UE corresponds to the UE reception of an EAP-request/5G-start via NWt reference point (see 3GPP TS 23.502 [9]) the creation of the access stratum connection for trusted non-3GPP access used by the N5CW device corresponds to the TWIF's start of acting on behalf of the N5CW device the creation of the access stratum connection for wireline access used by the 5G-RG corresponds to establishment of signalling connection using W-CP protocol stack via the Y4 reference point (see 3GPP TS 23.316 [6D]) the creation of the access stratum connection for wireline access used by the FN-RG corresponds to the W-AGF's start of acting on behalf of the FN-RG the creation of the access stratum connection for wireline access used by the N5GC device corresponds to the W-AGF's start of acting on behalf of the N5GC device

access to SNPN services via a PLMN/To access SNPN services via a PLMN a UE is accessing SNPN services via a PLMN when the UE is connecting to the 5GCN of the SNPN using the 3GPP access of the PLMN

aggregate maximum bit rate the maximum bit rate that limits the aggregate bit rate of a set of non-GBR bearers of a UE definition derived from 3GPP TS 23.501 [8]

alternative NSSAI a list of mapping information between the S-NSSAI to be replaced and the alternative S-NSSAI

Always-on PDU session a PDU session for which user-plane resources have to be established during every transition from 5GMM-IDLE mode to 5GMM-CONNECTED mode a UE requests a PDU session to be established as an always-on PDU session based on indication from upper layers and the network decides whether a PDU session is established as an always-on PDU session

NOTE 1 how the upper layers in the UE are configured to provide an indication is outside the scope of the present document

applicable UE radio capability ID for the current UE radio configuration in the selected network the UE has an applicable UE radio capability ID for the current UE radio configuration in the selected network if

a) the UE supports RACS; and

b) the UE has

1) a stored network-assigned UE radio capability ID which is associated with the PLMN ID or SNPN identity of the serving network and which maps to the set of radio capabilities currently enabled at the UE; or

2) a manufacturer-assigned UE radio capability ID which maps to the set of radio capabilities currently enabled at the UE

backhaul PLMN or backhaul SNPN (BH PLMN or BH SNPN) the term backhaul PLMN or backhaul SNPN (BH PLMN or BH SNPN) used in the present document corresponds to the term backhaul PLMN/SNPN (BH PLMN/SNPN) used in 3GPP TS 23.501 [8]

CAG cell a cell in which only members of the CAG can get normal service depending on local regulation the CAG cell can provide emergency services and emergency services fallback also to subscribers who are not members of the CAG

CAG-ID a CAG-ID is a unique identifier within the scope of one PLMN defined in 3GPP TS 23.003 [4] which identifies a closed access group (CAG) in the PLMN associated with a cell or group of cells to which access is restricted to members of the CAG

CAG restrictions restrictions applied to a UE in accessing a PLMN's 5GCN via

a) a non-CAG cell if the entry for the PLMN in the UE's "CAG information list" includes an "indication that the UE is only allowed to access 5GS via CAG cells"; or

b) a CAG cell if none of the CAG-ID(s) supported by the CAG cell is authorized based on the "allowed CAG list" for the PLMN in the UE's "CAG information list"

the CAG restrictions are not applied in a PLMN when a UE accesses the PLMN due to emergency services or emergency services fallback

cleartext IEs information elements that can be sent without confidentiality protection in initial NAS messages as specified in subclause 4.4.6

configuration of SNPN subscription parameters in PLMN via the user plane configuration of a UE in a PLMN with one or more entries of the "list of subscriber data” via the user plane

control plane CIoT 5GS optimization signalling optimizations to enable efficient transport of user data (IP ethernet unstructured or SMS) over control plane via the AMF including optional header compression of IP data and ethernet data

current TAI a TAI of a selected PLMN broadcast in the cell on which the UE is camping if the cell is a satellite NG-RAN cell broadcasting multiple TACs of the selected PLMN the UE NAS layer selects the current TAI from these multiple TACs of the selected PLMN as specified in subclause 4.23.5

NOTE 2 for the purpose of this definition the selected PLMN can either be the registered PLMN or a PLMN selected according to PLMN selection rules as specified in 3GPP TS 23.122 [5]

DNN based congestion control type of congestion control at session management level that is applied to reject session management requests from UEs or release PDU sessions when the associated DNN is congested DNN based congestion control can be activated at the SMF over session management level and also activated at the AMF over mobility management level

DNN determined by the AMF if no DNN requested by the UE is provided a DNN determined by the AMF based subscription information or local policy otherwise DNN determined by the AMF is the DNN requested by the UE

DNN requested by the UE a DNN explicitly requested by the UE and included in a NAS request message

DNN selected by the network if DNN replacement applies a DNN selected and indicated to the AMF by PCF otherwise DNN selected by the network is the DNN determined by the AMF

default S-NSSAI an S-NSSAI in the subscribed S-NSSAIs marked as default

emergency PDU session a PDU session established with the request type "initial emergency request" or "existing emergency PDU session"

general NAS level congestion control type of congestion control at mobility management level that is applied at a general overload or congestion situation in the network e.g lack of processing resources

Globally-unique SNPN identity an SNPN identity with an NID whose assignment mode is not set to 1 (see 3GPP TS 23.003 [4])

home country the country of the HPLMN (see 3GPP TS 23.122 [5] for the definition of country)

HPLMN S-NSSAI an S-NSSAI applicable in the HPLMN without any further mapping by the network if the UE has an EHPLMN list which is not empty then the HPLMN S-NSSAIs are applicable without any further mapping in the PLMN whose PLMN code is derived from the IMSI regardless of whether or not this PLMN is included in the EHPLMN list

the UE considers as HPLMN S-NSSAIs at least the following S-NSSAIs

a) any S-NSSAI included in the configured NSSAI or allowed NSSAI for a PLMN or SNPN if it is provided by

1) the PLMN whose PLMN code is derived from the IMSI; or

2) the subscribed SNPN;

b) any S-NSSAI provided as mapped S-NSSAI for the configured NSSAI or allowed NSSAI or partially allowed NSSAI for a PLMN or SNPN;

c) any S-NSSAI associated with a PDU session if there is no mapped S-NSSAI associated with the PDU session and the UE is

1) in the PLMN whose PLMN code is derived from the IMSI; or

2) in the subscribed SNPN; and

d) any mapped S-NSSAI associated with a PDU session

NOTE 3 the above list is not intended to be complete E.g. also in case of PLMN the S-NSSAIs included in URSP rules or in the signalling messages for network slice-specific authentication and authorization are HPLMN S-NSSAIs

in NB-N1 mode indicates this paragraph applies only to a system which operates in NB-N1 mode for a multi-access system this case applies if the current serving radio access network provides access to network services via E-UTRA connected to 5GCN by NB-IoT (see 3GPP TS 36.300 [25B] 3GPP TS 36.331 [25A] 3GPP TS 36.306 [25D])

in WB-N1 mode indicates this paragraph applies only to a system which operates in WB-N1 mode for a multi-access system this case applies if the system operates in N1 mode with E-UTRA connected to 5GCN but not in NB-N1 mode

in WB-N1/CE mode indicates this paragraph applies only when a UE which is a CE mode b capable UE (see 3GPP TS 36.306 [25D]) is operating in CE mode a or b in WB-N1 mode.Initial NAS message a NAS message is considered as an initial NAS message if this NAS message can trigger the establishment of an N1 NAS signalling connection for instance the REGISTRATION REQUEST message is an initial NAS message

initial registration for emergency services a registration performed with 5GS registration type "emergency registration" in the REGISTRATION REQUEST message

initial registration for onboarding services in SNPN a registration performed with 5GS registration type "SNPN onboarding registration" in the REGISTRATION REQUEST message

initial registration for disaster roaming services a registration performed with 5GS registration type "disaster roaming initial registration" in the REGISTRATION REQUEST message

initial small data rate control parameters parameters that if received by the UE during the establishment of a PDU session are used as initial parameters to limit the allowed data for the PDU session according to small data rate control after establishment of a PDU session as described in subclause 6.2.13 at expiry of the associated validity period the initial small data rate control parameters are no longer valid and the small data rate control parameters apply

initial small data rate control parameters for exception data parameters corresponding to initial small data rate control parameters for small data rate control of exception data

last visited registered TAI a TAI which is contained in the registration area that the UE registered to the network and which identifies the tracking area last visited by the UE if the cell is a satellite NG-RAN cell broadcasting multiple TAIs a TAI which is contained in the registration area that the UE registered to the network and last selected by the UE as the current TAI

local release release of a PDU session without peer-to-peer signalling between the network and the UE

NOTE 3A local release can include communication among network entities

mapped 5G-GUTI a 5G-GUTI which is mapped from a 4G-GUTI previously allocated by an MME mapping rules are defined in 3GPP TS 23.003 [4]

mapped S-NSSAI an S-NSSAI in the subscribed S-NSSAIs for the HPLMN or the subscribed SNPN to which an S-NSSAI of the registered PLMN (in case of a roaming scenario) or the registered non-subscribed SNPN is mapped

MBSR-UE a UE that is operating as a MBSR and supporting UE NAS functionalities specified in this specification

mobility registration for disaster roaming services a registration performed with 5GS registration type "disaster roaming mobility registration updating" in the REGISTRATION REQUEST message

MUSIM UE a UE with multiple valid USIMs capable of initiating and maintaining simultaneous separate registration states over 3GPP access with PLMN(s) using identities and credentials associated with those USIMs and supporting one or more of the N1 NAS signalling connection release the paging indication for voice services the reject paging request the paging restriction and the paging timing collision control (see 3GPP TS 23.501 [8])

MWAB broadcasted PLMN or MWAB broadcasted SNPN the term MWAB broadcasted PLMN or MWAB broadcasted SNPN used in the present document corresponds to the term MWAB broadcasted PLMN/SNPN used in 3GPP TS 23.501 [8]

MWAB-UE a UE that is operating as part of MWAB and supporting UE NAS functionalities specified in this specification

N1 mode a mode of a UE allowing access to the 5G core network via the 5G access network

native 4G-GUTI a native GUTI defined in 3GPP TS 24.301 [15]

native 5G-GUTI a 5G-GUTI previously allocated by an AMF

non 5G capable over WLAN (N5CW) device a device that is not capable to operate as a UE supporting NAS signalling with the 5GCN over a WLAN access network however this device may be capable to operate as a UE supporting NAS signalling with 5GCN using the N1 reference point as specified in this specification over 3GPP access an N5CW device may be allowed to access the 5GCN via trusted WLAN access network (TWAN) that supports a trusted WLAN interworking function (TWIF) as specified in 3GPP TS 24.502 [18]

Non-CAG cell an NR cell which does not broadcast any closed access group identity or an E-UTRA cell connected to 5GCN

Non-equivalent PLMN a PLMN which is not an equivalent PLMN

Non-equivalent SNPN an SNPN which is not an equivalent SNPN

Non-globally-unique SNPN identity an SNPN identity with an NID whose assignment mode is set to 1 (see 3GPP TS 23.003 [4])

N1 NAS signalling connection a peer to peer N1 mode connection between UE and AMF an N1 NAS signalling connection is either the concatenation of an RRC connection via the uu reference point and an NG connection via the N2 reference point for 3GPP access or the concatenation of an IPsec tunnel via the NWu reference point and an NG connection via the N2 reference point for non-3GPP access

N5CW device supporting 3GPP access an N5CW device which supports acting as a UE in 3GPP access (i.e which supports NAS over 3GPP access)

N6 PDU session a PDU session established between the UE and the user plane function (UPF) for transmitting the UE's IP data ethernet data or unstructured data related to a specific application

NEF PDU session a PDU session established between the UE and the network exposure function (NEF) for transmitting the UE's unstructured data related to a specific application

network slicing information information stored at the UE consisting of one or more of the following

a) default configured NSSAI for PLMN or SNPN;

b) configured NSSAI for a PLMN or an SNPN;

b1) NSSRG information for the configured NSSAI for a PLMN or an SNPN;

b2) S-NSSAI location validity information for the configured NSSAI for a PLMN or an SNPN;

b3) S-NSSAI time validity information for the configured NSSAI for a PLMN or an SNPN;

c) mapped S-NSSAI(s) for the configured NSSAI for a PLMN or an SNPN;

d) pending NSSAI for a PLMN or an SNPN;

e) mapped S-NSSAI(s) for the pending NSSAI for a PLMN or an SNPN;

f) rejected NSSAI for the current PLMN or SNPN;

g) mapped S-NSSAI(s) for the rejected NSSAI for the current PLMN or an SNPN;

h) rejected NSSAI for the failed or revoked NSSAA;

i) for each access type

1) allowed NSSAI for a PLMN or an SNPN;

2) mapped S-NSSAI(s) for the allowed NSSAI for a PLMN;

3) rejected NSSAI for the current registration area;

4) mapped S-NSSAI(s) for the rejected NSSAI for the current registration area;

5) rejected NSSAI for the maximum number of UEs reached;

6) mapped S-NSSAI(s) for the rejected NSSAI for the maximum number of UEs reached;

7) alternative NSSAI for a PLMN or an SNPN; and

8) on-demand NSSAI for a PLMN or an SNPN; and

j) for 3GPP access type

1) NSAG information for the configured NSSAI for a PLMN or an SNPN;

2) partially allowed NSSAI for a PLMN or an SNPN;

3) mapped S-NSSAI(s) for the partially allowed NSSAI for a PLMN or an SNPN;

4) partially rejected NSSAI for a PLMN or an SNPN; and

5) mapped S-NSSAI(s) for the partially rejected NSSAI for a PLMN or an SNPN;

NG-RAN cell a cell with NG-RAN access technology or satellite NG-RAN access technology

NITZ information network identity and time zone (NITZ) information includes full name for network short name for network local time zone universal time and local time zone network daylight saving time

Non-cleartext IEs information elements that are not cleartext IEs

Non-emergency PDU session any PDU session which is not an emergency PDU session

Non-satellite NG-RAN cell a cell with NG-RAN access technology

onboarding SUCI SUCI derived from onboarding SUPI

onboarding SUPI SUPI with the SUPI format "network specific identifier" containing a network specific identifier or with the SUPI format "IMSI" containing an IMSI derived by a UE in SNPN access operation mode from default UE credentials for primary authentication and used to identify the UE during initial registration for onboarding services in SNPN and while registered for onboarding services in SNPN

On-demand NSSAI a list of on-demand S-NSSAI(s) and optionally slice deregistration inactivity timer per on-demand S-NSSAI

On-demand S-NSSAI an S-NSSAI included in the configured NSSAI that the UE supporting network slice usage control is allowed to request only when this S-NSSAI is used by the UE to establish a PDU session for user data transmission

partially rejected NSSAI indicating the S-NSSAI(s) is rejected by the network in some TA(s) but not all TAs of the registration area each S-NSSAI in the partially rejected NSSAI is associated with a list of TAs where the S-NSSAI is rejected

PDU address an IP address assigned to the UE by the packet data network

PDU session for LADN a PDU session with a DNN associated with an LADN or a PDU session with a DNN and an S-NSSAI associated with an LADN

PDU session with suspended user-plane resources a PDU session for which user-plane resources were established or re-established and for which data radio bearers were suspended when transition to 5GMM-CONNECTED mode with RRC inactive indication

persistent PDU session either a non-emergency PDU session contains a GBR QoS flow with QoS equivalent to QoS of teleservice 11 and where there is a radio bearer associated with that PDU session over 3GPP access or an emergency PDU session where there is a radio bearer associated with that PDU session over 3GPP access

NOTE 4 an example of a persistent PDU session is a non-emergency PDU session which includes 5QI set to 5QI 1 where there is a radio bearer associated with that context

PLMN ID representing the participating operator a PLMN ID broadcasted in the area of indirect network sharing deployment to enable the UE of the participating operator to select it based on the existing PLMN selection procedures as specified in 3GPP TS 23.122 [5] PLMN ID representing the participating operator can be

a) PLMN ID of the HPLMN of UE of the participating operator;

b) PLMN ID of the EHPLMN of UE of the participating operator; or

c) PLMN ID included in the list of equivalent PLMNs when the UE of participating operator registers in the HPLMN (i.e PLMN ID different from the PLMN ID of case a and case b above)

procedure transaction identity an identity which is dynamically allocated by the UE for the UE-requested 5GSM procedures or allocated by the UE or the PCF for the UE policy delivery procedures the procedure transaction identity is released when the procedure is completed but it should not be released immediately

RAT frequency selection priority index a parameter provided by the AMF to the NG-RAN via the N2 reference point the AMF selects an RFSP index for a particular UE based on the subscribed RFSP index the locally configured operator's policies the allowed NSSAI the partially allowed NSSAI the partially rejected NSSAI the rejected NSSAI for the current registration area the pending NSSAI and the UE context information including the UE's usage setting if received during the registration procedure definition derived from 3GPP TS 23.501 [8]

registered for 5GS services with CIoT 5GS optimization a UE is registered for 5GS services with control plane CIoT 5GS optimization or registered for 5GS services with user plane CIoT 5GS optimization

registered for 5GS services with control plane CIoT 5GS optimization a UE supporting CIoT 5GS optimizations is registered for 5GS services and control plane CIoT 5GS optimization along with one or more other CIoT 5GS optimizations have been accepted by the network

registered for 5GS services with user plane CIoT 5GS optimization a UE supporting CIoT 5GS optimizations is registered for 5GS services and user plane CIoT 5GS optimization along with one or more other CIoT 5GS optimizations have been accepted by the network

registered for disaster roaming services a UE is considered as "registered for disaster roaming services" when it has successfully completed initial registration or mobility registration for disaster roaming services

registered for emergency services a UE is considered as "registered for emergency services" when it has successfully completed initial registration for emergency services

registered for onboarding services in SNPN a UE is considered as "registered for onboarding services in SNPN" when it has successfully completed initial registration for onboarding services in SNPN while registered for onboarding services in SNPN services other than the onboarding services are not available

registered PLMN the PLMN on which the UE performed the last successful registration the identity of the registered PLMN (MCC and MNC) is provided to the UE within the GUAMI field of the 5G-GUTI

rejected NSSAI rejected NSSAI for the current PLMN or SNPN rejected NSSAI for the current registration area rejected NSSAI for the failed or revoked NSSAA or rejected NSSAI for the maximum number of UEs reached

NOTE 5 rejected NSSAI for the current PLMN or SNPN rejected NSSAI for the current registration area or rejected NSSAI for the maximum number of UEs reached contains a set of S-NSSAI(s) associated with a PLMN identity or SNPN identity for the current PLMN or SNPN and in roaming scenarios also contains a set of mapped S-NSSAI(s) if available rejected NSSAI for the failed or revoked NSSAA only contains a set of S-NSSAI(s) associated with a PLMN identity or SNPN identity for the HPLMN or RSNPN

rejected NSSAI for the current PLMN or SNPN a set of S-NSSAI(s) which was included in the requested NSSAI by the UE and is sent by the AMF with the rejection cause "S-NSSAI not available in the current PLMN or SNPN"

rejected NSSAI for the current registration area a set of S-NSSAI(s) which was included in the requested NSSAI by the UE and is sent by the AMF with the rejection cause "S-NSSAI not available in the current registration area"

rejected NSSAI for the failed or revoked NSSAA a set of S-NSSAI(s) which is sent by the AMF with the rejection cause "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization"

rejected NSSAI for the maximum number of UEs reached a set of S-NSSAI(s) which was included in the requested NSSAI by the UE and is sent by the AMF with the rejection cause "S-NSSAI not available due to maximum number of UEs reached"

removal of ecall only mode restriction all the limitations as described in 3GPP TS 22.101 [2] for the ecall only mode do not apply any more

satellite NG-RAN cell a cell with satellite NG-RAN access technology

satellite NG-RAN RAT type in case of satellite NG-RAN access RAT types are used to distinguish different types of satellite NG-RAN access as defined in 3GPP TS 38.413 [31] in this version of the specification the defined satellite NG-RAN RAT types are "NR(LEO)" "NR(MEO)" and "NR(GEO)"

selected core network type information a type of core network (EPC or 5GCN) selected by the UE NAS layer in case of an E-UTRA cell connected to both EPC and 5GCN

SNPN access operation mode a UE operating in SNPN access operation mode only selects SNPNs this includes the case when the UE is accessing an SNPN over 3GPP access the case when the UE is accessing an SNPN over non-3GPP access and the case where the UE is accessing SNPN services via a PLMN

NOTE 7 in this release of specification the term "SNPN access operation mode" is the same as the term "SNPN access mode" used in 3GPP TS 23.501 [8]

S-NSSAI based congestion control type of congestion control at session management level that is applied to reject session management requests from UEs or release PDU sessions when the associated S-NSSAI and optionally the associated DNN are congested S-NSSAI based congestion control can be activated at the SMF over session management level and also activated at the AMF over mobility management level

UE configured for high priority access in selected PLMN a UE configured with one or more access identities equal to 1 2 or 11-15 applicable in the selected PLMN as specified in subclause 4.5.2 definition derived from 3GPP TS 22.261 [3]

UE configured for high priority access in selected SNPN a UE configured with one or more access identities equal to 1 2 or 11-15 applicable in the selected SNPN as specified in subclause 4.5.2A

UE operating in single-registration mode in a network supporting N26 interface a UE supporting both N1 mode and S1 mode during the last attach tracking area update (see 3GPP TS 24.301 [15]) or registration procedures the UE has received either a 5GS network feature support IE with IWK N26 bit set to "interworking without N26 interface not supported" or an EPS network feature support IE with IWK N26 bit set to "interworking without N26 interface not supported"

UE supporting CIoT 5GS optimizations a UE that supports control plane CIoT 5GS optimization or user plane CIoT 5GS optimization and one or more other CIoT 5GS optimizations when the UE is in N1 mode

UE supporting UAS services a UE which supports an aerial vehicle such as a drone with an onboard or built-in USIM and is able to perform UE NAS functionalities specified in this specification upper layers of the UE supporting UAS services are responsible for UAS related procedures such as UUAA and C2 authorization for which the NAS layer of the UE supporting UAS services performs the necessary NAS procedures

UE using 5GS services with control plane CIoT 5GS optimization a UE that is registered for 5GS services with the control plane CIOT 5GS optimization accepted by the network

user plane CIoT 5GS optimization signalling optimizations to enable efficient transport of user data (IP ethernet or Unstructured) over the user plane

user plane positioning connection management information (UPP-CMI) the messages defined in clause 6 of 3GPP TS 24.572 [64] that are utilized to manage the user plane connection between the UE and the LMF for LCS-UPP

User-plane resources resources established between the UE and the UPF the user-plane resources consist of one of the following

- user plane radio bearers via the uu reference point a tunnel via the N3 reference point and a tunnel via the N9 reference point (if any) for 3GPP access;

- IPsec tunnels via the NWu reference point a tunnel via the N3 reference point and a tunnel via the N9 reference point (if any) for untrusted non-3GPP access;

- IPsec tunnels via the NWt reference point a tunnel via the N3 reference point and a tunnel via the N9 reference point (if any) for trusted non-3GPP access used by the UE;

- a layer-2 connection via the yt reference point a layer-2 or layer-3 connection via the yw reference point a tunnel via the N3 reference point and a tunnel via the N9 reference point (if any) for trusted non-3GPP access used by the N5CW device;

- W-UP resources via Y4 reference point a tunnel via the N3 reference point and a tunnel via the N9 reference point (if any) for wireline access used by the 5G-RG; and

- L-W-UP resources via Y5 reference point a tunnel via the N3 reference point and a tunnel via the N9 reference point (if any) for wireline access used by the FN-RG

UE policy section identifier a UE policy section identifier (UPSI) is an identifier of a UE policy section which is composed of the MCC and MNC of

- the PLMN ID of a PLMN of the PCF which provides the UE policy section and a UE policy section code (UPSC) assigned by the PCF in that PLMN; or

- the PLMN ID part of an SNPN of the PCF which provides the UE policy section and a UPSC assigned by the PCF in that SNPN

W-AGF acting on behalf of the N5GC device a W-AGF that enables an N5GC device behind a 5G-CRG or an FN-CRG to connect to the 5G core

for the purposes of the present document the following terms and definitions given in 3GPP TS 22.261 [3] apply

disaster roaming

Non-public network

satellite NG-RAN

for the purposes of the present document the following terms and definitions given in 3GPP TS 23.003 [4] apply

5G-GUTI

5G-S-TMSI

5G-TMSI

global line identifier (GLI)

global cable identifier (GCI)

GUAMI

IMEI

IMEISV

IMSI

PEI

SUPI

SUCI

for the purposes of the present document the following terms and definitions given in 3GPP TS 23.122 [5] apply

access technology

CAG selection

CAG-ID authorized based on "Allowed CAG list"

country

EHPLMN

HPLMN

onboarding services in SNPN

registered SNPN

selected PLMN

selected SNPN

shared network

SNPN identity

steering of roaming SNPN selection information (SOR-SNPN-SI)

steering of roaming SNPN selection information for localized services in SNPN (SOR-SNPN-SI-LS)

steering of roaming (SOR)

steering of roaming connected mode control information (SOR-CMCI)

steering of roaming information

subscribed SNPN

suitable cell

UE determined PLMN with disaster condition

VPLMN

for the purposes of the present document the following terms and definitions given in 3GPP TS 23.167 [6] apply

ecall over IMS

for the purposes of the present document the following terms and definitions given in 3GPP TS 23.216 [6A] apply

SRVCC

for the purposes of the present document the following terms and definitions given in 3GPP TS 23.401 [7] apply

ecall only mode

for the purposes of the present document the following terms and definitions given in 3GPP TS 23.501 [8] apply

5G access network

5G core network

5G QoS flow

5G QoS identifier

5G-RG

5G-BRG

5G-CRG

5G system

5G VN group

allowed area

allowed NSSAI

alternative S-NSSAI

AMF region

AMF set

closed access group

configured NSSAI

credentials holder (CH)

default credentials server (DCS)

group ID for network selection (GIN)

hosting operator

IAB-node

indirect network sharing

local area data network

mobile base station relay

mobile gNB with wireless access backhauling (MWAB)

N3QAI

network identifier (NID)

network slice

network slice area of service

NG-RAN

Non-allowed area

onboarding standalone Non-Public network

partially allowed NSSAI

participating operator

PDU connectivity service

PDU session

PDU session type

PDU set

PEGC

PEMC

pending NSSAI

PIN

PIN direct communication

PIN indirect communication

PIN-DN communication

PINE

requested NSSAI

routing indicator

service data flow

service gap control

serving PLMN rate control

small data rate control status

SNPN-enabled UE

(S)RTP multiplexed media information

Stand-alone Non-Public network

time sensitive communication

time sensitive communication and time synchronization function

UE-DS-TT residence time

UE-Slice-MBR

UE presence in LADN service area

for the purposes of the present document the following terms and definitions given in 3GPP TS 23.503 [10] apply

UE local configuration

VPLMN specific (VPS) URSP

for the purposes of the present document the following terms and definitions given in 3GPP TS 24.008 [12] apply

A/Gb mode

GMM

GPRS

iu mode

MM

Non-GPRS

for the purposes of the present document the following terms and definitions given in 3GPP TS 24.301 [15] apply

CIoT EPS optimization

control plane CIoT EPS optimization

EENLV

EMM

EMM-DEREGISTERED

EMM-DEREGISTERED-INITIATED

EMM-IDLE mode

EMM-NULL

EMM-REGISTERED

EMM-REGISTERED-INITIATED

EMM-SERVICE-REQUEST-INITIATED

EMM-TRACKING-AREA-UPDATING-INITIATED

EPS

EPS security context

EPS services

lower layer failure

megabit

message header

NAS signalling connection recovery

NB-S1 mode

Non-EPS services

S1 mode

user plane CIoT EPS optimization

WB-S1 mode

for the purposes of the present document the following terms and definitions given in 3GPP TS 33.501 [24] apply

5G security context

5G NAS security context

ABBA

current 5G NAS security context

default UE credentials for primary authentication

default UE credentials for secondary authentication

full native 5G NAS security context

K'AME

KAMF

KASME

mapped 5G NAS security context

mapped security context

native 5G NAS security context

NCC

Non-current 5G NAS security context

partial native 5G NAS security context

RES\*

for the purposes of the present document the following terms and definitions given in 3GPP TS 38.413 [31] apply

NG connection

user location information

for the purposes of the present document the following terms and definitions given in 3GPP TS 24.587 [19B] apply

E-UTRA-PC5

NR-PC5

V2X

for the purposes of the present document the following terms and its definitions given in 3GPP TS 23.256 [6AB] apply

3GPP UAV ID

CAA (Civil aviation Administration)-Level UAV identity

command and control (C2) communication

direct C2 communication

No-transmit zone (NTZ)

UAV controller (UAV-C)

UAS services

UAS service supplier (USS)

uncrewed aerial system (UAS)

USS communication

UUAA

UUAA-MM

UUAA-SM

for the purposes of the present document the following terms and definitions given in 3GPP TS 24.554 [19E] apply

5G ProSe

for the purposes of the present document the following terms and definitions given in 3GPP TS 23.548 [10A] apply

edge application server

edge DNS client

for the purposes of the present document the following terms and definitions given in 3GPP TS 24.526 [19] apply

Non-subscribed SNPN signalled URSP

PLMN generic (PG) URSP

VPLMN specific (VPS) URSP of the RPLMN

VPLMN specific (VPS) URSP of the equivalent PLMN of the RPLMN

for the purposes of the present document the following terms and definitions given in 3GPP TS 24.577 [60] apply

A2X

for the purposes of the present document the following terms and definitions given in 3GPP TS 24.514 [62] apply

A2XP

RSLPP

for the purposes of the present document the following terms and definitions given in 3GPP TS 23.316 [6D] apply

authenticable Non-3GPP (AUN3) device

Non-Authenticable Non-3GPP (NAUN3) device

for the purposes of the present document the following terms and definitions given in 3GPP TS 23.586 [63] apply

SL positioning server UE

for the purposes of the present document the following terms and definitions given in 3GPP TS 38.300 [27] apply

NCR-MT

for the purposes of the present document the following terms and definitions given in 3GPP TS 24.572 [64] apply

LCS-UPP

# 4 general

## 4.1 overview

the non-access stratum (NAS) described in the present document forms the highest stratum of the control plane between the UE and the AMF (reference point "N1" see 3GPP TS 23.501 [8]) for both 3GPP and non-3GPP access

main functions of the protocols that are part of the NAS are

a) support of mobility of the user equipment (UE) including also common procedures such as authentication identification generic UE configuration update and security mode control procedures;

b) support of session management procedures to establish and maintain data connectivity between the UE and the data network; and

c) NAS transport procedure to provide a transport of SMS LPP SLPP LCS UPP-CMI container UE policy container SOR transparent container and UE parameters update information payload

principles for the handing of 5GS security contexts and for the activation of ciphering and integrity protection when a NAS signalling connection is established are provided in subclause 4.4

for the support of the above functions the following procedures are supplied within this specification

a) elementary procedures for 5GS mobility management in clause 5; and

b) elementary procedures for 5GS session management in clause 6

signalling procedures for the control of NAS security are described as part of the 5GMM common procedures in subclause 5.4

complete NAS transactions consist of specific sequences of elementary procedures examples of such specific sequences can be found in 3GPP TS 23.502 [9]

the NAS for 5GS follows the protocol architecture model for layer 3 as described in 3GPP TS 24.007 [11]

## 4.2 coordination between the protocols for 5GS mobility management and 5GS session management

a 5GS session management (5GSM) message is piggybacked in specific 5GS mobility management (5GMM) transport messages to this purpose the 5GSM messages can be transmitted in an information element in the 5GMM transport messages in this case the UE the AMF and the SMF execute the 5GMM procedure and the 5GSM procedure in parallel the success of the 5GMM procedure is not dependent on the success of the piggybacked 5GSM procedure

the UE can only initiate the 5GSM procedure when there is a 5GMM context established at the UE

during 5GMM procedures the UE and the AMF shall suspend the transmission of 5GSM messages except when

a) the 5GMM procedure is piggybacking 5GSM messages; or

b) the UE is in 5GMM-CONNECTED mode and a service request procedure for re-establishing user-plane resources of PDU session(s) is initiated without including PDU session status IE or allowed PDU session status IE in this case the UE and the AMF need not suspend the transmission of 5GSM messages related to other PDU session(s) than the one(s) for which the user- plane resources re-establishment is requested

if the UE determines to locally release the N1 NAS signalling connection upon receiving an SOR transparent container during a registration procedure as specified in 3GPP TS 23.122 [5] subclause C.2 the UE shall suspend the transmission of 5GSM messages after sending the REGISTRATION COMPLETE message and until the N1 NAS signalling connection is released to obtain service on a higher priority PLMN with the exception of the case when the UE has an emergency PDU session

a 5GMM message piggybacking a 5GSM message for a PDU session shall be delivered via the access associated with the PDU session if any with the following exceptions

a) the AMF shall send via 3GPP access a DL NAS TRANSPORT message piggybacking a downlink 5GSM message of a network-requested 5GSM procedure for a PDU session associated with non-3GPP access if the conditions specified in subclause 5.5.1.3.4 or subclause 5.6.1.4 are met;

b) the UE shall send an UL NAS TRANSPORT message piggybacking a response message to the 5GSM message described in a) via either

1) 3GPP access; or

2) non-3GPP access if the UE is in 5GMM-CONNECTED mode over non-3GPP access; and

NOTE the interaction between the 5GMM sublayer and the 5GSM sublayer to enable the UE to send the UL NAS TRANSPORT message containing the response message via 3GPP access is required this is achieved via UE implementation

c) the UE shall send via the target access an UL NAS TRANSPORT message piggybacking a 5GSM message associated with a request type set to "existing PDU session" or "existing emergency PDU session" for handover of an existing PDU session between 3GPP access and non-3GPP access

a 5GMM message piggybacking a 5GSM message as a response message to a request message associated with an MA PDU session shall be delivered via the same access that the initial message was received

## 4.2A controlling of UE access technology utilization by 5GS

the network operator may restrict subscriber's access to certain access technologies for this purpose the network may send the RAT utilization control information to the UE to provide RAT utilization control information for the current PLMN or for the current PLMN and its equivalent PLMN(s) via the REGISTRATION ACCEPT message (see subclause 5.5.1.2 and clause 5.5.1.3) the CONFIGURATION UPDATE COMMAND message (see subclause 5.4.4.2) the REGISTRATION REJECT message (see subclause 5.5.1.2.5 and subclause 5.5.1.3.5) and the DEREGISTRATION REQUEST message (see subclause 5.5.2.3.1) the RAT utilization control information is applied in PLMN selection procedures as specified in 3GPP TS 23.122 [5]

Editor's note how does the UE handle the received information of restricted RAT indicated in the RAT utilization control IE is FFS

the UE shall store the received RAT utilization control information together with the PLMN identity of the current PLMN in the list of "PLMNs with associated RAT restrictions" (see 3GPP TS 23.122 [6]) the same list is used by 5GMM EMM GMM and MM when the UE is switched off it shall keep the stored list so that it can be used after switch on the UE shall delete the stored list if the USIM is removed the number of entries that the ME can store in the list of "PLMNs with associated RAT restrictions" is implementation specific but it shall be at least one

## 4.3 UE domain selection

### 4.3.1 UE's usage setting

the UE's usage setting defined in 3GPP TS 24.301 [15] applies to voice capable UEs in 5GS and indicates whether the UE has preference for voice services over data services or vice-versa where

a) voice services include IMS voice; and

b) data services include any kind of user data transfer without a voice media component

the UE's usage setting can be set to

a) "voice centric"; or

b) "data centric"

if the UE is capable of S1 mode there is a single UE's usage setting at the UE which applies to both 5GS and EPS

### 4.3.2 domain selection for UE originating sessions / calls

the behaviour of the UE for domain selection is determined by

a) the UE usage setting;

b) the availability of IMS voice; and

c) whether the UE operates in single-registration mode or dual-registration mode (see 3GPP TS 23.501 [8])

in the present document the condition "the UE supports IMS voice over 3GPP access" evaluates to "true" if at least one of the following is fulfilled

1) the UE supports IMS voice over NR connected to 5GCN;

2) the UE supports IMS voice over E-UTRA connected to 5GCN; or

3) the UE supports IMS voice in EPS

in the present document the condition "the UE does not support IMS voice over 3GPP access" evaluates to "true" if the condition "the UE supports IMS voice over 3GPP access" evaluates to "false"

in the present document the condition "the UE supports IMS voice over non-3GPP access" evaluates to "true" if the UE supports IMS voice over non-3GPP access connected to 5GCN

in the present document the condition "the UE does not support IMS voice over non-3GPP access" evaluates to "true" if the condition "the UE supports IMS voice over non-3GPP access" evaluates to "false"

in the present document "IMS voice not available" is determined per access type independently i.e 3GPP access or non-3GPP access

in the present document "IMS voice not available" refers to one of the following conditions

a) the UE does not support IMS voice;

b) the UE supports IMS voice but the network indicates in the REGISTRATION ACCEPT message that IMS voice over PS sessions are not supported; or

c) the UE supports IMS voice the network indicates in the REGISTRATION ACCEPT message that IMS voice over PS sessions are supported but the upper layers

1) provide no indication that the UE is available for voice call in the IMS within a manufacturer determined period of time; or

2) indicate that the UE is not available for voice calls in the IMS

NOTE 1 if conditions a and b evaluate to false the upper layers need time to attempt IMS registration in the event an indication from the upper layers that the UE is available for voice calls in the IMS takes longer than the manufacturer determined period of time (e.g due to delay when attempting IMS registration or due to delay in obtaining a QoS flow for SIP signalling) the NAS layer assumes the UE is not available for voice calls in the IMS

other conditions may exist but these are implementation specific

in the present document "IMS voice available" applies when "IMS voice not available" does not apply

when IMS voice is not available over NG-RAN access (i.e over non-satellite NG-RAN cells) if the UE's usage setting is "voice centric" the UE operates in single-registration mode and the UE

a) does not have a persistent PDU session and

1) if the UE is only registered over 3GPP access or if the UE is registered over both 3GPP access and non-3GPP access and IMS voice is not available over non-3GPP access the UE shall disable the N1 mode capability for 3GPP access and proceed as specified in subclause 4.9.2 with modifications described below; or

2) if the UE is registered over both 3GPP access and non-3GPP access and IMS voice is available over non-3GPP access the UE may disable the N1 mode capability for 3GPP access and proceed as specified in subclause 4.9.2 with modifications described below; or

b) has a persistent PDU session then the UE waits until the radio bearer associated with the persistent PDU session has been released when the radio bearer associated with the persistent PDU session has been released then

1) if the UE is only registered over 3GPP access or if the UE is registered over both 3GPP access and non-3GPP access and IMS voice is not available over non-3GPP access,the UE shall disable the N1 mode capability for 3GPP access and proceed as specified in subclause 4.9.2 with modifications described below; or

2) if the UE is registered over both 3GPP access and non-3GPP access and IMS voice is available over non-3GPP access the UE may disable the N1 mode capability for 3GPP access and proceed as specified in subclause 4.9.2 with modifications described below

when IMS voice is not available over satellite NG-RAN access if the UE's usage setting is "voice centric" the UE operates in single-registration mode and the UE

a) does not have a persistent PDU session then the UE shall disable the satellite NG-RAN capability and proceed as specified in subclause 4.9.4; or

b) has a persistent PDU session then the UE waits until the radio bearer associated with the persistent PDU session has been released when the radio bearer associated with the persistent PDU session has been released then the UE shall disable the satellite NG-RAN capability and proceed as specified in subclause 4.9.4

NOTE 2 in some cases where the PLMN in N1 mode is only available over satellite NG-RAN e.g unique satellite PLMN ID the UE as an implementation option may disable the N1 mode capability for 3GPP access instead of disabling satellite NG-RAN capability

the following modifications are applied to the procedure in subclause 4.9.2 for disabling the N1 mode capability for 3GPP access if the UE's usage setting is "voice centric" and the UE operates in single-registration mode

a) in item a) of subclause 4.9.2 the UE shall attempt to select an E-UTRA cell connected to EPC if such a cell is found the UE shall then perform voice domain selection procedures as defined in 3GPP TS 24.301 [15]; and

b) in item b) of subclause 4.9.2 if an E-UTRA cell connected to EPC cannot be found the UE shall attempt to select another supported radio access technology which supports voice services

when IMS voice is not available over non-3GPP access if the UE's usage setting is "voice centric" and the UE operates in single-registration mode then

a) if the UE is only registered over non-3GPP access the UE shall disable the N1 mode capability for non-3GPP access (see subclause 4.9.3); or

b) if the UE is registered over both 3GPP access and non-3GPP access and IMS voice is not available also over 3GPP access the UE may disable the N1 mode capability for non-3GPP access (see subclause 4.9.3)

NOTE 3 the UE can register over 3GPP access in another mode e.g. S1 mode for voice service and in this case the UE can keep the N1 mode capability for non-3GPP access enabled

### 4.3.3 change of UE's usage setting

if the UE operates in single-registration mode whenever the UE's usage setting changes the UE shall execute procedures according to table 4.3.3.1

table 4.3.3.1 change of UE's usage setting for a UE in single-registration mode

|  |  |  |  |
| --- | --- | --- | --- |
| UE's usage setting change | | Procedure to execute | |
| From "data centric" to "voice centric" and "IMS voice not available" over NG-RAN access only | | Disable the N1 mode capability for 3GPP access (see subclause 4.9.2), if the UE is only registered over 3GPP access (NOTE) | |
| From "data centric" to "voice centric" and "IMS voice not available" over satellite NG-RAN | | Disable the satellite NG-RAN capability for 3GPP access (see subclause 4.9.4). | |
| From "data centric" to "voice centric", and "IMS voice not available" over both NG-RAN access and non-3GPP access | | Disable the N1 mode capability for 3GPP access (see subclause 4.9.2) and non-3GPP access (see subclause 4.9.3), if the UE is registered over both 3GPP access and non-3GPP access  Disable the N1 mode capability for 3GPP access (see subclause 4.9.2), if the UE is only registered over 3GPP access.  Disable the N1 mode capability for non-3GPP access (see subclause 4.9.3), if the UE is only registered over non-3GPP access.  (NOTE) | |
| From "voice centric" to "data centric" and the N1 mode capability for 3GPP access is disabled at the UE due to "IMS voice not available" | | Re-enable the N1 mode capability for 3GPP access (see subclause 4.9.2) | |
| From "voice centric" to "data centric" and satellite NG-RAN capability is disabled at the UE due to "IMS voice not available" | | Re-enable the satellite NG-RAN capability for 3GPP access (see subclause 4.9.4). | |
| From "data centric" to "voice centric" and "IMS voice not available" over non-3GPP access only | | Disable the N1 mode capability for non-3GPP access (see subclause 4.9.3), if the UE is only registered over non-3GPP access | |
| From "voice centric" to "data centric", and the N1 mode capability for non-3GPP access is disabled at the UE due to "IMS voice not available" | | Re-enable the N1 mode capability for non-3GPP access (see subclause 4.9.3) | |
| NOTE: If the UE is registered over 3GPP access and has a persistent PDU session, then the UE waits until the radio bearer associated with the persistent PDU session has been released. | | | |

### 4.3.4 change or determination of IMS voice availability

if the UE operates in single-registration mode whenever the IMS voice availability is determined or changes the UE shall execute procedures according to table 4.3.4.1

table 4.3.4.1 change of IMS voice availability for a UE in single-registration mode

|  |  |
| --- | --- |
| Change of IMS voice available condition | Procedure to execute |
| "IMS voice not available" over NG-RAN access only and the UE's usage setting is "voice centric" | Disable the N1 mode capability for 3GPP access, if the UE is only registered over 3GPP access (see subclause 4.9.2). (NOTE 2) |
| "IMS voice not available" over satellite NG-RAN and the UE's usage setting is "voice centric" | | Disable the satellite NG-RAN capability. |
| "IMS voice not available" over non-3GPP access only and the UE's usage setting is "voice centric" | Disable the N1 mode capability for non-3GPP access (see subclause 4.9.3), if the UE is only registered over non-3GPP access. (NOTE 2) |
| "IMS voice not available" over both NG-RAN access and non-3GPP access, and the UE's usage setting is "voice centric" | Disable the N1 mode capability for 3GPP access (see subclause 4.9.2) and non-3GPP access (see subclause 4.9.3), if the UE is registered over both 3GPP access and non-3GPP access.  Disable the N1 mode capability for 3GPP access (see subclause 4.9.2), if the UE is only registered over 3GPP access  Disable the N1 mode capability for non-3GPP access (see subclause 4.9.3), if the UE is only registered over non-3GPP access.  (NOTE 1, NOTE 2) |
| NOTE 1: If the UE is registered over 3GPP access and has a persistent PDU session, then the UE waits until the radio bearer associated with the persistent PDU session has been released.  NOTE 2: If the UE determines "IMS voice not available" upon receipt of a 5GS session management reject message including a back-off timer value, and the re-attempt indicator indicates that the UE is not allowed to re-attempt the procedure in S1 mode then, upon inter-system change from N1 mode to S1 mode, the UE proceeds as specified in 3GPP TS 24.301 [15], subclause 4.3.2.4, Change or determination of IMS registration status. | |

## 4.4 NAS security

### 4.4.1 general

this clause describes the principles for the handling of 5G NAS security contexts in the UE and in the AMF the procedures used for the security protection of NAS messages between the UE and the AMF and the procedures used for the protection of NAS IEs between the UE and the UDM security protection involves integrity protection and ciphering of the 5GMM messages 5GSM messages are security protected indirectly by being piggybacked by the security protected 5GMM messages (i.e UL NAS TRANSPORT message and the DL NAS TRANSPORT message)

the signalling procedures for the control of NAS security are part of the 5GMM protocol and are described in detail in clause 5

NOTE the use of ciphering in a network is an operator option in this subclause for the ease of description it is assumed that ciphering is used unless explicitly indicated otherwise operation of a network without ciphering is achieved by configuring the AMF so that it always selects the "null ciphering algorithm" 5G-EA0

### 4.4.2 handling of 5G NAS security contexts

#### 4.4.2.1 general

##### 4.4.2.1.1 establishment of 5G NAS security context

the security parameters for authentication integrity protection and ciphering are tied together in a 5G NAS security context and identified by a key set identifier (ngKSI) the relationship between the security parameters is defined in 3GPP TS 33.501 [24]

before security can be activated the AMF and the UE need to establish a 5G NAS security context usually the 5G NAS security context is created as the result of a primary authentication and key agreement procedure between the AMF and the UE a new 5G NAS security context may also be created during an N1 mode to N1 mode handover alternatively during inter-system change from S1 mode to N1 mode the AMF not supporting interworking without N26 and the UE operating in single-registration mode may derive a mapped 5G NAS security context from an EPS security context that has been established while the UE was in S1 mode

the 5G NAS security context is taken into use by the UE and the AMF when the AMF initiates a security mode control procedure during an N1 mode to N1 mode handover or during the inter-system change procedure from S1 mode to N1 mode the 5G NAS security context which has been taken into use by the network most recently is called current 5G NAS security context this current 5G NAS security context can be of type native or mapped i.e originating from a native 5G NAS security context or mapped 5G NAS security context

the key set identifier ngKSI is assigned by the AMF either during the primary authentication and key agreement procedure or for the mapped 5G NAS security context during the inter-system change the ngKSI consists of a value and a type of security context parameter indicating whether a 5G NAS security context is a native 5G NAS security context or a mapped 5G NAS security context when the 5G NAS security context is a native 5G NAS security context the ngKSI has the value of KSIAMF and when the current 5G NAS security context is of type mapped the ngKSI has the value of KSIASME

the 5G NAS security context which is indicated by an ngKSI can be taken into use to establish the secure exchange of NAS messages when a new N1 NAS signalling connection is established without executing a new primary authentication and key agreement procedure (see subclause 5.4.1) or when the AMF initiates a security mode control procedure for this purpose the initial NAS messages (i.e REGISTRATION REQUEST DEREGISTRATION REQUEST SERVICE REQUEST and CONTROL PLANE SERVICE REQUEST) and the SECURITY MODE COMMAND message contain an ngKSI in the ngKSI IE indicating the current 5G NAS security context used to integrity protect the NAS message

in the present document when the UE is required to delete an ngKSI the UE shall set the ngKSI to the value "no key is available" and consider also the associated keys KAMF or K'AMF 5G NAS ciphering key and 5G NAS integrity key invalid (i.e the 5G NAS security context associated with the ngKSI as no longer valid) in the initial registration procedure when the key KAUSF is invalid the UE shall delete the ngKSI

NOTE in some specifications the term ciphering key sequence number might be used instead of the term key set identifier (KSI)

as described in subclause 4.8 in order to interwork with E-UTRAN connected to EPC the UE supporting both S1 mode and N1 mode can operate in either single-registration mode or dual-registration mode a UE operating in dual-registration mode shall independently maintain and use both EPS security context (see 3GPP TS 24.301 [15]) and 5G NAS security context when the UE operating in dual-registration mode performs an EPS attach procedure it shall take into use an EPS security context and follow the handling of this security context as specified in 3GPP TS 24.301 [15] however when the UE operating in dual-registration mode performs an initial registration procedure it shall take into use a 5G NAS security context and follow the handling of this security context as described in the present specification

the UE and the AMF need to be able to maintain two 5G NAS security contexts simultaneously i.e a current 5G NAS security context and a non-current 5G NAS security context since

a) after a 5G re-authentication the UE and the AMF can have both a current 5G NAS security context and a non-current 5G NAS security context which has not yet been taken into use (i.e a partial native 5G NAS security context); and

b) after an inter-system change from S1 mode to N1 mode the UE and the AMF can have both a mapped 5G NAS security context which is the current 5G NAS security context and a non-current native 5G NAS security context that was created during a previous access in N1 mode

the number of 5G NAS security contexts that need to be maintained simultaneously by the UE and the AMF is limited by the following requirements

a) after a successful 5G (re-)authentication which creates a new partial native 5G NAS security context the AMF and the UE shall delete the non-current 5G NAS security context if any;

b) when a partial native 5G NAS security context is taken into use through a security mode control procedure the AMF shall delete the previously current 5G NAS security context if the UE does not support multiple records of NAS security context storage for multiple registration (see 3GPP TS 31.102 [22]) the UE shall delete the previously current 5G NAS security context if the UE supports multiple records of NAS security context storage for multiple registration the UE shall

1) replace the previously current 5G NAS security context stored in the first 5G security context of that access (see 3GPP TS 31.102 [22]) with the new 5G security context (taken into use through a security mode control procedure) when the UE activates the new 5G security context for the same PLMN and access;

1a) replace the previously current 5G NAS security context stored in the first 5G security context of that access (see 3GPP TS 31.102 [22]) with the new 5G security context (taken into use through a security mode control procedure) when the UE activates the new 5G security context for a different PLMN over that access but the previously current 5G NAS security context is not associated with the 5G-GUTI of the other access; or

2) store the previously current 5G NAS security context in the second 5G security context of that access (see 3GPP TS 31.102 [22]) and store the new 5G security context (taken into use through a security mode control procedure) in the first 5G security context when the UE activates the new 5G security context for a different PLMN over that access but the previously current 5G NAS security context is associated with the 5G-GUTI of the other access;

c) when the AMF and the UE create a 5G NAS security context using "null integrity protection algorithm" and "null ciphering algorithm" during an initial registration procedure for emergency services or a registration procedure for mobility and periodic registration update for a UE that has an emergency PDU session (see subclause 5.4.2.2) the AMF and the UE shall delete the previous current 5G NAS security context the UE shall not update the USIM and non-volatile ME memory with the current 5G NAS security context and shall delete the current 5G NAS security context when the UE is deregistered from emergency services (e.g before registering for normal service);

d) when a new mapped 5G NAS security context or 5G NAS security context created using "null integrity protection algorithm" and "null ciphering algorithm" is taken into use during the inter-system change from S1 mode to N1 mode the AMF and the UE shall not delete the previously current native 5G NAS security context if any instead the previously current native 5G NAS security context shall become a non-current native 5G NAS security context and the AMF and the UE shall delete any partial native 5G NAS security context;

if no previously current native 5G NAS security context exists the AMF and the UE shall not delete the partial native 5G NAS security context if any;

e) when the AMF and the UE derive a new mapped 5G NAS security context during inter-system change from S1 mode to N1 mode the AMF and the UE shall delete any existing current mapped 5G NAS security context;

f) when a non-current full native 5G NAS security context is taken into use by a security mode control procedure then the AMF and the UE shall delete the previously current mapped 5G NAS security context;

g) when the UE or the AMF moves from 5GMM-REGISTERED to 5GMM-DEREGISTERED state if the current 5G NAS security context is a mapped 5G NAS security context and a non-current full native 5G NAS security context exists then the non-current 5G NAS security context shall become the current 5G NAS security context furthermore the UE and the AMF shall delete any mapped 5G NAS security context or partial native 5G NAS security context

h) when the UE operating in single-registration mode in a network supporting N26 interface performs an inter-system change from N1 mode to S1 mode

1) if the UE has a mapped 5G NAS security context and the inter-system change is performed in

i) 5GMM-IDLE mode the UE shall delete the mapped 5G NAS security context after the successful completion of the tracking area update procedure or attach procedure (see 3GPP TS 24.301 [15]); or

ii) 5GMM-CONNECTED mode the UE shall delete the mapped 5G NAS security context after the completion of the inter-system change

after deletion of the mapped 5G NAS security context if the UE has a non-current full native 5G NAS security context then the non-current full native 5G NAS security context shall become the current full native 5G NAS security context; and

i) when the UE operating in single-registration mode in a network supporting N26 interface performs an inter-system change from S1 mode to N1 mode in 5GMM-IDLE mode if the UE has a non-current full native 5G NAS security context then the UE shall make the non-current full native 5G NAS security context as the current native 5G NAS security context the UE shall delete the mapped 5G NAS security context if any

##### 4.4.2.1.2 UE leaving state 5GMM-DEREGISTERED

if the UE is capable of registration over a single access only the UE shall mark the 5G NAS security context on the USIM or in the non-volatile memory as invalid when the UE initiates an initial registration procedure as described in subclause 5.5.1.2 or when the UE leaves state 5GMM-DEREGISTERED for any other state except 5GMM-NULL

if the UE is capable of registration over both 3GPP access and non-3GPP access and was last registered on the same PLMN over both 3GPP access and the non-3GPP access the UE in the state 5GMM-DEREGISTERED over both 3GPP access and non-3GPP access shall mark the 5G NAS security contexts in record 1 of the 3GPP access and the non-3GPP access on the USIM or in the non-volatile memory as invalid when the UE initiates an initial registration procedure over either 3GPP access or non-3GPP access as described in subclause 5.5.1.2 or when the UE leaves state 5GMM-DEREGISTERED for any other state except 5GMM-NULL over either 3GPP access or non-3GPP access

##### 4.4.2.1.3 UE entering state 5GMM-DEREGISTERED

if the UE is capable of registration over a single access only the UE shall store the current native 5G NAS security context on the USIM or in the non-volatile memory and mark it as valid only when the UE enters state 5GMM-DEREGISTERED from any other state except 5GMM-NULL or when the UE aborts the initial registration procedure without having left 5GMM-DEREGISTERED

if the UE is capable of registration over both 3GPP access and non-3GPP access and is registered on the same PLMN over both 3GPP access and the non-3GPP access the UE shall store the current native 5G NAS security contexts of the 3GPP access and the non-3GPP access as specified in annex c and mark them as valid only when the UE enters state 5GMM-DEREGISTERED from any other state except 5GMM-NULL over both the 3GPP access and non-3GPP access or only when the UE aborts the initial registration procedure without having left 5GMM-DEREGISTERED over both the 3GPP access and non-3GPP access

#### 4.4.2.2 establishment of a mapped 5G NAS security context during inter-system change from S1 mode to N1 mode in 5GMM-CONNECTED mode

in order for the UE operating in single-registration mode in a network supporting N26 interface to derive a mapped 5G NAS security context for an inter-system change from S1 mode to N1 mode in 5GMM-CONNECTED mode the AMF shall construct a mapped 5G NAS security context from the EPS security context received from the source MME as indicated in 3GPP TS 33.501 [24] the AMF shall select the 5G NAS security algorithms and derive the 5G NAS keys (i.e KNASenc and KNASint) the AMF shall define an ngKSI for the newly derived K'AMF key such that the value field is taken from the eKSI of the KASME key and the type field is set to indicate a mapped security context and associate this ngKSI with the newly created mapped 5G NAS security context the AMF shall then include the message authentication code selected NAS algorithms NCC and generated ngKSI in the S1 mode to N1 mode NAS transparent container IE (see subclause 9.11.2.9)

when the UE operating in single-registration mode in a network supporting N26 interface receives the command to perform inter-system change to N1 mode in 5GMM-CONNECTED mode the UE shall derive a mapped K'AMF as indicated in 3GPP TS 33.501 [24] using the KASME from the EPS security context furthermore the UE shall also derive the 5G NAS keys from the mapped K'AMF using the selected NAS algorithm identifiers included in the S1 mode to N1 mode NAS transparent container IE and associate this mapped 5G NAS security context with the ngKSI value received the UE shall then verify the received NAS MAC in case the received NAS MAC is not verified successfully (see subclause 4.4.3.3) the UE shall discard the content of the received S1 mode to N1 mode NAS transparent container IE and inform the lower layers that the received S1 mode to N1 mode NAS transparent container is invalid

when the UE operating in single-registration mode in a network supporting N26 interface has a PDN connection for emergency bearer services and has no current EPS security context the AMF shall set 5G-IA0 and 5G-EA0 as the selected 5G NAS security algorithms in the S1 mode to N1 mode NAS transparent container IE the AMF shall create a locally generated K'AMF the AMF shall set the ngKSI value of the associated security context to "000" and the type of security context flag to "mapped security context" in the S1 mode to N1 mode NAS transparent container IE

when the UE operating in single-registration mode in a network supporting N26 interface receives the command to perform inter-system change to N1 mode in 5GMM-CONNECTED mode (see 3GPP TS 38.331 [30]) and has a PDN connection for emergency bearer services if 5G-IA0 and 5G-EA0 as the selected 5G NAS security algorithms are included in the S1 mode to N1 mode NAS transparent container IE the UE shall create a locally generated K'AMF furthermore the UE shall set the ngKSI value of the associated security context to the KSI value received

after the new mapped 5G NAS security context is taken into use for the 3GPP access following a successful inter system change from S1 mode to N1 mode in 5GMM-CONNECTED mode and the UE is registered with the same PLMN over the 3GPP access and non-3GPP access

a) if a native 5G NAS security context is used on the non-3GPP access and

1) the UE is in 5GMM-IDLE mode over non-3GPP access then the AMF and the UE shall activate and take into use the new mapped 5G NAS security context on the 3GPP access for the non-3GPP access as described in 3GPP TS 33.501 [24] after the AMF sends or the UE receives the REGISTRATION ACCEPT message respectively the UE and AMF shall keep the native 5G NAS security context which was used on the non-3GPP access and make it a non-current native 5G NAS security context the non-current native 5G NAS security context may be re-activated later using the security mode control procedure; or

2) the UE is in 5GMM-CONNECTED mode over non-3GPP access in order to activate the native 5G NAS security context over the 3GPP access that is active on the non-3GPP access the AMF shall send the SECURITY MODE COMMAND message over the 3GPP access as described in 3GPP TS 33.501 [24] the SECURITY MODE COMMAND message shall include the same ngKSI to identify the native 5G NAS security context that is used on the non-3GPP access; or

b) if a mapped 5G NAS security context is used on the non-3GPP access and

1) the UE is in 5GMM-IDLE mode over non-3GPP access the AMF and the UE shall activate and take into use the new mapped 5G NAS security context active on the 3GPP access for the non-3GPP access as described in 3GPP TS 33.501 [24] after the AMF sends or the UE receives the REGISTRATION ACCEPT message respectively; or

2) the UE is in 5GMM-CONNECTED mode over non-3GPP access in order to activate the same mapped 5G NAS security context over one access that is used on the other access the AMF shall send the SECURITY MODE COMMAND message over one-access as described in 3GPP TS 33.501 [24] the SECURITY MODE COMMAND message shall include the same ngKSI to identify the mapped 5G NAS security context that is used over the other access

if the inter-system change from S1 mode to N1 mode in 5GMM-CONNECTED mode is not completed successfully the AMF and the UE operating in single-registration mode in a network supporting N26 interface shall delete the new mapped 5G NAS security context

#### 4.4.2.3 establishment of a 5G NAS security context during N1 mode to N1 mode handover

during an N1 mode to N1 mode handover the target AMF may derive a new 5G NAS security context for which the target AMF creates a new 5G NAS security context as indicated in 3GPP TS 33.501 [24]

when a new 5G NAS security context is derived using the same KAMF the target AMF includes the 8 least significant bits of the downlink NAS COUNT in the intra N1 mode NAS transparent container IE and indicates that a new KAMF shall not be derived (see subclause 9.11.2.6) the AMF shall increment the downlink NAS COUNT by one after creating the intra N1 mode NAS transparent container IE

when a new 5G NAS security context is created from a new KAMF the target AMF includes the 8 least significant bits of the downlink NAS COUNT in the intra N1 mode NAS transparent container IE and indicates that a new KAMF shall be derived (see subclause 9.11.2.6) the AMF shall then set both the uplink and downlink NAS COUNT counters of this 5G NAS security context to zero the AMF shall increment the downlink NAS COUNT by one after creating the intra N1 mode NAS transparent container IE

the target AMF also includes the ngKSI with the same value as the ngKSI currently being used with the UE the message authentication code and the selected NAS algorithms in the intra N1 mode NAS transparent container IE

when the UE receives a command to perform handover to NG-RAN including an intra N1 mode NAS transparent container IE (see subclause 9.11.2.6) the UE derives a new 5G NAS security context as described in 3GPP TS 33.501 [24] when the intra N1 mode NAS transparent container IE indicates that a new KAMF needs to be derived the UE shall set both the downlink NAS COUNT and uplink NAS COUNT to zero after creating the new 5G NAS security context

if the received intra N1 mode NAS transparent container IE does not have a valid NAS COUNT (see subclause 4.4.3.2) or the received NAS MAC is not verified successfully (see subclause 4.4.3.3) the UE shall discard the content of the received intra N1 mode NAS transparent container IE continue to use the current 5G NAS security context and inform the lower layers that the received intra N1 mode NAS transparent container is invalid

NOTE 1 during N1 mode to N1 mode handover the intra N1 mode NAS transparent container IE (see subclause 9.11.2.6) is equivalent to sending a SECURITY MODE COMMAND message to the UE in order to derive and use a new 5G NAS security context optionally created with a new KAMF the UE maintains the selected EPS NAS security algorithms until the UE receives a new selected EPS NAS security algorithms

after the new 5G NAS security context is taken into use for 3GPP access following a successful N1 mode to N1 mode handover and the UE is registered with the same PLMN over the 3GPP access and non-3GPP access

a) the UE is in 5GMM-IDLE mode over non-3GPP access the AMF and the UE shall activate and take into use the new 5G NAS security context over the non-3GPP access as described in 3GPP TS 33.501 [24] after the AMF sends or the UE receives the REGISTRATION ACCEPT message respectively if the new 5G NAS security context is created from a new KAMF the AMF and the UE shall set the downlink NAS COUNT and uplink NAS COUNT to zero also for the non-3GPP access otherwise the downlink NAS COUNT and uplink NAS COUNT for the non-3GPP access are not changed; or

b) the UE is in 5GMM-CONNECTED mode over non-3GPP access in order to activate the new 5G NAS security context over the non-3GPP access that has been activated for the 3GPP access the AMF shall send the SECURITY MODE COMMAND message over the non-3GPP access as described in 3GPP TS 33.501 [24] the SECURITY MODE COMMAND message shall include the same ngKSI to identify the new 5G NAS security context that was activated over the 3GPP access and shall include the horizontal derivation parameter indicating "KAMF derivation is not required" otherwise if the new 5G NAS security context is created from a new KAMF the AMF and the UE shall set the downlink NAS COUNT and uplink NAS COUNT to zero for the non-3GPP access

NOTE 2 explicit indication "KAMF derivation is not required" for the non-3GPP access is to align security contexts within the UE without a subsequent derivation of a new KAMF in the non-3GPP access

#### 4.4.2.4 establishment of an EPS security context during inter-system change from N1 mode to S1 mode in 5GMM-CONNECTED mode

in order for the UE operating in single-registration mode in a network supporting N26 interface to derive a mapped EPS security context for an inter-system change from N1 mode to S1 mode in 5GMM-CONNECTED mode the AMF shall prepare a mapped EPS security context for the target MME as indicated in 3GPP TS 33.501 [24]

the AMF shall derive a K'ASME using the KAMF key and the downlink NAS COUNT of the current 5G NAS security context include the corresponding NAS sequence number in the N1 mode to S1 mode NAS transparent container IE (see subclause 9.11.2.7) and then increments its stored downlink NAS COUNT value by one

NOTE the creation of the N1 mode to S1 mode NAS transparent container and the increment of the stored downlink NAS COUNT value by one are performed in prior to transferring the mapped EPS security context to the MME

the AMF shall select the NAS algorithms identifiers to be used in the target MME after the inter-system change from N1 mode to S1 mode in 5GMM-CONNECTED mode for encryption and integrity protection the uplink and downlink NAS COUNT associated with the newly derived K'ASME key are set to the uplink and downlink NAS COUNT value of the current 5G NAS security context respectively the eKSI for the newly derived K'ASME key shall be defined such as the value field is taken from the ngKSI and the type field is set to indicate a mapped security context

when the UE operating in single-registration mode in a network supporting N26 interface receives a command to perform inter-system change from N1 mode to S1 mode in 5GMM-CONNECTED mode the UE shall derive the mapped EPS security context i.e derive K'ASME from KAMF using a downlink NAS COUNT based on the NAS sequence number received in the N1 mode to S1 mode NAS transparent container IE (see subclause 9.11.2.7) as described in 3GPP TS 33.501 [24] the UE shall set the uplink and downlink NAS COUNT values associated with the newly derived K'ASME key to the uplink and downlink NAS COUNT values of the current 5G NAS security context respectively the eKSI for the newly derived K'ASME key is defined such that the value field is taken from the ngKSI and the type field is set to indicate a mapped security context the UE shall also derive the NAS keys as specified in 3GPP TS 33.401 [23A] using the EPS NAS security algorithms identifiers that are stored in the UE's 5G NAS security context

if the received N1 mode to S1 mode NAS transparent container IE does not have a valid NAS COUNT (see subclause 4.4.3.2) the UE shall discard the content of the received N1 mode to S1 mode NAS transparent container IE and inform the lower layers that the received N1 mode to S1 mode NAS transparent container is invalid

if the inter-system change from N1 mode to S1 mode in 5GMM-CONNECTED mode is not completed successfully the AMF and the UE shall delete the new mapped EPS security context

#### 4.4.2.5 establishment of secure exchange of NAS messages

secure exchange of NAS messages via a NAS signalling connection is usually established by the AMF during the registration procedure by initiating a security mode control procedure after successful completion of the security mode control procedure all NAS messages exchanged between the UE and the AMF are sent integrity protected using the current 5G security algorithms and except for the messages specified in subclause 4.4.5 all NAS messages exchanged between the UE and the AMF are sent ciphered using the current 5G security algorithms

during inter-system change from S1 mode to N1 mode in 5GMM-CONNECTED mode secure exchange of NAS messages is established between the AMF and the UE by

a) the transmission of NAS security related parameters encapsulated in the AS signalling from the AMF to the UE triggering the inter-system change in 5GMM-CONNECTED mode (see 3GPP TS 33.501 [24]) the UE uses these parameters to generate the mapped 5G NAS security context (see subclause 8.6.2 of 3GPP TS 33.501 [24]); and

b) after the inter-system change in 5GMM-CONNECTED mode the transmission of a REGISTRATION REQUEST message from the UE to the AMF the UE shall send this message integrity protected using the mapped 5G NAS security context and further protect this message as specified in subclause 4.4.6 and subclause 5.5.1.3.2 after the AMF receives the REGISTRATION REQUEST message

1) if the AMF decides to take the native 5G NAS security context into use the security mode control procedure is performed from this time onward all NAS messages exchanged between the UE and the AMF are sent integrity protected using the native 5G NAS security context and except for the messages specified in subclause 4.4.5 all NAS messages exchanged between the UE and the AMF are sent ciphered using the native 5G NAS security context; or

2) if the AMF decides to take the mapped 5G NAS security context into use from this time onward all NAS messages exchanged between the UE and the AMF are sent integrity protected using the mapped 5G NAS security context and except for the messages specified in subclause 4.4.5 all NAS messages exchanged between the UE and the AMF are sent ciphered using the mapped 5G NAS security context

during inter-system change from S1 mode to N1 mode in 5GMM-IDLE mode if the UE is operating in single-registration mode and

a) if the UE has a valid native 5G NAS security context the UE shall transmit a REGISTRATION REQUEST message integrity protected with the native 5G NAS security context the UE shall include the ngKSI indicating the native 5G NAS security context value in the REGISTRATION REQUEST message

after receiving the REGISTRATION REQUEST message including the ngKSI indicating a native 5G NAS security context value the AMF shall check whether the ngKSI included in the REGISTRATION REQUEST message belongs to a 5G NAS security context available in the AMF and shall verify the MAC of the REGISTRATION REQUEST message if the verification is successful the AMF deletes the EPS security context received from the source MME if any and the AMF re-establishes the secure exchange of NAS messages by either

1) replying with a REGISTRATION ACCEPT message that is integrity protected and ciphered using the native 5G NAS security context from this time onward all NAS messages exchanged between the UE and the AMF are sent integrity protected and except for the messages specified in subclause 4.4.5 all NAS messages exchanged between the UE and the AMF are sent ciphered; or

2) initiating a security mode control procedure this can be used by the AMF to take a non-current 5G NAS security context into use or to modify the current 5G NAS security context by selecting new NAS security algorithms

b) if the UE has no valid native 5G NAS security context the UE shall send the REGISTRATION REQUEST message without integrity protection and encryption

after receiving the REGISTRATION REQUEST message without integrity protection and encryption

1) if N26 interface is supported

i) if an EPS security context received from the source MME does not include the NAS security algorithms set to EIA0 and EEA0 the AMF shall either create a fresh mapped 5G NAS security context (see subclause 8.6.2 of 3GPP TS 33.501 [24]) or trigger a primary authentication and key agreement procedure to create a fresh native 5G NAS security context; or

ii) if an EPS security context received from the source MME includes the NAS security algorithms set to EIA0 and EEA0 the AMF shall trigger a primary authentication and key agreement procedure to create a fresh native 5G NAS security context; or

2) if N26 interface is not supported the AMF shall trigger a primary authentication and key agreement procedure

the newly created 5G NAS security context is taken into use by initiating a security mode control procedure and this context becomes the current 5G NAS security context in both the UE and the AMF this re-establishes the secure exchange of NAS messages

during an N1 mode to N1 mode handover secure exchange of NAS messages is established between the AMF and the UE by

- the transmission of NAS security related parameters encapsulated in the AS signalling from the target AMF to the UE triggering the N1 mode to N1 mode handover (see 3GPP TS 33.501 [24]) the UE uses these parameters to create a new 5G NAS security context

the secure exchange of NAS messages shall be continued after N1 mode to N1 mode handover it is terminated after inter-system change from N1 mode to S1 mode in 5GMM-CONNECTED mode or when the NAS signalling connection is released

when a UE in 5GMM-IDLE mode establishes a new NAS signalling connection and has a valid current 5G NAS security context the UE shall transmit the initial NAS message integrity protected with the current 5G NAS security context and further protect this message as specified in subclause 4.4.6 the UE shall include the ngKSI indicating the current 5G NAS security context value in the initial NAS message the AMF shall check whether the ngKSI included in the initial NAS message belongs to a 5G NAS security context available in the AMF and shall verify the MAC of the NAS message if the verification is successful the AMF may re-establish the secure exchange of NAS messages

a) by replying with a NAS message that is integrity protected and ciphered using the current 5G NAS security context from this time onward all NAS messages exchanged between the UE and the AMF are sent integrity protected and except for the messages specified in subclause 4.4.5 all NAS messages exchanged between the UE and the AMF are sent ciphered; or

b) by initiating a security mode control procedure this can be used by the AMF to take a non-current 5G NAS security context into use or to modify the current 5G NAS security context by selecting new NAS security algorithms

when a UE attempts multiple registrations in the same or different serving network both the AMF and the UE shall follow the behavior specified in subclause 6.3.2 of 3GPP TS 33.501 [24] the UE may support multiple records of NAS security context storage for multiple registration (see 3GPP TS 31.102 [22]) if the UE supports multiple records of NAS security context storage for multiple registration the UE can select the appropriate one among the stored 5G security contexts to protect the initial NAS message (see 3GPP TS 33.501 [24])

NOTE for the case when the UE has two records of NAS security context stored and is attempting registration to the PLMN associated with the 5G-GUTI (or an equivalent PLMN) for that access the UE uses the first NAS security context of that access to protect the initial NAS message for the case when the UE has two records of NAS security context stored and is attempting registration to the PLMN associated with the second record (or an equivalent PLMN) of that access the UE uses the second NAS security context of that access to protect the initial NAS message for other cases when the UE has two records of NAS security context stored and is attempting registration to a PLMN which is not associated with any NAS security context record the UE uses either record of the NAS security context of that access to protect the initial NAS message

#### 4.4.2.6 change of security keys

when the AMF initiates a re-authentication to create a new 5G NAS security context the messages exchanged during the authentication procedure are integrity protected and ciphered using the current 5G NAS security context if any

both UE and AMF shall continue to use the current 5G NAS security context until the AMF initiates a security mode control procedure the SECURITY MODE COMMAND message sent by the AMF includes the ngKSI of the new 5G NAS security context to be used the AMF shall send the SECURITY MODE COMMAND message integrity protected with the new 5G NAS security context but unciphered when the UE responds with a SECURITY MODE COMPLETE message it shall send the message integrity protected and ciphered with the new 5G NAS security context

the AMF can also modify the current 5G NAS security context or take the non-current native 5G NAS security context if any into use by sending a SECURITY MODE COMMAND message including the ngKSI of the 5G NAS security context to be modified and including a new set of selected NAS security algorithms in this case the AMF shall send the SECURITY MODE COMMAND message integrity protected with the modified 5G NAS security context but unciphered when the UE replies with a SECURITY MODE COMPLETE message it shall send the message integrity protected and ciphered with the modified 5G NAS security context

### 4.4.3 handling of NAS COUNT and NAS sequence number

#### 4.4.3.1 general

each 5G NAS security context shall be associated with two separate counters NAS COUNT per access type in the same PLMN one related to uplink NAS messages and one related to downlink NAS messages if the 5G NAS security context is used for access via both 3GPP and non-3GPP access in the same PLMN there are two NAS COUNT counter pairs associated with the 5G NAS security context the NAS COUNT counters use 24-bit internal representation and are independently maintained by UE and AMF the NAS COUNT shall be constructed as a NAS sequence number (8 least significant bits) concatenated with a NAS overflow counter (16 most significant bits)

when NAS COUNT is input to NAS ciphering or NAS integrity algorithms it shall be considered to be a 32-bit entity which shall be constructed by padding the 24-bit internal representation with 8 zeros in the most significant bits

the value of the uplink NAS COUNT that is stored or read out of the USIM or non-volatile memory as described in annex c is the value that shall be used in the next NAS message

the value of the downlink NAS COUNT that is stored or read out of the USIM or non-volatile memory as described in annex c is the largest downlink NAS COUNT used in a successfully integrity checked NAS message

the value of the uplink NAS COUNT stored in the AMF is the largest uplink NAS COUNT used in a successfully integrity checked NAS message

the value of the downlink NAS COUNT stored in the AMF is the value that shall be used in the next NAS message

the NAS sequence number part of the NAS COUNT shall be exchanged between the UE and the AMF as part of the NAS signalling after each new or retransmitted outbound SECURITY PROTECTED 5GS NAS MESSAGE message the sender shall increase the NAS COUNT number by one except for the initial NAS messages if the lower layers indicated the failure to establish the RRC connection (see 3GPP TS 38.331 [30]) specifically on the sender side the NAS sequence number shall be increased by one and if the result is zero (due to wrap around) the stored NAS overflow counter shall also be incremented by one (see subclause 4.4.3.5) if through implementation-dependent means the receiver determines that the NAS message is a replay of an earlier NAS message then the receiver handles the received NAS message as described in subclause 4.4.3.2 otherwise in order to determine the estimated NAS COUNT value to be used for integrity verification of a received NAS message

- the sequence number part of the estimated NAS COUNT value shall be equal to the sequence number in the received NAS message; and

- if the receiver can guarantee that this NAS message was not previously accepted then the receiver may select the estimated NAS overflow counter so that the estimated NAS COUNT value is lower than the stored NAS COUNT value; otherwise the receiver selects the estimated NAS overflow counter so that the estimated NAS COUNT value is higher than the stored NAS COUNT value

during the inter-system change from S1 mode to N1 mode in 5GMM-CONNECTED mode when a mapped 5G NAS security context is derived and taken into use the AMF shall set both the uplink and downlink NAS COUNT counters of this 5G NAS security context to zero the UE shall set both the uplink and downlink NAS COUNT counters of this 5G NAS security context to zero

during the inter-system change from S1 mode to N1 mode in 5GMM-CONNECTED mode the AMF shall increment the downlink NAS COUNT by one after it has created an S1 mode to N1 mode NAS transparent container (see subclause 9.11.2.9)

during the inter-system change from N1 mode to S1 mode in 5GMM-CONNECTED mode the AMF shall increment the downlink NAS COUNT by one after it has created an N1 mode to S1 mode NAS transparent container (see subclause 9.11.2.7)

during N1 mode to N1 mode handover

a) if the new 5G NAS security context is created with the same KAMF the AMF shall signal the 8 least significant bits of the current downlink NAS COUNT value in an intra N1 mode NAS transparent container (see subclause 9.11.2.6) the AMF shall then increment the downlink NAS COUNT by one; or

b) if the new 5G NAS security context is created with a new KAMF the AMF shall signal the 8 least significant bits of the current downlink NAS COUNT value in an intra N1 mode NAS transparent container (see subclause 9.11.2.6) and shall then set both the uplink and downlink NAS COUNT counters of this 5G NAS security context to zero the AMF shall then increment the downlink NAS COUNT by one the UE shall also set both the uplink and downlink NAS COUNT counters to zero

NOTE during the inter-system change from S1 mode to N1 mode in 5GMM-CONNECTED mode the S1 mode to N1 mode NAS transparent container (see subclause 9.11.2.9) is treated as an implicit SECURITY MODE COMMAND message for the UE and the AMF and therefore the AMF regards the sending of the S1 mode to N1 mode NAS transparent container as the sending of an initial SECURITY MODE COMMAND message in order to derive and take into use a mapped 5G NAS security context for the purpose of the NAS COUNT handling

#### 4.4.3.2 replay protection

replay protection shall be supported for received NAS messages both in the AMF and the UE however since the realization of replay protection does not affect the interoperability between nodes no specific mechanism is required for implementation

replay protection assures that one and the same NAS message is not accepted twice by the receiver specifically for a given 5G NAS security context a given NAS COUNT value shall be accepted at most one time and only if message integrity verifies correctly

replay protection is not applicable when 5G-IA0 is used

#### 4.4.3.3 integrity protection and verification

the sender shall use its locally stored NAS COUNT as input to the integrity protection algorithm

the receiver shall use the NAS sequence number included in the received message and an estimate for the NAS overflow counter as defined in subclause 4.4.3.1 to form the NAS COUNT input to the integrity verification algorithm

the algorithm to calculate the integrity protection information is specified in 3GPP TS 33.501 [24] and in case of the

a) SECURITY PROTECTED 5GS NAS MESSAGE message the integrity protection shall include octet 7 to n i.e the sequence number IE and the NAS message IE

b) intra N1 mode NAS transparent container IE and S1 mode to N1 mode NAS transparent container IE the integrity protection shall include all octets of the value part of the IE starting from octet 7

NOTE to ensure backward compatibility the UE uses all octets starting from octet 7 in the received NAS transparent container for the purpose of integrity check of the NAS transparent container irrespective of the release/version it supports after a successful integrity check the UE can ignore the octets which are not specified in the release/version which the UE supports

in addition to the data that is to be integrity protected the BEARER ID DIRECTION bit NAS COUNT and 5G NAS integrity key are input to the integrity protection algorithm these parameters are described in 3GPP TS 33.501 [24]

after successful integrity protection validation the receiver shall update its corresponding locally stored NAS COUNT with the value of the estimated NAS COUNT for this NAS message

integrity verification is not applicable when 5G-IA0 is used

#### 4.4.3.4 ciphering and deciphering

the sender shall use its locally stored NAS COUNT as input to the ciphering algorithm

the receiver shall use the NAS sequence number included in the received message and an estimate for the NAS overflow counter as defined in subclause 4.4.3.1 to form the NAS COUNT input to the deciphering algorithm

the input parameters to the NAS ciphering algorithm are the BEARER ID DIRECTION bit NAS COUNT NAS encryption key and the length of the key stream to be generated by the encryption algorithm

when applying initial NAS message protection to the REGISTRATION REQUEST DEREGISTRATION REQUEST or SERVICE REQUEST message as described in subclause 4.4.6 the length of the key stream is set to the length of the entire plain NAS message that is included in the NAS message container IE i.e the value part of the NAS message container IE that is to be ciphered

when applying initial NAS message protection to the CONTROL PLANE SERVICE REQUEST message as described in subclause 4.4.6 the length of the key stream is set to the length of

a) the value part of the CIoT small data container IE that is to be ciphered; or

b) the value part of the NAS message container IE that is to be ciphered

#### 4.4.3.5 NAS COUNT wrap around

if when increasing the NAS COUNT as specified above the AMF detects that either its downlink NAS COUNT or the UE's uplink NAS COUNT is "close" to wrap around (close to 224) the AMF shall take the following actions

- if there is no non-current native 5G NAS security context with sufficiently low NAS COUNT values the AMF shall initiate a new primary authentication and key agreement procedure with the UE leading to a new established 5G NAS security context and the NAS COUNT being reset to 0 in both the UE and the AMF when the new 5G NAS security context is activated;

- otherwise the AMF can activate a non-current native 5G NAS security context with sufficiently low NAS COUNT values or initiate a new primary authentication and key agreement procedure as specified above

if for some reason a new KAMF has not been established using primary authentication and key agreement procedure before the NAS COUNT wraps around the node (AMF or UE) in need of sending a NAS message shall instead release the NAS signalling connection prior to sending the next uplink NAS message the UE shall delete the ngKSI indicating the current 5G NAS security context

when the 5G-IA0 is used as the NAS integrity algorithm the UE and the AMF shall allow NAS COUNT wrap around if NAS COUNT wrap around occurs the following requirements apply

a) the UE and the AMF shall continue to use the current 5G NAS security context;

b) the AMF shall not initiate the primary authentication and key agreement procedure;

c) the AMF shall not release the NAS signalling connection; and

d) the UE shall not perform a local release of the NAS signalling connection

### 4.4.4 integrity protection of NAS signalling messages

#### 4.4.4.1 general

for the UE integrity protected signalling is mandatory for the 5GMM NAS messages once a valid 5G NAS security context exists and has been taken into use for the network integrity protected signalling is mandatory for the 5GMM NAS messages once a secure exchange of 5GS NAS messages has been established for the NAS signalling connection integrity protection of all NAS signalling messages is the responsibility of the NAS it is the network which activates integrity protection

the use of "null integrity protection algorithm" 5G-IA0 (see subclause 9.11.3.34) in the current 5G NAS security context is only allowed

a) for an unauthenticated UE for which establishment of emergency services is allowed;

b) for a W-AGF acting on behalf of an FN-RG;

c) for a W-AGF acting on behalf of an N5GC device; and

d) for a 5G-RG acting on behalf of an AUN3 device

for setting the security header type in outbound NAS messages the UE and the AMF shall apply the same rules irrespective of whether the "null integrity protection algorithm" or any other integrity protection algorithm is indicated in the 5G NAS security context

if the "null integrity protection algorithm"5G-IA0 has been selected as an integrity protection algorithm the receiver shall regard the NAS messages with the security header indicating integrity protection as integrity protected

details of the integrity protection and verification of NAS signalling messages are specified in 3GPP TS 33.501 [24]

when a NAS message needs to be sent both ciphered and integrity protected the NAS message is first ciphered and then the ciphered NAS message and the NAS sequence number are integrity protected by calculating the MAC

NOTE NAS messages that are ciphered with the "null ciphering algorithm" 5G-EA0 are regarded as ciphered (see subclause 4.4.5)

when a NAS message needs to be sent only integrity protected and unciphered the unciphered NAS message and the NAS sequence number are integrity protected by calculating the MAC

when a 5GSM message is piggybacked in a 5GMM message there is only one sequence number IE and one message authentication code IE for the 5GMM message piggybacking the 5GSM message

#### 4.4.4.2 integrity checking of NAS signalling messages in the UE

except the messages listed below no NAS signalling messages shall be processed by the receiving 5GMM entity in the UE or forwarded to the 5GSM entity unless the network has established secure exchange of 5GS NAS messages for the NAS signalling connection

a) IDENTITY REQUEST (if requested identification parameter is SUCI);

b) AUTHENTICATION REQUEST;

c) AUTHENTICATION RESULT;

d) AUTHENTICATION REJECT;

e) REGISTRATION REJECT (if the 5GMM cause is not #76 #78 #81 or #82);

f) DEREGISTRATION ACCEPT (for non switch off); and

g) SERVICE REJECT (if the 5GMM cause is not #76 or #78)

NOTE these messages are accepted by the UE without integrity protection as in certain situations they are sent by the network before security can be activated

integrity protection is never applied directly to 5GSM messages but to the 5GMM message in which the 5GSM message is included

once the secure exchange of NAS messages has been established the receiving 5GMM entity in the UE shall not process any NAS signalling messages unless they have been successfully integrity checked by the NAS if NAS signalling messages having not successfully passed the integrity check are received then the NAS in the UE shall discard that message the processing of the SECURITY MODE COMMAND message that has not successfully passed the integrity check is specified in subclause 5.4.2.5 if any NAS signalling message is received as not integrity protected even though the secure exchange of NAS messages has been established by the network then the NAS shall discard this message

#### 4.4.4.3 integrity checking of NAS signalling messages in the AMF

except the messages listed below no NAS signalling messages shall be processed by the receiving 5GMM entity in the AMF or forwarded to the 5GSM entity unless the secure exchange of NAS messages has been established for the NAS signalling connection

a) REGISTRATION REQUEST;

b) IDENTITY RESPONSE (if requested identification parameter is SUCI);

c) AUTHENTICATION RESPONSE;

d) AUTHENTICATION FAILURE;

e) SECURITY MODE REJECT;

f) DEREGISTRATION REQUEST; and

g) DEREGISTRATION ACCEPT;

NOTE 1 the REGISTRATION REQUEST message is sent by the UE without integrity protection if the registration procedure is initiated due to an inter-system change in 5GMM-IDLE mode and no current 5G NAS security context is available in the UE the other messages are accepted by the AMF without integrity protection as in certain situations they are sent by the UE before security can be activated

NOTE 2 the DEREGISTRATION REQUEST message can be sent by the UE without integrity protection e.g if the UE is registered for emergency services and there is no valid 5G NAS security context available or if due to user interaction a registration procedure is cancelled before the secure exchange of NAS messages has been established for these cases the network can attempt to use additional criteria (e.g whether the UE is subsequently still performing periodic registration update or still responding to paging) before marking the UE as 5GMM-DEREGISTERED

integrity protection is never applied directly to 5GSM messages but to the 5GMM message in which the 5GSM message is included

once a current 5G NAS security context exists until the secure exchange of NAS messages has been established for the NAS signalling connection the receiving 5GMM entity in the AMF shall process the following NAS signalling messages even if the MAC included in the message fails the integrity check or cannot be verified as the 5G NAS security context is not available in the network

a) REGISTRATION REQUEST;

b) IDENTITY RESPONSE (if requested identification parameter is SUCI);

c) AUTHENTICATION RESPONSE;

d) AUTHENTICATION FAILURE;

e) SECURITY MODE REJECT;

f) DEREGISTRATION REQUEST;

g) DEREGISTRATION ACCEPT;

h) SERVICE REQUEST; and

i) CONTROL PLANE SERVICE REQUEST;

NOTE 3 these messages are processed by the AMF even when the MAC that fails the integrity check or cannot be verified as in certain situations they can be sent by the UE protected with a 5G NAS security context that is no longer available in the network

if a REGISTRATION REQUEST message for initial registration fails the integrity check and it is not a registration request for emergency services the AMF shall authenticate the subscriber before processing the registration request any further additionally the AMF shall initiate a security mode control procedure and include the additional 5G security information IE with the RINMR bit set to "Retransmission of the initial NAS message requested" in the SECURITY MODE COMMAND message as specified in subclause 5.4.2.2 if authentication procedure is not successful the AMF shall maintain if any the 5GMM-context and 5G NAS security context unchanged.For the case when the registration procedure is for emergency services see subclause 5.5.1.2.3 and subclause 5.4.1.3.5

if a REGISTRATION REQUEST message for mobility and periodic registration update fails the integrity check and the UE provided EPS NAS message container IE which was successfully verified by the source MME the AMF may create a mapped 5G NAS security context and initiate a security mode control procedure to take the new mapped 5G NAS security context into use; otherwise if the UE has only a non-emergency PDU session established the AMF shall initiate a primary authentication and key agreement procedure to create a new native 5G NAS security context additionally the AMF shall initiate a security mode control procedure and include the additional 5G security information IE with the RINMR bit set to "Retransmission of the initial NAS message requested" in the SECURITY MODE COMMAND message as specified in subclause 5.4.2.2 if authentication procedure is not successful the AMF shall maintain if any the 5GMM-context and 5G NAS security context unchanged for the case when the UE has an emergency PDU session see subclause 5.5.1.3.3 and subclause 5.4.1.3.5

if a DEREGISTRATION REQUEST message fails the integrity check the AMF shall proceed as follows

- if it is not a deregistration request due to switch off and the AMF can initiate an authentication procedure the AMF should authenticate the subscriber before processing the deregistration request any further

- if it is a deregistration request due to switch off or the AMF does not initiate an authentication procedure for any other reason the AMF may ignore the deregistration request and remain in state 5GMM-REGISTERED

NOTE 4 the network can attempt to use additional criteria (e.g whether the UE is subsequently still performing periodic registration update or still responding to paging) before marking the UE as 5GMM-DEREGISTERED

if a SERVICE REQUEST or CONTROL PLANE SERVICE REQUEST message fails the integrity check and the UE has only non-emergency PDU sessions established the AMF shall send the SERVICE REJECT message with 5GMM cause #9 "UE identity cannot be derived by the network" and keep the 5GMM-context and 5G NAS security context unchanged for the case when the UE has an emergency PDU session and integrity check fails the AMF may skip the authentication procedure even if no 5G NAS security context is available and proceed directly to the execution of the security mode control procedure as specified in subclause 5.4.2 additionally the AMF shall include the additional 5G security information IE with the RINMR bit set to "Retransmission of the initial NAS message requested" in the SECURITY MODE COMMAND message as specified in subclause 5.4.2.2 after successful completion of the service request procedure the network shall perform a local release of all non-emergency PDU sessions the emergency PDU session shall not be released

once the secure exchange of NAS messages has been established for the NAS signalling connection the receiving 5GMM entity in the AMF shall not process any NAS signalling messages unless they have been successfully integrity checked by the NAS if any NAS signalling message having not successfully passed the integrity check is received then the NAS in the AMF shall discard that message if any NAS signalling message is received as not integrity protected even though the secure exchange of NAS messages has been established then the NAS shall discard this message

### 4.4.5 ciphering of NAS signalling messages

the use of ciphering in a network is an operator option subject to AMF configuration when operation of the network without ciphering is configured the AMF shall indicate the use of "null ciphering algorithm" 5G-EA0 (see subclause 9.11.3.34) in the current 5G NAS security context for all UEs for setting the security header type in outbound NAS messages the UE and the AMF shall apply the same rules irrespective of whether the "null ciphering algorithm" or any other ciphering algorithm is indicated in the 5G NAS security context

when the UE establishes a new N1 NAS signalling connection it shall apply security protection to the initial NAS message as described in subclause 4.4.6

the UE shall start the ciphering and deciphering of NAS messages when the secure exchange of NAS messages has been established for an N1 NAS signalling connection from this time onward unless explicitly defined the UE shall send all NAS messages ciphered until the N1 NAS signalling connection is released or the UE performs inter-system change to S1 mode

the AMF shall start ciphering and deciphering of NAS messages as described in subclause 4.4.2.5 from this time onward except for the SECURITY MODE COMMAND message the AMF shall send all NAS messages ciphered until the N1 NAS signalling connection is released or the UE performs inter-system change to S1 mode

ciphering is never applied directly to 5GSM messages but to the 5GMM message in which the 5GSM message is included

once the encryption of NAS messages has been started between the AMF and the UE the receiver shall discard the unciphered NAS messages which shall have been ciphered according to the rules described in this specification

if the "null ciphering algorithm" 5G-EA0 has been selected as a ciphering algorithm the NAS messages with the security header indicating ciphering are regarded as ciphered

details of ciphering and deciphering of NAS signalling messages are specified in 3GPP TS 33.501 [24]

### 4.4.6 protection of initial NAS signalling messages

the 5GS supports protection of initial NAS messages as specified in 3GPP TS 33.501 [24] the protection of initial NAS messages applies to the REGISTRATION REQUEST DEREGISTRATION REQUEST SERVICE REQUEST and CONTROL PLANE SERVICE REQUEST message and is achieved as follows

a) if the UE does not have a valid 5G NAS security context the UE sends a REGISTRATION REQUEST message including cleartext IEs only after activating a 5G NAS security context resulting from a security mode control procedure

1) if the UE needs to send non-cleartext IEs the UE shall include the entire REGISTRATION REQUEST message (i.e containing both cleartext IEs and non-cleartext IEs) in the NAS message container IE and shall include the NAS message container IE in the SECURITY MODE COMPLETE message; or

2) if the UE does not need to send non-cleartext IEs the UE shall include the entire REGISTRATION REQUEST message (i.e containing cleartext IEs only) in the NAS message container IE and shall include the NAS message container IE in the SECURITY MODE COMPLETE message

b) if the UE has a valid 5G NAS security context and

1) the UE needs to send non-cleartext IEs in a REGISTRATION REQUEST DEREGISTRATION REQUEST or SERVICE REQUEST message the UE includes the entire REGISTRATION REQUEST DEREGISTRATION REQUEST or SERVICE REQUEST message (i.e containing both cleartext IEs and non-cleartext IEs) in the NAS message container IE and shall cipher the value part of the NAS message container IE the UE shall then send a REGISTRATION REQUEST DEREGISTRATION REQUEST or SERVICE REQUEST message containing the cleartext IEs and the NAS message container IE;

2) the UE needs to send non-cleartext IEs in a CONTROL PLANE SERVICE REQUEST message

i) if CIoT small data container IE is the only non-cleartext IE to be sent the UE shall cipher the value part of the CIoT small data container IE the UE shall then send a CONTROL PLANE SERVICE REQUEST message containing the cleartext IEs and the CIoT small data container IE;

ii) otherwise the UE includes non-cleartext IEs in the NAS message container IE and shall cipher the value part of the NAS message container IE the UE shall then send a CONTROL PLANE SERVICE REQUEST message containing the cleartext IEs and the NAS message container IE;

3) the UE does not need to send non-cleartext IEs in a REGISTRATION REQUEST DEREGISTRATION REQUEST or SERVICE REQUEST message the UE sends the REGISTRATION REQUEST DEREGISTRATION REQUEST or SERVICE REQUEST message without including the NAS message container IE; or

4) the UE does not need to send non-cleartext IEs in a CONTROL PLANE SERVICE REQUEST message the UE sends the CONTROL PLANE SERVICE REQUEST message without including the NAS message container IE and the CIoT small data container IE

when the initial NAS message is a REGISTRATION REQUEST message the cleartext IEs are

- extended protocol discriminator;

- security header type;

- spare half octet;

- registration request message identity;

- 5GS registration type;

- ngKSI;

- 5GS mobile identity;

- UE security capability;

- additional GUTI;

- UE status;

- EPS NAS message container;

- NID; and

- UE determined PLMN with disaster condition

when the initial NAS message is a DEREGISTRATION REQUEST message the cleartext IEs are

- extended protocol discriminator;

- security header type;

- spare half octet;

- De-registration request message identity;

- De-registration type;

- ngKSI; and

- 5GS mobile identity

when the initial NAS message is a SERVICE REQUEST message the cleartext IEs are

- extended protocol discriminator;

- security header type;

- spare half octet;

- ngKSI;

- service request message identity;

- service type; and

- 5G-S-TMSI

when the initial NAS message is a CONTROL PLANE SERVICE REQUEST message the cleartext IEs are

- extended protocol discriminator;

- security header type;

- spare half octet;

- ngKSI;

- control plane service request message identity; and

- control plane service type

when the UE sends a REGISTRATION REQUEST DEREGISTRATION REQUEST SERVICE REQUEST or CONTROL PLANE SERVICE REQUEST message that includes a NAS message container IE the UE shall set the security header type of the initial NAS message to "integrity protected"

when the AMF receives an integrity protected initial NAS message which includes a NAS message container IE the AMF shall decipher the value part of the NAS message container IE if the received initial NAS message is a REGISTRATION REQUEST DEREGISTRATION REQUEST or a SERVICE REQUEST message the AMF shall consider the NAS message that is obtained from the NAS message container IE as the initial NAS message that triggered the procedure

when the AMF receives a CONTROL PLANE SERVICE REQUEST message which includes a CIoT small data container IE the AMF shall decipher the value part of the CIoT small data container IE and handle the message as specified in subclause 5.6.1.4.2

if the UE

a) has 5G-EA0 as a selected 5G NAS security algorithm; and

b) selects a PLMN other than registered PLMN and EPLMN over one access;

the UE shall send an initial NAS message including cleartext IEs only via the access type associated with the newly selected PLMN as described in this subclause for the case when the UE does not have a valid 5G NAS security context

if the UE

a) has 5G-EA0 as a selected 5G NAS security algorithm; and

b) selects a PLMN other than registered PLMN and EPLMN over one access and the registered PLMN or EPLMN is not registering or registered over other access;

the UE shall delete the 5G NAS security context

NOTE UE deletes the 5G NAS security context only if the UE is not in the connected mode

### 4.4.7 protection of NAS IEs

the network can provide the SOR transparent container IE during the registration procedure to the UE in the REGISTRATION ACCEPT message the SOR transparent container IE is integrity protected by the HPLMN or subscribed SNPN as specified in 3GPP TS 33.501 [24]

the UE can provide the SOR transparent container IE during the registration procedure to the network in the REGISTRATION COMPLETE message the SoR-MAC-IUE in the SOR transparent container IE is generated by the UE as specified in 3GPP TS 33.501 [24]

the network can provide the payload container IE during the Network-initiated NAS transport procedure to the UE in DL NAS TRANSPORT message if the payload container type IE is set to "SOR transparent container" or "UE parameters update transparent container" the payload container IE is integrity protected by the HPLMN or subscribed SNPN as specified in 3GPP TS 33.501 [24] if the payload container type IE is set to "Multiple payloads" and the payload container type field of the payload container entry is set to "SOR transparent container" or "UE parameters update transparent container" the payload container entry contents field of the payload container entry is integrity protected correspondingly

the UE can provide the payload container IE during the UE-initiated NAS transport procedure to the network in UL NAS TRANSPORT message if the payload container type IE is set to "SOR transparent container" or "UE parameters update transparent container" the SoR-MAC-IUE or UPU-MAC-IUE in the payload container IE is generated by the UE as specified in 3GPP TS 33.501 [24] if the payload container type IE is set to "Multiple payloads" and the payload container type field of the payload container entry is set to "SOR transparent container" or "UE parameters update transparent container" the SoR-MAC-IUE or UPU-MAC-IUE in the payload container entry contents field of the payload container entry is generated by the UE correspondingly

## 4.5 unified access control

### 4.5.1 general

when the UE needs to access the 5GS the UE not operating as an IAB-node (see 3GPP TS 23.501 [8]) not acting as a 5G ProSe layer-2 UE-to-network relay UE (see 3GPP TS 23.304 [6E]) whose access attempt is triggered by a 5G ProSe layer-2 remote UE and not acting as an NCR-MT node (see 3GPP TS 38.300 [27]) first performs access control checks to determine if the access is allowed access control checks shall be performed for the access attempts defined by the following list of events

NOTE 1 although the UE operating as an IAB-node or as an NCR-MT node skips the access control checks the UE operating as an IAB-node or as an NCR-MT node determines an access category and one or more access identities for each access attempt in order to derive an RRC establishment cause in this case the NAS provides the RRC establishment cause but does not provide the access category and the one or more access identities to the lower layers

NOTE 1A although the UE acting as a 5G ProSe layer-2 UE-to-network relay UE skips the access control checks the UE determines an access category and one or more access identities for each access attempt in order to derive an RRC establishment cause

a) the UE is in 5GMM-IDLE mode or 5GMM-IDLE mode with suspend indication over 3GPP access and an event that requires a transition to 5GMM-CONNECTED mode occurs; and

b) the UE is in 5GMM-CONNECTED mode over 3GPP access or 5GMM-CONNECTED mode with RRC inactive indication and one of the following events occurs

1) 5GMM receives an MO-IMS-registration-related-signalling-started indication an MO-MMTEL-voice-call-started indication an MO-MMTEL-video-call-started indication or an MO-SMSoIP-attempt-started indication from upper layers;

2) 5GMM receives a request from upper layers to send a mobile originated SMS over NAS unless the request triggered a service request procedure to transition the UE from 5GMM-IDLE mode or 5GMM-IDLE mode with suspend indication to 5GMM-CONNECTED mode;

3) 5GMM receives a request from upper layers to send an UL NAS TRANSPORT message for the purpose of PDU session establishment unless the request triggered a service request procedure to transition the UE from 5GMM-IDLE mode or 5GMM-IDLE mode with suspend indication to 5GMM-CONNECTED mode;

4) 5GMM receives a request from upper layers to send an UL NAS TRANSPORT message for the purpose of UE-requested PDU session modification procedure unless the request triggered a service request procedure to transition the UE from 5GMM-IDLE mode or 5GMM-IDLE mode with suspend indication to 5GMM-CONNECTED mode;

5) 5GMM receives a request to re-establish the user-plane resources for an existing PDU session;

6) 5GMM is notified that an uplink user data packet is to be sent for a PDU session with suspended user-plane resources;

7) 5GMM receives a request from upper layers to send a mobile originated location request unless the request triggered a service request procedure to transition the UE from 5GMM-IDLE mode or 5GMM-IDLE mode with suspend indication to 5GMM-CONNECTED mode;

8) 5GMM receives a request from upper layers to send a mobile originated signalling transaction towards the PCF by sending an UL NAS TRANSPORT message including a UE policy container (see 3GPP TS 24.587 [19B] and 3GPP TS 24.554 [19E]) unless the request triggered a service request procedure to transition the UE from 5GMM-IDLE mode to 5GMM-CONNECTED mode; and

9) 5GMM receives an indication from lower layers of the RAN timing synchronization status change and decides to transition the UE from 5GMM-CONNECTED mode with RRC inactive indication to 5GMM-CONNECTED mode as specified in subclause 5.3.1.4

NOTE 2 5GMM specific procedures initiated by NAS in 5GMM-CONNECTED mode or 5GMM-CONNECTED mode with RRC inactive indication are not subject to access control e.g a registration procedure after PS handover will not be prevented by access control (see subclause 5.5)

NOTE 3 LPP messages SLPP messages or location event report messages transported in the UL NAS TRANSPORT message sent in response to a mobile terminating or network induced location request and the corresponding access attempts are handled as MT access

NOTE 4 initiating a mobile originated signalling transaction towards the UDM by sending an UL NAS TRANSPORT message including an SOR transparent container is not supported therefore access control for these cases has not been specified

when the NAS detects one of the above events the NAS needs to perform the mapping of the kind of request to one or more access identities and one access category and lower layers will perform access barring checks for that request based on the determined access identities and access category

NOTE 5 the NAS is aware of the above events through indications provided by upper layers or through determining the need to start 5GMM procedures through normal NAS behaviour or both

to determine the access identities and the access category for a request the NAS checks the reason for access types of service requested and profile of the UE including UE configurations against a set of access identities and access categories defined in 3GPP TS 22.261 [3] namely

a) a set of standardized access identities;

b) a set of standardized access categories; and

c) a set of operator-defined access categories if available

for the purpose of determining the applicable access identities from the set of standardized access identities defined in 3GPP TS 22.261 [3] the NAS shall follow the requirements set out in

a) subclause 4.5.2 and the rules and actions defined in table 4.5.2.1 if the UE is not operating in SNPN access operation mode over 3GPP access; or

b) subclause 4.5.2A and the rules and actions defined in table 4.5.2A.1 if the UE is operating in SNPN access operation mode over 3GPP access

in order to enable access barring checks for access attempts identified by lower layers in 5GMM-CONNECTED mode with RRC inactive indication the UE provides the applicable access identities to lower layers

NOTE 6 when and how the NAS provides the applicable access identities to lower layers is UE implementation specific

NOTE 7 although the UE operating as an IAB-node or as an NCR-MT node skips the access control checks the UE provides the applicable access identities to lower layers for access attempts identified by lower layers in 5GMM-CONNECTED mode with RRC inactive indication

for the purpose of determining the applicable access category from the set of standardized access categories and operator-defined access categories defined in 3GPP TS 22.261 [3] the NAS shall follow the requirements set out in

a) subclause 4.5.2 and the rules and actions defined in table 4.5.2.2 if the UE is not operating in SNPN access operation mode over 3GPP access; or

b) subclause 4.5.2A and the rules and actions defined in table 4.5.2A.2 if the UE is operating in SNPN access operation mode over 3GPP access

### 4.5.2 determination of the access identities and access category associated with a request for access for UEs not operating in SNPN access operation mode over 3GPP access

when the UE needs to initiate an access attempt in one of the events listed in subclause 4.5.1 the UE shall determine one or more access identities from the set of standardized access identities and one access category from the set of standardized access categories and operator-defined access categories to be associated with that access attempt

the set of the access identities applicable for the request is determined by the UE in the following way

a) for each of the access identities 1 2 3 11 12 13 14 and 15 in table 4.5.2.1 the UE shall check whether the access identity is applicable in the selected PLMN if a new PLMN is selected or otherwise if it is applicable in the RPLMN or equivalent PLMN; and

b) if none of the above access identities is applicable then access identity 0 is applicable

table 4.5.2.1 access identities

|  |  |
| --- | --- |
| Access Identity number | UE configuration |
| 0 | UE is not configured with any parameters from this table |
| 1 (NOTE 1) | UE is configured for multimedia priority service (MPS). |
| 2 (NOTE 2) | UE is configured for mission critical service (MCS). |
| 3 (NOTE 4) | UE for which a disaster condition applies |
| 4-10 | Reserved for future use |
| 11 (NOTE 3) | Access Class 11 is configured in the UE. |
| 12 (NOTE 3) | Access Class 12 is configured in the UE. |
| 13 (NOTE 3) | Access Class 13 is configured in the UE. |
| 14 (NOTE 3) | Access Class 14 is configured in the UE. |
| 15 (NOTE 3) | Access Class 15 is configured in the UE. |
| NOTE 1: Access identity 1 is valid when: - the USIM file EFUAC\_AIC indicates the UE is configured for access identity 1 and the selected PLMN, if a new PLMN is selected, or RPLMN is the HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present), or a visited PLMN of the home country;  - the UE receives the 5GS network feature support IE with the MPS indicator bit set to "Access identity 1 valid" from the RPLMN as described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4; or - the UE receives the Priority indicator IE with the MPS indicator bit set to "Access identity 1 valid" from the RPLMN as described in subclause 5.4.4.3.  NOTE 2: Access identity 2 is used by UEs configured for MCS and is valid when: - the USIM file EFUAC\_AIC indicates the UE is configured for access identity 2 and the selected PLMN, if a new PLMN is selected, or RPLMN is the HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present), or a visited PLMN of the home country; - the UE receives the 5GS network feature support IE with the MCS indicator bit set to "Access identity 2 valid" from the RPLMN as described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4;or  - the UE receives the Priority indicator IE with the MCS indicator bit set to "Access identity 2 valid" from the RPLMN as described in subclause 5.4.4.3.  NOTE 3: Access identities 11 and 15 are valid in HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present). Access Identities 12, 13 and 14 are only valid in HPLMN and visited PLMNs of home country only.  NOTE 4: Access Identity 3 is valid when the UE is registering or registered for disaster roaming services (see 3GPP TS 23.122 [5]). | |

the UE uses the MPS indicator bit of the 5GS network feature support IE or the priority indicator IE to determine if access identity 1 is valid processing of the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message is described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4 processing of the MPS indicator bit of the priority indicator IE in the CONFIGURATION UPDATE COMMAND message is described in subclause 5.4.4.3 when the UE is neither in the HPLMN (if the EHPLMN list is not present or is empty) nor in an EHPLMN (if the EHPLMN list is present) nor in a visited PLMN of the home country and the USIM file EFUAC\_AIC indicates the UE is configured for access identity 1 then the UE shall not consider access identity 1 to be valid until the UE receives the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message or of the priority indicator IE in the CONFIGURATION UPDATE COMMAND message being set to "Access identity 1 valid" from the RPLMN or from an equivalent PLMN

when the UE is in the HPLMN (if the EHPLMN list is not present or is empty) or in an EHPLMN (if the EHPLMN list is present) or in a visited PLMN of the home country the contents of the USIM file EFUAC\_AIC as specified in 3GPP TS 31.102 [22] and the rules specified in table 4.5.2.1 are used to determine the applicability of access identity 1 when the UE is in the HPLMN (if the EHPLMN list is not present or is empty) or in an EHPLMN (if the EHPLMN list is present) or in a visited PLMN of the home country and the USIM file EFUAC\_AIC does not indicate the UE is configured for access identity 1 the UE uses the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message or of the priority indicator IE in the CONFIGURATION UPDATE COMMAND message to determine if access identity 1 is valid when the UE is in the HPLMN (if the EHPLMN list is not present or is empty) or in an EHPLMN (if the EHPLMN list is present) or in a visited PLMN of the home country and the USIM file EFUAC\_AIC indicates the UE is configured for access identity 1 the MPS indicator bit of the 5GS network feature support IE and the priority indicator IE are not applicable when the UE is not in the HPLMN (if the EHPLMN list is not present or is empty) or in an EHPLMN (if the EHPLMN list is present) or in a visited PLMN of the home country the contents of the USIM file EFUAC\_AIC are not applicable

the UE uses the MCS indicator bit of the 5GS network feature support IE or of the priority indicator IE to determine if access identity 2 is valid processing of the MCS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message is described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4 processing of the MCS indicator bit of the priority indicator IE in the CONFIGURATION UPDATE COMMAND message is described in subclause 5.4.4.3 when the UE is neither in the HPLMN (if the EHPLMN list is not present or is empty) nor in an EHPLMN (if the EHPLMN list is present) nor in a visited PLMN of the home country and the USIM file EFUAC\_AIC indicates the UE is configured for access identity 2 the UE shall not consider access identity 2 to be valid until the UE receives the MCS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message or of the priority indicator IE in the CONFIGURATION UPDATE COMMAND message being set to "Access identity 2 valid" from the RPLMN or from an equivalent PLMN

when the UE is in the HPLMN (if the EHPLMN list is not present or is empty) or in an EHPLMN (if the EHPLMN list is present) or in a visited PLMN of the home country the contents of the USIM file EFUAC\_AIC as specified in 3GPP TS 31.102 [22] and the rules specified in table 4.5.2.1 are used to determine the applicability of access identity 2 when the UE is in the HPLMN (if the EHPLMN list is not present or is empty) or in an EHPLMN (if the EHPLMN list is present) or in a visited PLMN of the home country and the USIM file EFUAC\_AIC does not indicate the UE is configured for access identity 2 the UE uses the MCS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message or of the priority indicator IE in the CONFIGURATION UPDATE COMMAND message to determine if access identity 2 is valid when the UE is in the HPLMN (if the EHPLMN list is not present or is empty) or in an EHPLMN (if the EHPLMN list is present) or in a visited PLMN of the home country and the USIM file EFUAC\_AIC indicates the UE is configured for access identity 2 the MCS indicator bit of the 5GS network feature support IE and the priority indicator IE is not applicable when the UE is not in the HPLMN (if the EHPLMN list is not present or is empty) or in an EHPLMN (if the EHPLMN list is present) or in a visited PLMN of the home country the contents of the USIM file EFUAC\_AIC are not applicable

the UE checks the conditions specified in subclause 4.4.3.1.1 of 3GPP TS 23.122 [5] to determine if access identity 3 is valid and the applicability of access identity 3

when the UE is in its HPLMN (if the EHPLMN list is not present or is empty) or in an EHPLMN (if the EHPLMN list is present) the contents of the USIM file EFACC as specified in 3GPP TS 31.102 [22] and the rules specified in table 4.5.2.1 are used to determine the applicability of access classes 11 and 15 when the UE is not in its HPLMN (if the EHPLMN list is not present or is empty) or in an EHPLMN (if the EHPLMN list is present) access classes 11 and 15 are not applicable

when the UE is in the HPLMN or in a visited PLMN of the home country the contents of the USIM file EFACC as specified in 3GPP TS 31.102 [22] and the rules specified in table 4.5.2.1 are used to determine the applicability of access classes 12 - 14 when the UE is neither in the HPLMN nor in a visited PLMN of the home country access classes 12-14 are not applicable

in order to determine the access category applicable for the access attempt the NAS shall check the rules in table 4.5.2.2 and use the access category for which there is a match for barring check if the access attempt matches more than one rule the access category of the lowest rule number shall be selected if the access attempt matches more than one operator-defined access category definition the UE shall select the access category from the operator-defined access category definition with the lowest precedence value (see subclause 4.5.3)

NOTE the case when an access attempt matches more than one rule includes the case when multiple events trigger an access attempt at the same time when multiple events trigger an access attempt at the same time how the access attempt is checked for multiple events is up to UE implementation

table 4.5.2.2 mapping table for access categories

|  |  |  |  |
| --- | --- | --- | --- |
| Rule # | Type of access attempt | Requirements to be met | Access Category |
| 1 | Response to paging or NOTIFICATION over non-3GPP access;  5GMM connection management procedure initiated for the purpose of transporting an LPP or SLPP message without an ongoing 5GC-MO-LR or SL-MO-LR procedure;  Access attempt to handover of ongoing MMTEL voice call, MMTEL video call or SMSoIP from non-3GPP access; or  Access attempt upon receipt of "call-pull-initiated" indication from the upper layers (see 3GPP TS 24.174 [13D]) | Access attempt is for MT access, or handover of ongoing MMTEL voice call, MMTEL video call or SMSoIP from non-3GPP access; or Access attempt is made upon receipt of "call-pull-initiated" (3GPP TS 24.174 [13D]) | 0 (= MT\_acc) |
| 2 | Emergency | UE is attempting access for an emergency session (NOTE 1, NOTE 2) | 2 (= emergency) |
| 3 | Access attempt for operator-defined access category | UE stores operator-defined access category definitions valid in the current PLMN as specified in subclause 4.5.3, and access attempt is matching criteria of an operator-defined access category definition | 32-63  (= based on operator classification) |
| 3.1 | Access attempt for MO exception data | UE is in NB-N1 mode and allowed to use exception data reporting (see the ExceptionDataReportingAllowed leaf of the NAS configuration MO in 3GPP TS 24.368 [17] or the USIM file EFNASCONFIG in 3GPP TS 31.102 [22]), and access attempt is for MO data or for MO signalling initiated upon receiving a request from upper layers to transmit user data related to an exceptional event. | 10 (= MO exception data) |
| 4 | Access attempt for delay tolerant service | (a) UE is configured for NAS signalling low priority or UE supporting S1 mode is configured for EAB (see the "ExtendedAccessBarring" leaf of NAS configuration MO in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22]) where "EAB override" does not apply, and  (b): the UE received one of the categories a, b or c as part of the parameters for unified access control in the broadcast system information, and the UE is a member of the broadcasted category in the selected PLMN or RPLMN/equivalent PLMN  (NOTE 3, NOTE 5, NOTE 6, NOTE 7, NOTE 8) | 1 (= delay tolerant) |
| 5 | MO MMTel voice call; or  MT MMTel voice call | Access attempt is for MO MMTel voice call or MT MMTel voice call  or for NAS signalling connection recovery during ongoing MO MMTel voice call or ongoing MT MMTel voice call (NOTE 2) | 4 (= MO MMTel voice) |
| 6 | MO MMTel video call; or  MT MMTel video call | Access attempt is for MO MMTel video call or MT MMTel video call  or for NAS signalling connection recovery during ongoing MO MMTel video call or ongoing MT SMS over SMSoIP (NOTE 2) | 5 (= MO MMTel video) |
| 7 | MO SMS over NAS or MO SMSoIP; or  MT SMSoIP | Access attempt is for MO SMS over NAS (NOTE 4) or MO SMS over SMSoIP transfer or MT SMS over SMSoIP  or for NAS signalling connection recovery during ongoing MO SMS or SMSoIP transfer or ongoing MT MMTel video call (NOTE 2) | 6 (= MO SMS and SMSoIP) |
| 7.1 | MO IMS registration related signalling | Access attempt is for MO IMS registration related signalling (e.g. IMS initial registration, re-registration, subscription refresh)  or for PDU session establishment procedure for DNN = "IMS" or for the DNN used for SMSoIP, if the upper layers have indicated a DNN used for SMSoIP and the indicated DNN used for SMSoIP is different from "IMS", establishing a PDU session, transferring a PDU session from non-3GPP access, or interworking a PDN connection in non-3GPP access connected to EPC to a PDU session  or service request procedure triggered by PDU session establishment procedure for DNN = "IMS" or for the DNN used for SMSoIP, if the upper layers have indicated a DNN used for SMSoIP and the indicated DNN used for SMSoIP is different from "IMS", establishing a PDU session, transferring a PDU session from non-3GPP access, or interworking a PDN connection in non-3GPP access connected to EPC to a PDU session  or for NAS signalling connection recovery during ongoing procedure for MO IMS registration related signalling (NOTE 2a) | 9 (= MO IMS registration related signalling) |
| 8 | UE NAS initiated 5GMM specific procedures | Access attempt is for MO signalling | 3 (= MO\_sig) |
| 8.1 | Mobile originated location request | Access attempt is for mobile originated location request (NOTE 9) | 3 (= MO\_sig) |
| 8.2 | Mobile originated signalling transaction towards the PCF | Access attempt is for mobile originated signalling transaction towards the PCF (NOTE 10) | 3 (= MO\_sig) |
| 8.3 | Access attempt for RAN timing synchronization | Access attempt is for mobile originated signalling for the reconnection to the network due to RAN timing synchronization status change | 3 (= MO\_sig) |
| 9 | UE NAS initiated 5GMM connection management procedure or 5GMM NAS transport procedure | Access attempt is for MO data | 7 (= MO\_data) |
| 10 | An uplink user data packet is to be sent for a PDU session with suspended user-plane resources | No further requirement is to be met | 7 (= MO\_data) |
| NOTE 1: This includes 5GMM specific procedures while the service is ongoing and 5GMM connection management procedures required to establish a PDU session with request type = "initial emergency request" or "existing emergency PDU session", or to re-establish user-plane resources for such a PDU session. This further includes the service request procedure initiated with a SERVICE REQUEST message with the Service type IE set to "emergency services fallback".  NOTE 2: Access for the purpose of NAS signalling connection recovery during an ongoing service as defined in subclause 4.5.5, or for the purpose of NAS signalling connection establishment following fallback indication from lower layers during an ongoing service as defined in subclause 4.5.5, is mapped to the access category of the ongoing service in order to derive an RRC establishment cause, but barring checks will be skipped for this access attempt.  NOTE 2a: Access for the purpose of NAS signalling connection recovery during an ongoing procedure for MO IMS registration related signalling as defined in subclause 4.5.5, or for the purpose of NAS signalling connection establishment following fallback indication from lower layers during an ongoing procedure for MO IMS registration related signalling as defined in subclause 4.5.5, is mapped to the access category of the MO IMS registration related signalling in order to derive an RRC establishment cause, but barring checks will be skipped for this access attempt.  NOTE 3: If the UE selects a new PLMN, then the selected PLMN is used to check the membership; otherwise the UE uses the RPLMNor a PLMN equivalent to the RPLMN.  NOTE 4: This includes the 5GMM connection management procedures triggered by the UE-initiated NAS transport procedure for transporting the MO SMS.  NOTE 5: The UE configured for NAS signalling low priority is not supported in this release of specification. If a UE supporting both S1 mode and N1 mode is configured for NAS signalling low priority in S1 mode as specified in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22], the UE shall ignore the configuration for NAS signalling low priority when in N1 mode.  NOTE 6: If the access category applicable for the access attempt is 1, then the UE shall additionally determine a second access category from the range 3 to 7. If more than one access category matches, the access category of the lowest rule number shall be chosen. The UE shall use the second access category only to derive an RRC establishment cause for the access attempt.  NOTE 7: "EAB override" does not apply, if the UE is not configured to allow overriding EAB (see the "Override\_ExtendedAccessBarring" leaf of NAS configuration MO in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22]), or if NAS has not received an indication from the upper layers to override EAB and the UE does not have a PDU session that was established with EAB override.  NOTE 8: For the definition of categories a, b and c associated with access category 1, see 3GPP TS 22.261 [3]. The categories associated with access category 1 are distinct from the categories a, b and c associated with EAB (see 3GPP TS 22.011 [1A]).  NOTE 9: This includes: a) the UE-initiated NAS transport procedure for transporting a mobile originated location  request; b) the 5GMM connection management procedure triggered by a) above; and c) NAS signalling connection recovery during an ongoing 5GC-MO-LR procedure.  NOTE 10: This includes: a) the UE-initiated NAS transport procedure for transporting a mobile originated signalling  transaction towards the PCF; b) the 5GMM connection management procedure triggered by a) above; and c) NAS signalling connection recovery during an ongoing UE-requested policy provisioning procedure for V2XP, ProSeP or both (see 3GPP TS 24.587 [19B] and see 3GPP TS 24.554 [19E]). | | | |

### 4.5.2A determination of the access identities and access category associated with a request for access for UEs operating in SNPN access operation mode over 3GPP access

when the UE needs to initiate an access attempt in one of the events listed in subclause 4.5.1 the UE shall determine one or more access identities from the set of standardized access identities and one access category from the set of standardized access categories and operator-defined access categories to be associated with that access attempt

the set of the access identities applicable for the request is determined by the UE in the following way

a) for each of the access identities 1 2 11 12 13 14 and 15 in table 4.5.2A.1 the UE shall check whether the access identity is applicable in the selected SNPN if a new SNPN is selected or otherwise if it is applicable in the RSNPN or equivalent SNPN; and

b) if none of the above access identities is applicable then access identity 0 is applicable

table 4.5.2A.1 access identities

|  |  |
| --- | --- |
| Access Identity number | UE configuration |
| 0 | UE is not configured with any parameters from this table |
| 1 (NOTE 1) | UE is configured for multimedia priority service (MPS). |
| 2 (NOTE 2) | UE is configured for mission critical service (MCS). |
| 3-10 | Reserved for future use |
| 11 (NOTE 3) | Access Class 11 is configured in the UE. |
| 12 (NOTE 3) | Access Class 12 is configured in the UE. |
| 13 (NOTE 3) | Access Class 13 is configured in the UE. |
| 14 (NOTE 3) | Access Class 14 is configured in the UE. |
| 15 (NOTE 3) | Access Class 15 is configured in the UE. |
| NOTE 1: Access identity 1 is valid when: - the unified access control configuration in the "list of subscriber data" stored in the ME (see 3GPP TS 23.122 [5]), if an entry of "list of subscriber data" is selected, or in the USIM (see 3GPP TS 31.102 [22]), if the PLMN subscription is selected, indicates the UE is configured for access identity 1 in the selected SNPN, if a new SNPN is selected, or RSNPN, and the selected SNPN or the RSNPN is the subscribed SNPN, an SNPN equivalent to the subscribed SNPN, or an non-subscribed SNPN of the same country as the subscribed SNPN if the MCC of the SNPN identity of the subscribed SNPN is not the MCC of value 999;  - the UE receives the 5GS network feature support IE with the MPS indicator bit set to "Access identity 1 valid" from the RSNPN as described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4; or - the UE receives the Priority indicator IE with the MPS indicator bit set to "Access identity 1 valid" from the RPLMN as described in subclause 5.4.4.3.  NOTE 2: Access identity 2 is used by UEs configured for MCS and is valid when: - the unified access control configuration in the "list of subscriber data" stored in the ME (see 3GPP TS 23.122 [5]), if an entry of "list of subscriber data" is selected, or in the USIM (see 3GPP TS 31.102 [22]), if the PLMN subscription is selected, indicates the UE is configured for access identity 2 in the selected SNPN, if a new SNPN is selected, or RSNPN, and the selected SNPN or the RSNPN is the subscribed SNPN, or an SNPN equivalent to the subscribed SNPN, or an non-subscribed SNPN of the same country as the subscribed SNPN if the MCC of the SNPN identity of the subscribed SNPN is not the MCC of value 999; or - the UE receives the 5GS network feature support IE with the MCS indicator bit set to "Access identity 2 valid" from the RSNPN as described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4.  NOTE 3: Access identities 11 and 15 are valid if indicated as configured for the UE in the unified access control configuration in the "list of subscriber data" stored in the ME (see 3GPP TS 23.122 [5]), if an entry of "list of subscriber data" is selected, or in the USIM (see 3GPP TS 31.102 [22]), if the PLMN subscription is selected, in the selected SNPN, if a new SNPN is selected, or RSNPN, and the selected SNPN or the RSNPN is the subscribed SNPN. Access identities 12, 13 and 14 are valid if indicated as configured for the UE in the unified access control configuration in the "list of subscriber data" stored in the ME (see 3GPP TS 23.122 [5]), if an entry of "list of subscriber data" is selected, or in the USIM (see 3GPP TS 31.102 [22]), if the PLMN subscription is selected, in the selected SNPN, if a new SNPN is selected, or RSNPN, and the selected SNPN or the RSNPN in the subscribed SNPN or an non-subscribed SNPN of the same country as the subscribed SNPN if the MCC of the SNPN identity of the subscribed SNPN is not the MCC of value 999. | |

the contents of the unified access control configuration in the "list of subscriber data" stored in the ME (see 3GPP TS 23.122 [5]) if an entry of "list of subscriber data" is selected or in the USIM (see 3GPP TS 31.102 [22]) if the PLMN subscription is selected and the rules specified in table 4.5.2A.1 are used to determine the applicability of access identity 1 in the SNPN when the contents of the unified access control configuration in the "list of subscriber data" stored in the ME (see 3GPP TS 23.122 [5]) if an entry of "list of subscriber data" is selected or in the USIM (see 3GPP TS 31.102 [22]) if the PLMN subscription is selected do not indicate the UE is configured for access identity 1 for the SNPN the UE uses the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message and the MPS indicator bit of the priority indicator IE in the CONFIGURATION UPDATE COMMAND message to determine if access identity 1 is valid

the contents of the unified access control configuration in the "list of subscriber data" stored in the ME (see 3GPP TS 23.122 [5]) if an entry of "list of subscriber data" is selected or in the USIM (see 3GPP TS 31.102 [22]) if the PLMN subscription is selected and the rules specified in table 4.5.2A.1 are used to determine the applicability of access identity 2 in the SNPN when the contents of the unified access control configuration in the "list of subscriber data" stored in the ME (see 3GPP TS 23.122 [5]) if an entry of "list of subscriber data" is selected or in the USIM (see 3GPP TS 31.102 [22]) if the PLMN subscription is selected do not indicate the UE is configured for access identity 2 for the SNPN the UE uses the MCS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message to determine if access identity 2 is valid

the contents of the unified access control configuration in the "list of subscriber data" stored in the ME (see 3GPP TS 23.122 [5]) if an entry of "list of subscriber data" is selected or in the USIM (see 3GPP TS 31.102 [22]) if the PLMN subscription is selected and the rules specified in table 4.5.2A.1 are used to determine the applicability of access classes 11 to 15 in the SNPN

in order to determine the access category applicable for the access attempt the NAS shall check the rules in table 4.5.2A.2 and use the access category for which there is a match for barring check if the access attempt matches more than one rule the access category of the lowest rule number shall be selected if the access attempt matches more than one operator-defined access category definition the UE shall select the access category from the operator-defined access category definition with the lowest precedence value (see subclause 4.5.3)

NOTE the case when an access attempt matches more than one rule includes the case when multiple events trigger an access attempt at the same time when multiple events trigger an access attempt at the same time how the access attempt is checked for multiple events is up to UE implementation

table 4.5.2A.2 mapping table for access categories

|  |  |  |  |
| --- | --- | --- | --- |
| Rule # | Type of access attempt | Requirements to be met | Access Category |
| 1 | Response to paging or NOTIFICATION over non-3GPP access ;  5GMM connection management procedure initiated for the purpose of transporting an LPP or SLPP message without an ongoing 5GC-MO-LR or SL-MO-LR procedure;  Access attempt to handover of MMTEL voice call, MMTEL video call or SMSoIP from non-3GPP access;  Access attempt upon receipt of "call-pull-initiated" indication from the upper layers (see 3GPP TS 24.174 [13D]) | Access attempt is for MT access, handover of ongoing MMTEL voice call, MMTEL video call or SMSoIP from non-3GPP access; or  Access attempt is made upon receipt of "call-pull-initiated" indication (3GPP TS 24.174 [13D]) | 0 (= MT\_acc) |
| 2 | Emergency | UE is attempting access for an emergency session (NOTE 1, NOTE 2) | 2 (= emergency) |
| 3 | Access attempt for operator-defined access category | UE stores operator-defined access category definitions valid in the SNPN as specified in subclause 4.5.3, and access attempt is matching criteria of an operator-defined access category definition | 32-63  (= based on operator classification) |
| 4 | Access attempt for delay tolerant service | (a) UE is configured for NAS signalling low priority, and  (b) the UE received one of the categories a, b or c as part of the parameters for unified access control in the broadcast system information, and the UE is a member of the broadcasted category in the selected SNPN, RSNPN or equivalent SNPN  (NOTE 3, NOTE 5, NOTE 6, NOTE 7, NOTE 8) | 1 (= delay tolerant) |
| 5 | MO MMTel voice call; or  MT MMTel voice call | Access attempt is for MO MMTel voice call or MT MMTel voice call  or for NAS signalling connection recovery during ongoing MO MMTel voice call or ongoing MT MMTel voice call (NOTE 2) | 4 (= MO MMTel voice) |
| 6 | MO MMTel video call; or  MT MMTel video call | Access attempt is for MO MMTel video call or MT MMTel video call  or for NAS signalling connection recovery during ongoing MO MMTel video call or ongoing MT MMTel video call (NOTE 2) | 5 (= MO MMTel video) |
| 7 | MO SMS over NAS or MO SMSoIP; or  MT SMSoIP | Access attempt is for MO SMS over NAS (NOTE 4) or MO SMS over SMSoIP transfer or MT SMS over SMSoIP  or for NAS signalling connection recovery during ongoing MO SMS or SMSoIP transfer or MT SMS over SMSoIP (NOTE 2) | 6 (= MO SMS and SMSoIP) |
| 5 | MO MMTel voice call | Access attempt is for MO MMTel voice call  or for NAS signalling connection recovery during ongoing MO MMTel voice call (NOTE 2) | 4 (= MO MMTel voice) |
| 6 | MO MMTel video call | Access attempt is for MO MMTel video call  or for NAS signalling connection recovery during ongoing MO MMTel video call (NOTE 2) | 5 (= MO MMTel video) |
| 7 | MO SMS over NAS or MO SMSoIP | Access attempt is for MO SMS over NAS (NOTE 4) or MO SMS over SMSoIP transfer  or for NAS signalling connection recovery during ongoing MO SMS or SMSoIP transfer (NOTE 2) | 6 (= MO SMS and SMSoIP) |
| 7.1 | MO IMS registration related signalling | Access attempt is for MO IMS registration related signalling (e.g. IMS initial registration, re-registration, subscription refresh)  or for PDU session establishment procedure for DNN = "IMS" or for the DNN used for SMSoIP, if the upper layers have indicated a DNN used for SMSoIP and the indicated DNN used for SMSoIP is different from "IMS", establishing a PDU session or transferring a PDU session from non-3GPP access  or service request procedure triggered by PDU session establishment procedure for DNN = "IMS" or for the DNN used for SMSoIP, if the upper layers have indicated a DNN used for SMSoIP and the indicated DNN used for SMSoIP is different from "IMS", establishing a PDU session or transferring a PDU session from non-3GPP access  or for NAS signalling connection recovery during ongoing procedure for MO IMS registration related signalling (NOTE 2a) | 9 (= MO IMS registration related signalling) |
| 8 | UE NAS initiated 5GMM specific procedures | Access attempt is for MO signalling | 3 (= MO\_sig) |
| 8.1 | Mobile originated location request | Access attempt is for mobile originated location request (NOTE 9) | 3 (= MO\_sig) |
| 8.2 | Mobile originated signalling transaction towards the PCF | Access attempt is for mobile originated signalling transaction towards the PCF (NOTE 10) | 3 (= MO\_sig) |
| 8.3 | Access attempt for RAN timing synchronization | Access attempt is for mobile originated signalling for the reconnection to the network due to RAN timing synchronization status change | 3 (= MO\_sig) |
| 9 | UE NAS initiated 5GMM connection management procedure or 5GMM NAS transport procedure | Access attempt is for MO data | 7 (= MO\_data) |
| 10 | An uplink user data packet is to be sent for a PDU session with suspended user-plane resources | No further requirement is to be met | 7 (= MO\_data) |
| NOTE 1: Void  NOTE 2: Access for the purpose of NAS signalling connection recovery during an ongoing service as defined in subclause 4.5.5, or for the purpose of NAS signalling connection establishment following fallback indication from lower layers during an ongoing service as defined in subclause 4.5.5, is mapped to the access category of the ongoing service in order to derive an RRC establishment cause, but barring checks will be skipped for this access attempt.  NOTE 2a: Access for the purpose of NAS signalling connection recovery during an ongoing MO IMS registration related signalling as defined in subclause 4.5.5, or for the purpose of NAS signalling connection establishment following fallback indication from lower layers during an ongoing MO IMS registration related signalling as defined in subclause 4.5.5, is mapped to the access category of the MO IMS registration related signalling in order to derive an RRC establishment cause, but barring checks will be skipped for this access attempt.  NOTE 3: If the UE selects a new SNPN, then the selected SNPN is used to check the membership; otherwise the UE uses the RSNPN or an SNPN equivalent to the RSNPN.  NOTE 4: This includes the 5GMM connection management procedures triggered by the UE-initiated NAS transport procedure for transporting the MO SMS.  NOTE 5: The UE configured for NAS signalling low priority is not supported in this release of specification.  NOTE 6: If the access category applicable for the access attempt is 1, then the UE shall additionally determine a second access category from the range 3 to 7. If more than one access category matches, the access category of the lowest rule number shall be chosen. The UE shall use the second access category only to derive an RRC establishment cause for the access attempt.  NOTE 7: Void.  NOTE 8: For the definition of categories a, b and c associated with access category 1, see 3GPP TS 22.261 [3]. The categories associated with access category 1 are distinct from the categories a, b and c associated with EAB (see 3GPP TS 22.011 [1A]).  NOTE 9: This includes: a) the UE-initiated NAS transport procedure for transporting a mobile originated location  request; b) the 5GMM connection management procedure triggered by a) above; and c) NAS signalling connection recovery during an ongoing 5GC-MO-LR procedure.  NOTE 10: This includes: a) the UE-initiated NAS transport procedure for transporting a mobile originated signalling  transaction towards the PCF; b) the 5GMM connection management procedure triggered by a) above; and c) NAS signalling connection recovery during an ongoing UE-requested policy provisioning procedure for V2XP (see 3GPP TS 24.587 [19B]).  . | | | |

### 4.5.3 Operator-defined access categories

Operator-defined access category definitions can be signalled to the UE using NAS signalling each operator-defined access category definition consists of the following parameters

a) a precedence value which indicates in which order the UE shall evaluate the operator-defined category definition for a match;

b) an operator-defined access category number i.e access category number in the 32-63 range that uniquely identifies the access category in the PLMN or SNPN in which the access categories are being sent to the UE;

c) criteria consisting of one or more access category criteria type and associated access category criteria type values the access category criteria type can be set to one of the following

1) DNN;

2) Void;

3) OS id + OS app id of application triggering the access attempt; or

4) S-NSSAI; and

NOTE 1 an access category criteria type can be associated with more than one access category criteria values

d) optionally a standardized access category this standardized access category is used in combination with the access identities of the UE to determine the RRC establishment cause as specified in subclause 4.5.6

if the access attempt is to establish a new PDU session i.e it is triggered by

- a request from upper layers to send an UL NAS TRANSPORT message for the purpose of PDU session establishment unless the request triggered a service request procedure (or a registration procedure if the UE is in state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE) to transition the UE from 5GMM-IDLE mode or 5GMM-IDLE mode with suspend indication to 5GMM-CONNECTED mode; or

- a service request procedure (or a registration procedure if the UE is in state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE) to transition the UE from 5GMM-IDLE mode or 5GMM-IDLE mode with suspend indication to 5GMM-CONNECTED mode triggered by a request from upper layers to send an UL NAS TRANSPORT message for the purpose of PDU session establishment

then

- the access attempt matches access category criteria type DNN if the DNN requested by the UE during the PDU session establishment procedure matches any of the access criteria type values associated with the access criteria type DNN; and

- the access attempt matches access category criteria type S-NSSAI if the S-NSSAI requested by the UE during the PDU session establishment procedure matches any of the access criteria type values associated with the access criteria type S-NSSAI

if the access attempt is for an existing PDU session i.e it is triggered by

- a request from upper layers to send an UL NAS TRANSPORT message for the purpose of PDU session modification unless the request triggered a service request procedure (or a registration procedure if the UE is in state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE) to transition the UE from 5GMM-IDLE mode or 5GMM-IDLE mode with suspend indication to 5GMM-CONNECTED mode;

- a service request procedure (or a registration procedure if the UE is in state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE) to transition the UE from 5GMM-IDLE mode or 5GMM-IDLE mode with suspend indication to 5GMM-CONNECTED mode triggered by a request from upper layers to send an UL NAS TRANSPORT message for the purpose of PDU session modification;

- a service request procedure (or a registration procedure if the UE is in state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE) to transition the UE from 5GMM-IDLE mode or 5GMM-IDLE mode with suspend indication to 5GMM-CONNECTED mode triggered by a request from upper layers to send an UL NAS TRANSPORT message for the purpose of PDU session release;

- a service request procedure (or a registration procedure if the UE is in state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE) requesting user-plane resources for a PDU session; or

- an uplink user data packet is to be sent for a PDU session with suspended user-plane resources

then

- the access attempt matches access category criteria type DNN if the DNN provided by the network in the PDU SESSION ESTABLISHMENT ACCEPT message matches any of the access criteria type values associated with the access criteria type DNN; and

- the access attempt matches access category criteria type S-NSSAI if the S-NSSAI associated with the PDU session matches any of the access criteria type values associated with the access criteria type S-NSSAI

NOTE 2 in order to avoid having access attempts for non-always-on PDU sessions blocked due to access barring of always-on PDU sessions it is recommended that the network assigns the highest precedence values to operator-defined access category definition which can be matched by always-on PDU sessions

an access attempt matches the criteria of an operator-defined access category definition if the access attempt matches all access category criteria types included in the criteria with any of the associated access criteria type values

each operator-defined access category definition has a different precedence value

several operator-defined access category definitions can have the same operator-defined access category number

if

- an access category in bullet d) is not provided;

- an access category in bullet d) is provided and is not a standardized access category; or

- an access category in bullet d) is provided is a standardized access category and is not recognized by the UE;

the UE shall use instead access category 7 (MO\_data) in combination with the access identities of the UE to determine the RRC establishment cause as specified in subclause 4.5.6

the operator-defined access category definitions are valid in the PLMN which provided them and in a PLMN equivalent to the PLMN which provided them or in the SNPN which provided them and in an SNPN equivalent to the SNPN which provided them as specified in annex c

if the UE stores operator-defined access category definitions valid in the selected PLMN or the RPLMN or valid in the selected SNPN or RSNPN then access control in 5GMM-IDLE mode or 5GMM-IDLE mode with suspend indication will only be performed for the event a) defined in subclause 4.5.1 if the transition from 5GMM-IDLE mode or 5GMM-IDLE mode with suspend indication over 3GPP access to 5GMM-CONNECTED mode is due to a UE NAS initiated 5GMM specific procedure then this access attempt shall be mapped to one of the standardized access categories in the range < 32 see subclause 4.5.2 I.e for this case the UE shall skip the checking of operator-defined access category definitions

if the UE stores operator-defined access category definitions valid in the selected PLMN or the RPLMN or valid in the selected SNPN or RSNPN then access control in 5GMM-CONNECTED mode and in 5GMM-CONNECTED mode with RRC inactive indication will only be performed for the events 1) to 8) defined in subclause 4.5.1

the UE shall handle the operator-defined access category definitions stored for the RPLMN or RSNPN as specified in subclause 5.4.4.3 subclause 5.5.1.2.4 and subclause 5.5.1.3.4

when the UE is switched off the UE shall keep the operator-defined access category definitions so that the operator-defined access category definitions can be used after switch on

when the UE selects a new PLMN which is not equivalent to the previously selected PLMN or selects a new SNPN which is not equivalent to the previously selected SNPN the UE shall stop using the operator-defined access category definitions stored for the previously selected PLMN or SNPN and should keep the operator-defined access category definitions stored for the previously selected PLMN or SNPN

NOTE 3 when the UE selects a new PLMN which is not equivalent to the previously selected PLMN or selects a new SNPN which is not equivalent to the previously selected SNPN the UE can delete the operator-defined access category definitions stored for the previously selected PLMN or SNPN e.g if there is no storage space in the UE

### 4.5.4 access control and checking

#### 4.5.4.1 access control and checking in 5GMM-IDLE mode and in 5GMM-IDLE mode with suspend indication

when the UE is in 5GMM-IDLE mode or 5GMM-IDLE mode with suspend indication upon receiving a request from the upper layers for an access attempt the NAS shall categorize the access attempt into access identities and an access category following

a) subclause 4.5.2 table 4.5.2.1 and table 4.5.2.2 and subclause 4.5.3 if the UE is not operating in SNPN access operation mode over 3GPP access ; or

b) subclause 4.5.2A table 4.5.2A.1 and table 4.5.2A.2 and subclause 4.5.3 if the UE is operating in SNPN access operation mode over 3GPP access

and provide the applicable access identities and the access category to the lower layers for the purpose of access control checking in this request to the lower layer the NAS can also provide to the lower layer the RRC establishment cause determined as specified in subclause 4.5.6 of this specification

NOTE 1 the access barring check is performed by the lower layers

NOTE 2 as an implementation option the NAS can provide the RRC establishment cause to the lower layers after being informed by the lower layers that the access attempt is allowed

if the UE has uplink user data pending for one or more PDU sessions when it builds a REGISTRATION REQUEST or SERVICE REQUEST message as initial NAS message the UE shall indicate the respective PDU sessions in the uplink data status IE as specified in subclause 5.5.1.3.2 and 5.6.1.2.1 regardless of the access category for which the access barring check is performed

if the UE is registered for 5GS services with control plane CIoT 5GS optimization has uplink user data pending for one or more PDU sessions when it builds a CONTROL PLANE SERVICE REQUEST message as initial NAS message the UE shall indicate the respective PDU sessions as specified in subclause 5.6.1.2.2 regardless of the access category for which the access barring check is performed

NOTE 3 the UE indicates pending user data for all the respective PDU sessions even if barring timers are running for some of the corresponding access categories

if the lower layers indicate that the access attempt is allowed the NAS shall initiate the procedure to send the initial NAS message for the access attempt

if the lower layers indicate that the access attempt is barred the NAS shall not initiate the procedure to send the initial NAS message for the access attempt additionally

a) if the event which triggered the access attempt was an MO-MMTEL-voice-call-started indication or an MO-MMTEL-video-call-started indication

1) if the UE is operating in the single-registration mode the UE's usage setting is "voice centric" and the UE has not disabled its E-UTRA capability as specified in 3GPP TS 24.301 [15] the UE may attempt to select an E-UTRA cell connected to EPC if the UE finds a suitable E-UTRA cell connected to EPC it then proceeds with the appropriate EMM specific procedures and if necessary ESM procedures to make a PDN connection providing access to IMS available; see subclause 4.8.2 and 3GPP TS 24.301 [15];

2) if the UE is operating in the dual-registration mode the UE may proceed in S1 mode with the appropriate EMM specific procedures and ESM procedures to make a PDN connection providing access to IMS available; see subclause 4.8.3 and 3GPP TS 24.301 [15]; or

3) otherwise the NAS shall notify the upper layers that the access attempt is barred in this case upon receiving an indication from the lower layers that the barring is alleviated for the access category with which the access attempt was associated the NAS shall notify the upper layers that the barring is alleviated for the access category and may initiate the procedure to send the initial NAS message if still needed;

b) if the event which triggered the access attempt was an MO-SMSoIP-attempt-started indication or an MO-IMS-registration-related-signalling-started indication

1) if the UE is operating in the single-registration mode the UE may attempt to select an E-UTRA cell connected to EPC if the UE finds a suitable E-UTRA cell connected to EPC it then proceeds with the appropriate EMM specific procedures and if necessary ESM procedures to make a PDN connection providing access to IMS available; see subclause 4.8.2 and 3GPP TS 24.301 [15];

2) if the UE is operating in the dual-registration mode the UE may proceed in S1 mode with the appropriate EMM specific procedures and ESM procedures to make a PDN connection providing access to IMS available; see subclause 4.8.3 and 3GPP TS 24.301 [15]; or

3) otherwise the NAS shall notify the upper layers that the access attempt is barred in this case upon receiving an indication from the lower layers that the barring is alleviated for the access category with which the access attempt was associated the NAS shall notify the upper layers that the barring is alleviated for the access category and may initiate the procedure to send the initial NAS message if still needed; and

c) if the access attempt is for emergency

1) the NAS shall notify the upper layers that the access attempt is barred in this case upon receiving an indication from the lower layers that the barring is alleviated for the access category with which the access attempt was associated the NAS shall notify the upper layers of that the barring is alleviated for the access category and may initiate the procedure to send the initial NAS message if still needed

NOTE 4 this can result in the upper layers requesting another emergency call attempt using domain selection as specified in 3GPP TS 23.167 [6] and 3GPP TS 24.229 [14]

NOTE 5 barring timers on a per access category basis are run by the lower layers at expiry of barring timers the indication of alleviation of access barring is indicated to the NAS on a per access category basis

#### 4.5.4.2 access control and checking in 5GMM-CONNECTED mode and in 5GMM-CONNECTED mode with RRC inactive indication

when the UE is in 5GMM-CONNECTED mode or 5GMM-CONNECTED mode with RRC inactive indication upon detecting one of events 1) through 8) listed in subclause 4.5.1 the NAS shall categorize the corresponding access attempt into access identities and an access category following

a) subclause 4.5.2 table 4.5.2.1 and table 4.5.2.2 and subclause 4.5.3 if the UE is not operating in SNPN access operation mode over 3GPP access ; or

b) subclause 4.5.2A table 4.5.2A.1 and table 4.5.2A.2 and subclause 4.5.3 if the UE is operating in SNPN access operation mode over 3GPP access

and provide the access identities and the access category to the lower layers for the purpose of access control checking in this request to the lower layer the NAS can also provide to the lower layer the RRC establishment cause determined as specified in subclause 4.5.6 of this specification

NOTE 1 as an implementation option the NAS can provide the RRC establishment cause to the lower layers after being informed by the lower layers that the access attempt is allowed

if the UE has uplink user data pending for one or more PDU sessions when it builds a REGISTRATION REQUEST or SERVICE REQUEST message for the access attempt the UE shall indicate the respective PDU sessions in the uplink data status IE as specified in subclause 5.5.1.3.2 and 5.6.1.2 regardless of the access category for which the access barring check is performed

NOTE 2 the UE indicates pending user data for all the respective PDU sessions even if barring timers are running for some of the corresponding access categories

if the lower layers indicate that the access attempt is allowed the NAS shall take the following action depending on the event which triggered the access attempt

a) if the event which triggered the access attempt was an MO-MMTEL-voice-call-started indication an MO-MMTEL-video-call-started indication an MO-SMSoIP-attempt-started indication or an MO-IMS-registration-related-signalling-started indication the NAS shall notify the upper layers that the access attempt is allowed;

b) if the event which triggered the access attempt was a request from upper layers to send a mobile originated SMS over NAS 5GMM shall initiate the NAS transport procedure as specified in subclause 5.4.5 to send the SMS in an UL NAS TRANSPORT message;

c) if the event which triggered the access attempt was a request from upper layers to establish a new PDU session 5GMM shall initiate the NAS transport procedure as specified in subclause 5.4.5 to send the PDU SESSION ESTABLISHMENT REQUEST message;

d) if the event which triggered the access attempt was a request from upper layers to modify an existing PDU session 5GMM shall initiate the NAS transport procedure as specified in subclause 5.4.5 to send the PDU SESSION MODIFICATION REQUEST message;

e) if the event which triggered the access attempt was a request to re-establish the user-plane resources for an existing PDU session 5GMM shall initiate the service request procedure as specified in subclause 5.6.1;

f) if the event which triggered the access attempt was an uplink user data packet to be sent for a PDU session with suspended user-plane resources 5GMM shall consider that the uplink user data packet is allowed to be sent;

g) if the event which triggered the access attempt was a request from upper layers to send a mobile originated location request 5GMM shall initiate the NAS transport procedure as specified in subclause 5.4.5 to send an LCS message in an UL NAS TRANSPORT message; and

h) if the event which triggered the access attempt was a request from upper layers to send a mobile originated signalling transaction towards the PCF by sending an UL NAS TRANSPORT message including a UE policy container (see 3GPP TS 24.587 [19B] and 3GPP TS 24.554 [19E]) 5GMM shall initiate the NAS transport procedure as specified in subclause 5.4.5 to send the signalling transaction via an UL NAS TRANSPORT message

if the lower layers indicate that the access attempt is barred the NAS shall take the following action depending on the event which triggered the access attempt

a) if the event which triggered the access attempt was an MO-MMTEL-voice-call-started indication an MO-MMTEL-video-call-started indication or an MO-SMSoIP-attempt-started indication or an MO-IMS-registration-related-signalling-started indication

1) if the UE is operating in the dual-registration mode the UE may proceed in S1 mode with the appropriate EMM specific procedures and ESM procedures to make a PDN connection providing access to IMS available; see subclause 4.8.3 and 3GPP TS 24.301 [15];

2) otherwise the NAS shall notify the upper layers that the access attempt is barred in this case upon receiving an indication from the lower layers that the barring is alleviated for the access category with which the access attempt was associated the NAS shall notify the upper layers that the barring is alleviated for the access category;

NOTE 3 in this case prohibiting the initiation of the MMTEL voice session MMTEL video session or prohibiting sending of the SMS over IP or the IMS registration related signalling is performed by the upper layers

b) if the event which triggered the access attempt was a request from upper layers to send a mobile originated SMS over NAS 5GMM shall not initiate the NAS transport procedure as specified in subclause 5.4.5 to send the SMS in an UL NAS TRANSPORT message upon receiving an indication from the lower layers that the barring is alleviated for the access category with which the access attempt was associated 5GMM may initiate the NAS transport procedure as specified in subclause 5.4.5 to send the SMS in an UL NAS TRANSPORT message if still needed;

c) if the event which triggered the access attempt was a request from upper layers to establish a new PDU session 5GMM shall not initiate the NAS transport procedure to send the PDU SESSION ESTABLISHMENT REQUEST message upon receiving an indication from the lower layers that the barring is alleviated for the access category with which the access attempt was associated the NAS may initiate the NAS transport procedure as specified in subclause 5.4.5 if still needed;

d) if the event which triggered the access attempt was a request from upper layers to modify an existing PDU session modification 5GMM shall not initiate the NAS transport procedure to send the PDU SESSION MODIFICATION REQUEST message upon receiving an indication from the lower layers that the barring is alleviated for the access category with which the access attempt was associated the NAS may initiate the NAS transport procedure as specified in subclause 5.4.5 if still needed;

e) if the event which triggered the access attempt was a request to re-establish the user-plane resources for an existing PDU session the NAS shall not initiate the service request procedure as specified in subclause 5.6.1 upon receiving an indication from the lower layers that the barring is alleviated for the access category with which the access attempt was associated the NAS may initiate the service request procedure as specified in subclause 5.6.1 if still needed;

f) if the event which triggered the access attempt was an uplink user data packet to be sent for a PDU session with suspended user-plane resources 5GMM shall consider that the uplink user data packet is not allowed to be sent upon receiving an indication from the lower layers that the barring is alleviated for the access category with which the access attempt was associated the NAS shall consider that the barring is alleviated for the access category;

g) if the event which triggered the access attempt was a request from upper layers to send a mobile originated location request 5GMM shall not initiate the NAS transport procedure as specified in subclause 5.4.5 to send an LCS message in an UL NAS TRANSPORT message upon receiving an indication from the lower layers that the barring is alleviated for the access category with which the access attempt was associated 5GMM may initiate the NAS transport procedure as specified in subclause 5.4.5 to send the LCS message in an UL NAS TRANSPORT message if still needed; and

h) if the event which triggered the access attempt was a request from upper layers to send a mobile originated signalling transaction towards the PCF by sending an UL NAS TRANSPORT message including a UE policy container (see 3GPP TS 24.587 [19B] and 3GPP TS 24.554 [19E]) 5GMM shall not initiate the NAS transport procedure as specified in subclause 5.4.5 to send the mobile originated signalling transaction via an UL NAS TRANSPORT message upon receiving an indication from the lower layers that the barring is alleviated for the access category with which the access attempt was associated 5GMM may initiate the NAS transport procedure as specified in subclause 5.4.5 to send the mobile originated signalling transaction via an UL NAS TRANSPORT message if still needed

### 4.5.5 exception handling and avoiding double barring

access attempts are allowed to proceed without further access control checking in order to avoid double barring for any service request or registration procedure initiated for the purpose of NAS signalling connection recovery or following a fallback indication from the lower layers (see subclauses 5.3.1.2 and 5.3.1.4)

NOTE 1 the case of NAS signalling connection recovery also includes the cases where the UE was in S1 mode when the RRC connection failure occurred

for any service request or registration procedure of this kind the UE determines an access category as specified in subclause 4.5.1 and 4.5.2 or 4.5.2A unless a different access category is specified in the rest of the present subclause

NOTE 2 although the access control checking is skipped the access category is determined for the specific access attempt in order to derive an RRC establishment cause

there are several services or an MO IMS registration related signalling for which the NAS needs to be informed when the service starts and stops

- because while the service is ongoing or the MO IMS registration related signalling is ongoing the mapping of other access attempts to a specific access category can be affected; and

- in order to avoid double barring at the start of these services or at the start of the MO IMS registration related signalling

these services are

a) emergency service;

b) MMTEL voice;

c) MMTEL video;

d) SMSoIP;

e) SMS over NAS;

f) 5GC-MO-LR procedure;

g) UE-requested policy provisioning procedure for V2XP ProSeP or both; and

h) CIoT user data transfer over the control plane

the UE considers an emergency service a) as started when 5GMM receives a request from upper layers to register for emergency services or to establish a PDU session with request type = "initial emergency request" or "existing emergency PDU session" it considers the emergency service as stopped when this PDU session is released

in addition the UE considers an emergency service a) as started when the 5GMM receives a request from the upper layers to perform emergency services fallback and performs emergency services fallback as specified in subclause 4.13.4.2 of 3GPP TS 23.502 [9] in this case the UE considers the emergency service as stopped when

- the emergency PDU session established during the emergency services fallback is released if the UE has moved to an E-UTRA cell connected to 5GCN; or

- the service request procedure involved in the emergency services fallback is completed otherwise

while an emergency service a) is ongoing any access attempt triggered by the initiation of a registration de-registration or service request procedure or by an uplink user data packet to be sent for an emergency PDU session with suspended user-plane resources is mapped to access category 2 = emergency

once the emergency service has successfully passed access control then as long as the service is ongoing the following access attempts are allowed to proceed without further access control checking in order to avoid double barring

- any service request procedure related to the PDU session associated with request type = "initial emergency request" or "existing emergency PDU session"; and

- any uplink user data packet to be sent for a PDU session with suspended user-plane resources associated with request type = "initial emergency request" or "existing emergency PDU session"

NOTE 3 although the access control checking is skipped the mapping is performed in order to derive an RRC establishment cause

for services b) to h) the 5GMM receives explicit start and stop indications from the upper layers

for the case of handover of ongoing services b) to d) from non-3GPP access the 5GMM receives an additional explicit handover of ongoing service from non-3GPP access indication from the upper layers

the 5GMM may receive an additional explicit "call-pull-initiated" indication from the upper layers (see 3GPP TS 24.174 [13D])

once the service has successfully passed access control then as long as the service is ongoing the following access attempts are allowed to proceed without further access control checking in order to avoid double barring

- for services b) c) and d)

1) any service request procedure related to the PDU session established for DNN = "IMS" except between receiving from the lower layers an indication that access barring is applicable for all access categories except categories 0 and 2 or access barring is applicable for all access categories except category 0 and receiving from the lower layers an indication that the barring is alleviated for the access category determined for the access attempt;

2) any uplink user data packet to be sent for a PDU session with suspended user-plane resources established for DNN = "IMS" except between receiving from the lower layers an indication that access barring is applicable for all access categories except categories 0 and 2 or access barring is applicable for all access categories except category 0 and receiving from the lower layers an indication that the barring is alleviated for the access category determined for the access attempt; and

3) any start of the MO IMS registration related signalling;

- for service d) if the upper layers have indicated a DNN used for SMSoIP and the indicated DNN used for SMSoIP is different from "IMS"

1) any service request procedure related to the PDU session established for the DNN used for SMSoIP except between receiving from the lower layers an indication that access barring is applicable for all access categories except categories 0 and 2 or access barring is applicable for all access categories except category 0 and receiving from the lower layers an indication that the barring is alleviated for access category 6; and

2) any uplink user data packet to be sent for a PDU session with suspended user-plane resources established for the DNN used for SMSoIP except between receiving from the lower layers an indication that access barring is applicable for all access categories except categories 0 and 2 or access barring is applicable for all access category except category 0 and receiving from the lower layers an indication that the barring is alleviated for access category 6

for the MO IMS registration related signalling the 5GMM receives explicit start and stop indications from the upper layers

once the MO IMS registration related signalling has successfully passed access control then as long as the MO IMS registration related signalling is ongoing the following access attempts are allowed to proceed without further access control checking in order to avoid double barring

1) any service request procedure related to the PDU session established for DNN = "IMS" and for the DNN used for SMSoIP if the upper layers have indicated a DNN used for SMSoIP and the indicated DNN used for SMSoIP is different from "IMS" except between receiving from the lower layers an indication that access barring is applicable for all access categories except categories 0 and 2 or access barring is applicable for all access categories except category 0 and receiving from the lower layers an indication that the barring is alleviated for the access category determined for the access attempt; and

2) any uplink user data packet to be sent for a PDU session with suspended user-plane resources established for DNN = "IMS" and for the DNN used for SMSoIP except between receiving from the lower layers an indication that access barring is applicable for all access categories except categories 0 and 2 or access barring is applicable for all access categories except category 0 and receiving from the lower layers an indication that the barring is alleviated for the access category determined for the access attempt;

while an MMTEL voice call is ongoing

- any service request procedure related to the PDU session established for DNN = "IMS" is mapped to access category 4;

- any uplink user data packet to be sent for a PDU session with suspended user-plane resources established for DNN = "IMS" is mapped to access category 4; and

- any

1) service request procedure; or

2) registration procedure;

initiated in 5GMM-IDLE mode or 5GMM-IDLE mode with suspend indication for the purpose of NAS signalling connection recovery or following a fallback indication from the lower layers (see subclause 5.3.1.2 and 5.3.1.4) is mapped to access category 4

while an MMTEL video call is ongoing and no MMTEL voice call is ongoing

- any service request procedure related to the PDU session established for DNN = "IMS" is mapped to access category 5;

- any uplink user data packet to be sent for a PDU session with suspended user-plane resources established for DNN = "IMS" is mapped to access category 5; and

- any

1) service request procedure; or

2) registration procedure;

initiated in 5GMM-IDLE mode or 5GMM-IDLE mode with suspend indication for the purpose of NAS signalling connection recovery or following a fallback indication from the lower layers (see subclause 5.3.1.2 and 5.3.1.4) is mapped to access category 5

while an SMSoIP is ongoing no MMTEL video call is ongoing and no MMTEL voice call is ongoing

- any service request procedure related to the PDU session established

1) for DNN = "IMS"; or

2) for the DNN used for SMSoIP if the upper layers have indicated a DNN used for SMSoIP and the indicated DNN used for SMSoIP is different from "IMS";

is mapped to access category 6; and

- any uplink user data packet to be sent for a PDU session with suspended user-plane resources established

1) for DNN = "IMS"; or

2) for the DNN used for SMSoIP if the upper layers have indicated a DNN used for SMSoIP and the indicated DNN used for SMSoIP is different from "IMS";

is mapped to access category 6; and

- any

1) service request procedure; or

2) registration procedure;

initiated in 5GMM-IDLE mode or 5GMM-IDLE mode with suspend indication for the purpose of NAS signalling connection recovery or following a fallback indication from the lower layers (see subclause 5.3.1.2 and 5.3.1.4) is mapped to access category 6

while an SMS over NAS is ongoing no SMSoIP is ongoing no MMTEL video call is ongoing and no MMTEL voice call is ongoing

- any

1) service request procedure; or

2) registration procedure;

initiated in 5GMM-IDLE mode or 5GMM-IDLE mode with suspend indication for the purpose of NAS signalling connection recovery or following a fallback indication from the lower layers (see subclause 5.3.1.2 and 5.3.1.4) is mapped to access category 6

while an MO IMS registration related signalling is ongoing no SMSoIP is ongoing no MMTEL video call is ongoing and no MMTEL voice call is ongoing

- any service request procedure related to the PDU session established

1) for DNN = "IMS"; and

2) for the DNN used for SMSoIP if the upper layers have indicated a DNN used for SMSoIP and the indicated DNN used for SMSoIP is different from "IMS";

is mapped to access category 9; and

- any uplink user data packet to be sent for a PDU session with suspended user-plane resources established

1) for DNN = "IMS"; and

2) for the DNN used for SMSoIP if the upper layers have indicated a DNN used for SMSoIP and the indicated DNN used for SMSoIP is different from "IMS";

is mapped to access category 9; and

- if no SMS over NAS is ongoing any

1) service request procedure; or

2) registration procedure;

initiated in 5GMM-IDLE mode for the purpose of NAS signalling connection recovery or following a fallback indication from the lower layers (see subclause 5.3.1.2 and 5.3.1.4) is mapped to access category 9

while a 5GC-MO-LR procedure is ongoing no SMS over NAS is ongoing no SMSoIP is ongoing no MO IMS registration related signalling is ongoing no MMTEL video call is ongoing and no MMTEL voice call is ongoing

- any

1) service request procedure; or

2) registration procedure;

initiated in 5GMM-IDLE mode or 5GMM-IDLE mode with suspend indication for the purpose of NAS signalling connection recovery or following a fallback indication from the lower layers (see subclauses 5.3.1.2 and 5.3.1.4) is mapped to access category 3

while a UE-requested policy provisioning procedure for V2XP ProSeP or both (see 3GPP TS 24.587 [19B] and 3GPP TS 24.554 [19E]) no 5GC-MO-LR procedure is ongoing no SMS over NAS is ongoing no SMSoIP is ongoing no MMTEL video call is ongoing and no MMTEL voice call is ongoing

- any

1) service request procedure; or

2) registration procedure;

initiated in 5GMM-IDLE mode for the purpose of NAS signalling connection recovery or following a fallback indication from the lower layers (see subclauses 5.3.1.2 and 5.3.1.4) is mapped to access category 3

while CIoT user data transfer over the control plane is ongoing no 5GC-MO-LR procedure is ongoing no SMS over NAS is ongoing no SMSoIP is ongoing no MMTEL video call is ongoing and no MMTEL voice call is ongoing any service request procedure initiated in 5GMM-IDLE mode following a fallback indication from the lower layers (see subclause 5.3.1.4) is mapped to access category 7

NOTE 3 although the access control checking is skipped the mapping is performed in order to derive an RRC establishment cause

if an access category is determined and the access control checking is skipped the NAS shall determine the RRC establishment cause from one or more determined access identities and the access category as specified in subclause 4.5.6 the NAS shall initiate the procedure to send the initial NAS message for the access attempt and shall provide the RRC establishment cause to lower layers

if the UE receives from the lower layers an indication that access barring is applicable for all access categories except categories 0 and 2 or access barring is applicable for all access categories except category 0

a) if an MMTEL voice call or MMTEL video call is ongoing

1) if the UE is operating in the single-registration mode and the UE's usage setting is "voice centric" the UE may attempt to select an E-UTRA cell connected to EPC if the UE finds a suitable E-UTRA cell connected to EPC it then proceeds with the appropriate EMM specific procedures and if necessary ESM procedures to make a PDN connection providing access to IMS available; see subclause 4.8.2 and 3GPP TS 24.301 [15]; and

2) if the UE is operating in the dual-registration mode the UE may proceed in S1 mode with the appropriate EMM specific procedures and ESM procedures to make a PDN connection providing access to IMS available; see subclause 4.8.3 and 3GPP TS 24.301 [15]; and

b) if SMSoIP is ongoing or an MO IMS registration related signalling is ongoing

1) if the UE is operating in the single-registration mode the UE may attempt to select an E-UTRA cell connected to EPC if the UE finds a suitable E-UTRA cell connected to EPC it then proceeds with the appropriate EMM specific procedures and if necessary ESM procedures to make a PDN connection providing access to IMS available; see subclause 4.8.2 and 3GPP TS 24.301 [15]; and

2) if the UE is operating in the dual-registration mode the UE may proceed in S1 mode with the appropriate EMM specific procedures and ESM procedures to make a PDN connection providing access to IMS available; see subclause 4.8.3 and 3GPP TS 24.301 [15]

once access control check for access category 9 due to a PDU session establishment procedure

a) for DNN = "IMS" or for the DNN used for SMSoIP if the upper layers have indicated a DNN used for SMSoIP and the indicated DNN used for SMSoIP is different from "IMS"; and

b) for establishing a PDU session transferring a PDU session from non-3GPP access or interworking a PDN connection in non-3GPP access connected to EPC to a PDU session;

or due to a service request procedure triggered by a PDU session establishment procedure

c) for DNN = "IMS" or for the DNN used for SMSoIP if the upper layers have indicated a DNN used for SMSoIP and the indicated DNN used for SMSoIP is different from "IMS"; and

d) for establishing a PDU session transferring a PDU session from non-3GPP access or interworking a PDN connection in non-3GPP access connected to EPC to a PDU session;

has successfully passed access control then the next access attempt of access category 9 due to MO IMS registration related signalling is allowed to proceed without further access control checking

### 4.5.6 mapping between access categories/access identities and RRC establishment cause

when 5GMM requests the establishment of a NAS-signalling connection the RRC establishment cause used by the UE shall be selected according to one or more access identities (see subclauses 4.5.2 and 4.5.2A) and the determined access category by checking the rules specified in table 4.5.6.1 and table 4.5.6.2 if the access attempt matches more than one rule the RRC establishment cause of the lowest rule number shall be used if the determined access category is an operator-defined access category then the RRC establishment cause used by the UE shall be selected according to table 4.5.6.1 and table 4.5.6.2 based on one or more access identities (see subclauses 4.5.2 and 4.5.2A) and the standardized access category determined for the operator-defined access category as described in subclause 4.5.3

NOTE 1 following an RRC release with redirection the lower layers can set the RRC establishment cause or the resume cause to "mps-PriorityAccess" in the case of redirection to an NR cell connected to 5GCN (see 3GPP TS 38.331 [30]) or to "highPriorityAccess" in the case of redirection to an E-UTRA cell connected to 5GCN (see 3GPP TS 36.331 [25A]) if the network indicates to the UE during RRC connection release with redirection that the UE has an active MPS session

NOTE 2 when the UE is acting as a 5G ProSe layer-2 UE-to-network relay UE it is possible for the lower layer to decide an applicable RRC establishment cause according to the request from the 5G ProSe layer-2 remote UE or according to the indication from upper layers including the case when the request from the 5G ProSe layer-2 remote UE is for emergency services as specified in 3GPP TS 38.331 [30]

table 4.5.6.1 mapping table for access identities/access categories and RRC establishment cause when establishing N1 NAS signalling connection via NR connected to 5GCN

|  |  |  |  |
| --- | --- | --- | --- |
| Rule # | Access identities | Access categories | RRC establishment cause is set to |
| 1 | 1 | Any category | mps-PriorityAccess |
| 2 | 2 | Any category | mcs-PriorityAccess |
| 3 | 11, 15 | Any category | highPriorityAccess |
| 4 | 12,13,14, | Any category | highPriorityAccess |
| 5 | 0 | 0 (= MT\_acc) | mt-Access |
| 1 (= delay tolerant) | Not applicable (NOTE 1) |
| 2 (= emergency) | emergency |
| 3 (= MO\_sig) | mo-Signalling |
| 4 (= MO MMTel voice) | mo-VoiceCall |
| 5 (= MO MMTel video) | mo-VideoCall |
| 6 (= MO SMS and SMSoIP) | mo-SMS |
| 7 (= MO\_data) | mo-Data |
| 9 (= MO IMS registration related signalling) | mo-Data |
| NOTE 1: A UE using access category 1 for the access barring check will determine a second access category in the range 3 to 7 that is to be used for determination of the RRC establishment cause. See subclause 4.5.2, table 4.5.2.2, NOTE 6.  NOTE 2: See subclause 4.5.2, table 4.5.2.1 for use of the access identities of 0, 1, 2, and 11-15. | | | |

table 4.5.6.2 mapping table for access identities/access categories and RRC establishment cause when establishing N1 NAS signalling connection via E-UTRA connected to 5GCN

|  |  |  |  |
| --- | --- | --- | --- |
| Rule # | Access identities | Access categories | RRC establishment cause is set to |
| 1 | 1 | Any category | highPriorityAccess |
| 2 | 2 | Any category | highPriorityAccess |
| 3 | 11, 15 | Any category | highPriorityAccess |
| 4 | 12,13,14, | Any category | highPriorityAccess |
| 5 | 0 | 0 (= MT\_acc) | mt-Access |
| 1 (= delay tolerant) | Not applicable (NOTE 1) |
| 2 (= emergency) | emergency |
| 3 (= MO\_sig) | mo-Signalling |
| 4 (= MO MMTel voice) | mo-VoiceCall |
| 5 (= MO MMTel video) | mo-VoiceCall |
| 6 (= MO SMS and SMSoIP) | mo-Data |
| 7 (= MO\_data) | mo-Data |
| 9 (= MO IMS registration related signalling) | mo-Data |
| 10 (= MO exception data) | mo-ExceptionData (NOTE 3) |
| NOTE 1: A UE using access category 1 for the access barring check will determine a second access category in the range 3 to 7 that is to be used for determination of the RRC establishment cause. See subclause 4.5.2, table 4.5.2.2, NOTE 6.  NOTE 2: See subclause 4.5.2, table 4.5.2.1 for use of the access identities of 0, 1, 2, and 11-15.  NOTE 3: This applies to the UE in NB-N1 mode. | | | |

## 4.6 network slicing

### 4.6.1 general

the 5GS supports network slicing as described in 3GPP TS 23.501 [8] within a PLMN or SNPN a network slice is identified by an S-NSSAI which is comprised of a slice/service type (SST) and a slice differentiator (SD) inclusion of an SD in an S-NSSAI is optional a set of one or more S-NSSAIs is called the NSSAI the following S-NSSAIs and NSSAIs are defined in 3GPP TS 23.501 [8]

a) configured NSSAI;

b) requested NSSAI;

c) allowed NSSAI;

d) subscribed S-NSSAIs;

e) pending NSSAI;

f) alternative S-NSSAIs; and

g) partially allowed NSSAI

the following S-NSSAIs and NSSAIs are defined in the present document

a) rejected NSSAI for the current PLMN or SNPN;

b) rejected NSSAI for the current registration area;

c) rejected NSSAI for the failed or revoked NSSAA;

d) rejected NSSAI for the maximum number of UEs reached;

e) alternative NSSAI;

f) partially rejected NSSAI;

g) on-demand S-NSSAIs; and

h) on-demand NSSAI

in roaming scenarios rejected NSSAI for the current PLMN or SNPN rejected NSSAI for the current registration area rejected NSSAI for the maximum number of UEs reached or partially rejected NSSAI includes one or more S-NSSAIs for the current PLMN and also contains a set of mapped S-NSSAI(s) an S-NSSAI included in the rejected NSSAI for the failed or revoked NSSAA is an HPLMN S-NSSAI

in case of a PLMN a serving PLMN may configure a UE with

a) the configured NSSAI per PLMN;

b) NSSRG information if the UE has indicated that it supports the subscription-based restrictions to simultaneous registration of network slices feature;

c) on-demand NSSAI if the UE has indicated it supports the network slice usage control feature;

d) S-NSSAI time validity information if the UE has indicated that it supports S-NSSAI time validity information; and

e) S-NSSAI location validity information if the UE has indicated that it supports S-NSSAI location validity information

in addition the HPLMN may configure a UE with a single default configured NSSAI and consider the default configured NSSAI as valid in a PLMN for which the UE has neither a configured NSSAI nor an allowed NSSAI the support for NSSRG information by the UE and the network respectively is optional

NOTE 0 in this version of the specification the network slice usage control feature is not supported in roaming scenarios

NOTE 1 the value(s) used in the default configured NSSAI are expected to be commonly decided by all roaming partners e.g. values standardized by 3GPP or other bodies

in case of an SNPN the SNPN may configure a UE which is neither registering nor registered for onboarding services in SNPN with

a) a configured NSSAI applicable to the SNPN;

b) NSSRG information if the UE has indicated that it supports the subscription-based restrictions to simultaneous registration of network slices feature;

c) S-NSSAI time validity information if the UE has indicated that it supports S-NSSAI time validity information;

d) on-demand NSSAI if the UE has indicated it supports the network slice usage control feature; and

e) S-NSSAI location validity information if the UE has indicated that it supports S-NSSAI location validity information

in addition the credential holder may configure a single default configured NSSAI associated with the selected entry of the "list of subscriber data" or the PLMN subscription and consider the default configured NSSAI as valid in a SNPN for which the UE has neither a configured NSSAI nor an allowed NSSAI if the UE is registering or registered for onboarding services in SNPN the serving SNPN shall not provide a configured NSSAI to the UE the support for NSSRG information by the UE and the network respectively is optional

the allowed NSSAI and the rejected NSSAI for the current registration area are managed per access type independently i.e 3GPP access or non-3GPP access and is applicable for the registration area if the UE does not have a valid registration area the rejected NSSAI for the current registration area is applicable to the tracking area on which it was received if the registration area contains TAIs belonging to different PLMNs which are equivalent PLMNs the allowed NSSAI the rejected NSSAI for the current registration area rejected NSSAI for the failed or revoked NSSAA and rejected NSSAI for the maximum number of UEs reached are applicable to these PLMNs in this registration area

the allowed NSSAI that is associated with a registration area containing TAIs belonging to different PLMNs which are equivalent PLMNs can be used to form the requested NSSAI for any of the equivalent PLMNs when the UE is outside of the registration area where the allowed NSSAI was received

when the network slice-specific authentication and authorization procedure is to be initiated for one or more S-NSSAIs in the requested NSSAI or the network slice-specific authentication and authorization procedure is ongoing for one or more S-NSSAIs these S-NSSAI(s) will be included in the pending NSSAI when the network slice-specific authentication and authorization procedure is completed for an NSSAI that has been in the pending NSSAI the S-NSSAI will be moved to the allowed NSSAI or rejected NSSAI depending on the outcome of the procedure the AMF sends the updated allowed NSSAI to the UE over the same access of the requested S-NSSAI the AMF sends the updated partially allowed NSSAI to the UE only over the 3GPP access the AMF sends the updated rejected NSSAI over either 3GPP access or non-3GPP access the pending NSSAI is managed regardless of access type i.e the pending NSSAI is applicable to both 3GPP access and non-3GPP access for the current PLMN even if sent over only one of the accesses if the registration area contains TAIs belonging to different PLMNs which are equivalent PLMNs the pending NSSAI is applicable to these PLMNs in this registration area

the rejected NSSAI for the current PLMN or SNPN is applicable for the whole registered PLMN or SNPN regardless of the access type the AMF shall only send a rejected NSSAI for the current PLMN when the registration area consists of TAIs that only belong to the registered PLMN if the UE receives a rejected NSSAI for the current PLMN and the registration area also contains TAIs belonging to different PLMNs the UE shall treat the received rejected NSSAI for the current PLMN as applicable to the whole registered PLMN

the rejected NSSAI for the failed or revoked NSSAA includes one or more S-NSSAIs that have failed the network slice-specific authentication and authorization or for which the authorization have been revoked and are applicable for the whole registered PLMN or SNPN regardless of the access type

the rejected NSSAI for the maximum number of UEs reached is applicable for the whole registered PLMN or SNPN and the access type over which the rejected NSSAI was sent the AMF shall send a rejected NSSAI including S-NSSAI(s) with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" when one or more S-NSSAIs are indicated that the maximum number of UEs has been reached if the timer T3526 associated with the S-NSSAI(s) was started upon reception of the rejected NSSAI for the maximum number of UEs reached the UE may remove the S-NSSAI(s) from the rejected NSSAI including S-NSSAI(s) with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" if the timer T3526 associated with the S-NSSAI(s) expires if one or more S-NSSAIs are removed from the rejected NSSAI for the maximum number of UEs reached the timer T3526 associated with the removed S-NSSAI(s) shall be stopped if running the UE shall not stop the timer T3526 if the UE selects an E-UTRA cell connected to EPC

if the UE receives a rejected NSSAI for the maximum number of UEs reached the registration area contains TAIs belonging to different PLMNs which are equivalent PLMNs the UE shall treat the received rejected NSSAI for the maximum number of UEs reached as applicable to these equivalent PLMNs when the UE is in this registration area

if the UE has indicated that the UE supports network slice replacement feature and the AMF determines to provide the mapping information between the S-NSSAI to be replaced and the alternative S-NSSAI to the UE the network shall provide the UE with the alternative NSSAI the alternative NSSAI is managed per access type independently i.e 3GPP access or non-3GPP access and is applicable for the registration area

if the UE has indicated that the UE supports the partial network slice feature and includes the S-NSSAI(s) in the requested NSSAI the AMF determines the S-NSSAI(s) to be included in the partially allowed NSSAI or the partially rejected NSSAI as specified in subclause 4.6.2.11 when the AMF provides both the partially allowed NSSAI and the partially rejected NSSAI to the UE each S-NSSAI shall be either in the partially allowed NSSAI or in the partially rejected NSSAI but not both the number of S-NSSAIs included in the partially allowed NSSAI or the partially rejected NSSAI shall not exceed 7 the sum of the number of S-NSSAI(s) stored in the partially allowed NSSAI and the allowed NSSAI shall not exceed 8 the partially allowed NSSAI is only applicable to 3GPP access and is applicable for the registration area the partially rejected NSSAI is only applicable to 3GPP access and is applicable for the registration area

NOTE 2 based on local policies the UE can remove an S-NSSAI from the rejected NSSAI for the failed or revoked NSSAA when the UE wants to register to the slice identified by this S-NSSAI

NOTE 3 based on network local policy network slice-specific authentication and authorization procedure can be initiated by the AMF for an S-NSSAI in rejected NSSAI for the failed or revoked NSSAA when the S-NSSAI is requested by the UE based on its local policy

NOTE 4 at least one S-NSSAI in the default configured NSSAI or at least one default S-NSSAI is recommended as not subject to network slice-specific authentication and authorization in order to ensure that at least one PDU session can be established to access service even when network Slice-specific authentication and authorization fails

NOTE 5 at least one S-NSSAI in the default configured NSSAI or at least one default S-NSSAI is recommended as not subject to network slice admission control in order to ensure that at least one PDU session can be established to access service

NOTE 6 the rejected NSSAI can be provided by the network via either rejected NSSAI IE or the extended rejected NSSAI IE

### 4.6.2 mobility management aspects

#### 4.6.2.1 general

upon registration to a PLMN or SNPN (except for the registration procedure for periodic registration update the initial registration for onboarding services in SNPN and the registration procedure for mobility registration update when registered for onboarding services in SNPN) the UE shall send to the AMF the requested NSSAI which includes one or more S-NSSAIs of the allowed NSSAI for the PLMN or SNPN or the configured NSSAI for the PLMN or SNPN and corresponds to the network slice(s) to which the UE intends to register with if

a) the UE has a configured NSSAI for the current PLMN or SNPN;

b) the UE has an allowed NSSAI for the current PLMN or SNPN; or

c) the UE has neither allowed NSSAI for the current PLMN or SNPN nor configured NSSAI for the current PLMN or SNPN and has a default configured NSSAI in this case the UE indicates to the AMF that the requested NSSAI is created from the default configured NSSAI

in roaming scenarios if the mapped S-NSSAI(s) associated to the allowed NSSAI or the configured NSSAI are missing the UE shall locally set the mapped S-NSSAI to the same value as the received S-NSSAI additionally if the UE receives a rejected NSSAI IE or an extended rejected NSSAI IE without associated mapped S-NSSAI(s) and the rejected NSSAI is different from the rejected NSSAI for the failed or revoked NSSAA the UE shall locally set the mapped S-NSSAI(s) to the same value as the received S-NSSAI

NOTE 1 the above occurs only when the UE is roaming and the AMF is compliant with earlier versions of the specification omits providing to the UE a mapped S-NSSAI for one or more S-NSSAIs in e.g. the allowed NSSAI or configured NSSAI

other than S-NSSAIs contained in the NSSAIs described above the requested NSSAI can be formed based on the S-NSSAI(s) available in the UE (see subclause 5.5.1.3.2 for further details) in roaming scenarios the UE shall also provide the mapped S-NSSAI(s) for the requested NSSAI

NOTE 2 if the UE did not receive a mapped S-NSSAI for one or more S-NSSAIs in the allowed NSSAI or configured NSSAI the UE still uses the S-NSSAI as received from the serving network (i.e. without the locally set mapped S-NSSAI) in any NAS message

the AMF verifies if the requested NSSAI is permitted based on the subscribed S-NSSAIs in the UE subscription and in roaming scenarios the mapped S-NSSAI(s) provided by the UE and if so then the AMF shall provide the UE with the allowed NSSAI for the PLMN or SNPN and shall also provide the UE with the mapped S-NSSAI(s) for the allowed NSSAI for the PLMN or SNPN additionally if the AMF allows one or more subscribed S-NSSAIs for the UE the AMF may include the allowed subscribed S-NSSAI(s) in the allowed NSSAI in the REGISTRATION ACCEPT message the AMF shall ensure that there are not two or more S-NSSAIs of the allowed NSSAI which are mapped to the same S-NSSAI of the HPLMN or the subscribed SNPN if

a) all the S-NSSAIs included in the requested NSSAI are rejected or the requested NSSAI was not included by the UE;

b) all default S-NSSAIs are not allowed; and

c) the UE is neither registering nor registered for onboarding services in SNPN and the UE is neither registering nor registered for emergency services;

then the AMF may reject the registration request (see subclauses 5.5.1.2.5 and 5.5.1.3.5 for further details)

in roaming scenarios if the mapped S-NSSAI(s) associated to requested NSSAI are missing the AMF shall locally set the mapped S-NSSAI to the same value as the received S-NSSAI

NOTE 3 in roaming scenarios when the UE is compliant with earlier versions of the specification or when the serving network does not provide a mapped S-NSSAI for one or more S-NSSAIs in the allowed NSSAI or configured NSSAI the UE can omit a mapped S-NSSAI for one or more S-NSSAIs in requested NSSAI

the set of network slice(s) for a UE can be changed at any time while the UE is registered to a PLMN or SNPN and the change may be initiated by the network or the UE in this case the allowed NSSAI and associated registration area may be changed during the registration procedure or the generic UE configuration update procedure the configured NSSAI and the rejected NSSAI may be changed during the registration procedure or the generic UE configuration update procedure the default configured NSSAI may be changed by sending a UE parameters update transparent container to the UE during the NAS transport procedure the pending NSSAI may be changed during the registration procedure in addition using the generic UE configuration update procedure the network may trigger the registration procedure in order to update the allowed NSSAI

the UE in NB-N1 mode does not include the requested NSSAI during the registration procedure if the 5GS registration type IE indicates "mobility registration updating" procedure is not initiated to change the slice(s) that the UE is currently registered to and the UE is still in the current registration area

the AMF does not include the allowed NSSAI during a registration procedure with the 5GS registration type IE indicating "mobility registration updating" for the UE in NB-N1 mode except if the allowed NSSAI has changed for the UE

the UE does not include the requested NSSAI during the registration procedure if the 5GS registration type IE indicates "SNPN onboarding registration" or the UE is registered for onboarding services in SNPN the AMF does not include the allowed NSSAI during a registration procedure with the 5GS registration type IE indicating "SNPN onboarding registration" or during a registration procedure when the UE is registered for onboarding services in SNPN

the UE considers the last received allowed NSSAI as valid until the UE receives a new allowed NSSAI

#### 4.6.2.2 NSSAI storage

if available the configured NSSAI(s) shall be stored in a non-volatile memory in the ME as specified in annex c for a configured NSSAI if there is

a) associated NSSRG information the NSSRG information shall also be stored in a non-volatile memory in the ME as specified in annex C;

b) associated NSAG information the NSAG information shall be stored in the ME;

c) associated S-NSSAI time validity information the S-NSSAI time validity information shall also be stored in a non-volatile memory in the ME as specified in annex C;

d) associated S-NSSAI location validity information the S-NSSAI location validity information shall also be stored in a non-volatile memory in the ME as specified in annex C; and

e) associated on-demand NSSAI the on-demand NSSAI shall also be stored in a non-volatile memory in the ME as specified in annex c

each of the configured NSSAI stored in the UE including the default configured NSSAI is a set composed of at most 16 S-NSSAIs each of the configured NSSAI except the default configured NSSAI is associated with a PLMN identity or SNPN identity and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the selected entry of the "list of subscriber data" or the selected PLMN subscription

the allowed NSSAI(s) should be stored in a non-volatile memory in the ME as specified in annex c the partially allowed NSSAI(s) should be stored in a non-volatile memory in the ME as specified in annex c

each of the allowed NSSAI stored in the UE is a set composed of at most 8 S-NSSAIs and is associated with a PLMN identity or SNPN identity an access type and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the selected entry of the "list of subscriber data" or the selected PLMN subscription each of the alternative NSSAI stored in the UE is a set composed of at most 8 pairs of S-NSSAI to be replaced and alternative S-NSSAI and is associated with a PLMN identity or SNPN identity an access type and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the selected entry of the "list of subscriber data" or the selected PLMN subscription each of the partially allowed NSSAI stored in the UE is a set composed of at most 7 S-NSSAIs and a list of TAs for which S-NSSAI is supported and is associated with a PLMN identity or SNPN identity 3GPP access type and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the selected entry of the "list of subscriber data" or the selected PLMN subscription the sum of number of S-NSSAI(s) stored in the partially allowed NSSAI and the allowed NSSAI shall not exceed 8

each of the pending NSSAI stored in the UE is a set composed of at most 16 S-NSSAIs and is associated with a PLMN identity or SNPN identity and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the selected entry of the "list of subscriber data" or the selected PLMN subscription

each of the rejected NSSAI is associated with a PLMN identity or SNPN identity and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the selected entry of the "list of subscriber data" or the selected PLMN subscription the S-NSSAI(s) in the rejected NSSAI for the current registration area are further associated with one or more tracking areas where the rejected S-NSSAI(s) is not available the S-NSSAI(s) in the rejected NSSAI for the maximum number of UEs reached are further associated with the access type over which the rejected NSSAI was received the S-NSSAI(s) in the partially rejected NSSAI are further associated with 3GPP access

there shall be no duplicated PLMN identities or SNPN identities associated with each of the list of configured NSSAI(s) pending NSSAI(s) rejected NSSAI(s) for the current PLMN or SNPN rejected NSSAI(s) for the current registration area rejected NSSAI(s) for the failed or revoked NSSAA and rejected NSSAI for the maximum number of UEs reached

the UE stores NSSAIs as follows

a) the configured NSSAI shall be stored until a new configured NSSAI is received for a given PLMN or SNPN the network may provide to the UE the mapped S-NSSAI(s) for the new configured NSSAI which shall also be stored in the UE when the UE is provisioned with a new configured NSSAI for a PLMN or SNPN the UE shall

1) replace any stored configured NSSAI for this PLMN or SNPN with the new configured NSSAI for this PLMN or SNPN;

2) delete any stored mapped S-NSSAI(s) for the configured NSSAI and if available store the mapped S-NSSAI(s) for the new configured NSSAI;

3) delete any stored allowed NSSAI and partially allowed NSSAI for this PLMN or SNPN and if available the stored mapped S-NSSAI(s) for the allowed NSSAI if the UE received the new configured NSSAI for this PLMN or SNPN and the configuration update indication IE with the registration requested bit set to "registration requested" in the same CONFIGURATION UPDATE COMMAND message but without any new allowed NSSAI for this PLMN or SNPN included;

4) delete any stored rejected NSSAI and partially rejected NSSAI and stop any timer T3526 associated with a deleted S-NSSAI in the rejected NSSAI for the maximum number of UEs reached if running;

4A) delete any stored mapped S-NSSAI(s) for the rejected NSSAI; and

5) delete any S-NSSAI(s) stored in the pending NSSAI that are not included in the new configured NSSAI for the current PLMN or SNPN or any mapped S-NSSAI(s) if any stored in the pending NSSAI that are not included in the mapped S-NSSAI(s) for the configured NSSAI (if the UE is roaming or is in a non-subscribed SNPN);

if the UE having a stored configured NSSAI for a PLMN ID receives an S-NSSAI associated with a PLMN ID from the network during the PDN connection establishment procedure in EPS as specified in 3GPP TS 24.301 [15] or via ePDG as specified in 3GPP TS 24.302 [16] the UE may store the received S-NSSAI in the configured NSSAI for the PLMN identified by the PLMN ID associated with the S-NSSAI if not already included in the configured NSSAI and if the number of S-NSSAIs in the configured NSSAI is less than 16;

the UE may continue storing a received configured NSSAI for a PLMN and associated mapped S-NSSAI(s) if available when the UE registers in another PLMN

NOTE 1 the maximum number of configured NSSAIs and associated mapped S-NSSAIs for PLMNs other than the HPLMN that need to be stored in the UE and how to handle the stored entries are up to UE implementation

aa) the NSAG information shall be stored until

1) a new NSAG information for the registered PLMN or the registered SNPN is received over 3GPP access; or

2) a new configured NSSAI without any associated NSAG information for the registered PLMN or the registered SNPN is received over 3GPP access

the UE shall remove any S-NSSAI from the NSAG information which is not part of the configured NSSAI if any

NOTE 1A if the UE is roaming or the current SNPN is a non-subscribed SNPN the UE uses the S-NSSAI(s) in the configured NSSAI to compare against any S-NSSAI from the NSAG information

when a new NSAG information for the registered PLMN or the registered SNPN is received over 3GPP access the UE shall replace any stored NSAG information for the registered PLMN and its equivalent PLMN(s) or the registered SNPN and its equivalent SNPN(s) with the new NSAG information for the registered PLMN or the registered SNPN

when a new configured NSSAI without any associated NSAG information for the registered PLMN or the registered SNPN is received over 3GPP access the UE shall delete any stored NSAG information for the registered PLMN and its equivalent PLMN(s) or the registered SNPN and its equivalent SNPN(s)

the UE shall be able to store 32 NSAG entries in the NSAG information stored for the registered PLMN or the registered SNPN

the UE shall be able to store TAI lists for up to 4 NSAG entries in the NSAG information stored for the registered PLMN or the registered SNPN

the UE needs not to store the NSAG information when the UE is switched off or when the UE is deregistered from the registered PLMN or the registered SNPN

NOTE 1B the UE stores the NSAG information associated with the configured NSSAI for at least the registered PLMN and its equivalent PLMN(s) or the registered SNPN and its equivalent PLMN(s)

b) the allowed NSSAI shall be stored and the mapped S-NSSAI(s) for the allowed NSSAI (if available) shall be stored for a given PLMN and its equivalent PLMN(s) in the registration area or SNPN until

1) a new allowed NSSAI for the same access type (i.e 3GPP access or non-3GPP access) is received for a given PLMN or SNPN;

2) the CONFIGURATION UPDATE COMMAND message with the registration requested bit of the configuration update indication IE set to "registration requested" is received and contains no other parameters (see subclauses 5.4.4.2 and 5.4.4.3);

3) the REGISTRATION ACCEPT message is received with the "NSSAA to be performed" indicator of the 5GS registration result IE set to "Network slice-specific authentication and authorization is to be performed" and the REGISTRATION ACCEPT message contains a pending NSSAI and no new allowed NSSAI as described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4; or

4) a new partially allowed NSSAI via 3GPP access is received for a given PLMN or SNPN

b1) the UE shall delete the stored partially allowed NSSAI and stored mapped S-NSSAI(s) for partially allowed NSSAI over 3GPP access when

1) new partially allowed NSSAI for a PLMN or SNPN is received and the new partially allowed NSSAI does not include any S-NSSAI(s);

2) the CONFIGURATION UPDATE COMMAND message with the registration requested bit of the configuration update indication IE set to "registration requested" is received and contains no other parameters (see subclauses 5.4.4.2 and 5.4.4.3); or

3) the REGISTRATION ACCEPT message is received with the "NSSAA to be performed" indicator of the 5GS registration result IE set to "Network slice-specific authentication and authorization is to be performed" and the REGISTRATION ACCEPT message contains a pending NSSAI and no new partially allowed NSSAI

the network may provide to the UE the mapped S-NSSAI(s) for the new allowed NSSAI (see subclauses 5.5.1.2 and 5.5.1.3) which shall also be stored in the UE when a new allowed NSSAI for a PLMN or SNPN is received the UE shall

1) replace any stored allowed NSSAI for this PLMN and its equivalent PLMN(s) in the registration area or this SNPN for the same access type with the new allowed NSSAI for this PLMN or SNPN;

2) delete any stored mapped S-NSSAI(s) for the allowed NSSAI for this PLMN and its equivalent PLMN(s) in the registration area or this SNPN for the same access type and if available store the mapped S-NSSAI(s) for the new allowed NSSAI;

3) remove from the stored rejected NSSAI for the current PLMN or SNPN the rejected NSSAI for the current registration area rejected NSSAI for the maximum number of UEs reached and the partially rejected NSSAI the S-NSSAI(s) if any included in the new allowed NSSAI for the current PLMN or SNPN unless the S-NSSAI in the rejected NSSAI or the partially rejected NSSAI is associated with one or more S-NSSAI(s) in the stored mapped rejected NSSAI or the stored mapped partially rejected NSSAI and at least one of these mapped S-NSSAI(s) is not included in the mapped S-NSSAI(s) for the new allowed NSSAI and stop any timer T3526 associated with a deleted S-NSSAI in the rejected NSSAI for the maximum number of UEs reached if running;

4) remove from the stored rejected NSSAI for the failed or revoked NSSAA the S-NSSAI(s) if any included in the new allowed NSSAI for the current PLMN (if the UE is not roaming) or the current SNPN (if the SNPN is the subscribed SNPN) or the mapped S-NSSAI(s) for the new allowed NSSAI for the current PLMN (if the UE is roaming) or the current SNPN (if the SNPN is a non-subscribed SNPN);

5) remove from the stored mapped S-NSSAI(s) for the rejected NSSAI for the current PLMN or SNPN the stored mapped S-NSSAI(s) for the rejected NSSAI for the current registration area the stored mapped S-NSSAI(s) for the partially rejected NSSAI and the mapped S-NSSAI(s) for the rejected NSSAI for the maximum number of UEs reached the S-NSSAI(s) if any included in the mapped S-NSSAI(s) for the new allowed NSSAI for the current PLMN (if the UE is roaming) or the current SNPN (if the SNPN is a non-subscribed SNPN) and stop any timer T3526 associated with a deleted S-NSSAI in the rejected NSSAI for the maximum number of UEs reached if running; and

6) remove from the stored pending NSSAI for this PLMN and its equivalent PLMN(s) in the registration area or this SNPN one or more S-NSSAIs if any included in the new allowed NSSAI for the current PLMN and these equivalent PLMN(s) (if the UE is not roaming) or the current SNPN (if the SNPN is the subscribed SNPN) or the mapped S-NSSAI(s) for the new allowed NSSAI for the current PLMN and these equivalent PLMN(s) (if the UE is roaming) or the current SNPN (if the SNPN is a non-subscribed SNPN)

NOTE 2 whether the UE stores the allowed NSSAI and the mapped S-NSSAI(s) for the allowed NSSAI also when the UE is switched off is implementation specific

the network may provide to the UE the partially allowed NSSAI when a new partially allowed NSSAI for a PLMN or SNPN is received and the new partially allowed NSSAI includes one or more S-NSSAI(s) the UE shall

1) replace any stored partially allowed NSSAI for this PLMN and its equivalent PLMN(s) in the registration area or this SNPN via the 3GPP access with the new partially allowed NSSAI for this PLMN or SNPN;

2) delete any stored mapped S-NSSAI(s) for the partially allowed NSSAI for this PLMN and its equivalent PLMN(s) in the registration area or this SNPN for the 3GPP access type and if available store the mapped S-NSSAI(s) for the new partially allowed NSSAI;

3) remove from the stored rejected NSSAI for the current PLMN or SNPN the rejected NSSAI for the current registration area rejected NSSAI for the maximum number of UEs reached and the partially rejected NSSAI the S-NSSAI(s) if any included in the new partially allowed NSSAI for the current PLMN or SNPN unless the S-NSSAI in the rejected NSSAI or the partially rejected NSSAI is associated with one or more S-NSSAI(s) in the stored mapped rejected NSSAI or the stored mapped partially rejected NSSAI and at least one of these mapped S-NSSAI(s) is not included in the mapped S-NSSAI(s) for the new partially allowed NSSAI and stop any timer T3526 associated with a deleted S-NSSAI in the rejected NSSAI for the maximum number of UEs reached if running;

4) remove from the stored rejected NSSAI for the failed or revoked NSSAA the S-NSSAI(s) if any included in the new partially allowed NSSAI for the current PLMN (if the UE is not roaming) or the current SNPN (if the SNPN is the subscribed SNPN) or the mapped S-NSSAI(s) for the new partially allowed NSSAI for the current PLMN (if the UE is roaming) or the current SNPN (if the SNPN is a non-subscribed SNPN);

5) remove from the stored mapped S-NSSAI(s) for the rejected NSSAI for the current PLMN or SNPN the stored mapped S-NSSAI(s) for the rejected NSSAI for the current registration area the stored mapped S-NSSAI(s) for the partially rejected NSSAI and the mapped S-NSSAI(s) for the rejected NSSAI for the maximum number of UEs reached the S-NSSAI(s) if any included in the mapped S-NSSAI(s) for the new partially allowed NSSAI for the current PLMN (if the UE is roaming) or the current SNPN (if the SNPN is a non-subscribed SNPN) and stop any timer T3526 associated with a deleted S-NSSAI in the rejected NSSAI for the maximum number of UEs reached if running; and

6) remove from the stored pending NSSAI for this PLMN and its equivalent PLMN(s) in the registration area or this SNPN one or more S-NSSAIs if any included in the new partially allowed NSSAI for the current PLMN and these equivalent PLMN(s) (if the UE is not roaming) or the current SNPN (if the SNPN is the subscribed SNPN) or the mapped S-NSSAI(s) for the new partially allowed NSSAI for the current PLMN and these equivalent PLMN(s) (if the UE is roaming) or the current SNPN (if the SNPN is a non-subscribed SNPN)

ba) the alternative NSSAI and the mapped S-NSSAI(s) for the alternative NSSAI (if the UE is roaming) shall be stored for a given PLMN and its equivalent PLMN(s) or SNPN until a new alternative NSSAI for the same access type (i.e 3GPP access or non-3GPP access) is received for a given PLMN or SNPN

when a new alternative NSSAI for a given PLMN or SNPN is received and the new alternative NSSAI includes a list of mapping information between the S-NSSAI to be replaced and the alternative S-NSSAI the UE shall

1) replace any stored alternative NSSAI for this PLMN and its equivalent PLMN(s) or this SNPN for the same access type with the new alternative NSSAI for this PLMN or SNPN; and

2) delete any stored mapped S-NSSAI(s) for the alternative NSSAI for this PLMN and its equivalent PLMN(s) or this SNPN for the same access type and if available store the mapped S-NSSAI(s) for the new alternative NSSAI

when a new alternative NSSAI for a given PLMN or SNPN is received and the new alternative NSSAI does not include any mapping information between the S-NSSAI to be replaced and the alternative S-NSSAI the UE shall delete any stored alternative NSSAI for this PLMN and its equivalent PLMN(s) or this SNPN for the same access type

when the UE locally removes either the replaced S-NSSAI or the alternative S-NSSAI in the allowed NSSAI upon expiry of the associated slice deregistration inactivity timer or the S-NSSAI time validity information indicates that the S-NSSAI is not available the UE shall delete the entry including the replaced S-NSSAI or the alternative S-NSSAI stored in the alternative NSSAI

NOTE 3 whether the UE stores the alternative NSSAI and the mapped S-NSSAI(s) for the alternative NSSAI also when the UE is switched off is implementation specific

c) when the UE receives the S-NSSAI(s) included in the rejected NSSAI in the REGISTRATION ACCEPT message the REGISTRATION REJECT message the DEREGISTRATION REQUEST message or in the CONFIGURATION UPDATE COMMAND message or the partially rejected NSSAI in the REGISTRATION ACCEPT message or the CONFIGURATION UPDATE COMMAND message the UE shall

1) store the S-NSSAI(s) into the rejected NSSAI and the mapped S-NSSAI(s) for the rejected NSSAI based on the associated rejection cause(s);

2) if the UE receives the S-NSSAI(s) included in the rejected NSSAI IE or if the UE receives the S-NSSAI(s) included in the extended rejected NSSAI IE or if the UE receives the S-NSSAI(s) included in the partially rejected NSSAI IE in non-roaming case when not in SNPN access operation mode or in the subscribed SNPN remove from the stored allowed NSSAI or partially allowed NSSAI for the current PLMN and its equivalent PLMN(s) in the registration area or the current SNPN the S-NSSAI(s) if any included in the

i) rejected NSSAI for the failed or revoked NSSAA for each and every access type;

ii) rejected NSSAI for the current PLMN or SNPN for each and every access type;

iii) rejected NSSAI for the current registration area associated with the same access type;

iv) rejected NSSAI for the maximum number of UEs reached associated with the same access type; or

v) partially rejected NSSAI associated with 3GPP access;

3) if the UE receives the S-NSSAI(s) included in the extended rejected NSSAI IE or if the UE receives the S-NSSAI(s) included in the partially rejected NSSAI IE in roaming case or in a non-subscribed SNPN remove from the stored allowed NSSAI or partially allowed NSSAI for the current PLMN and its equivalent PLMN(s) in the registration area or the current SNPN the S-NSSAI(s) if any included in the

i) rejected NSSAI for the current PLMN or SNPN for each and every access type;

ii) rejected NSSAI for the current registration area associated with the same access type;

iii) rejected NSSAI for the maximum number of UEs reached associated with the same access type; or

iv) partially rejected NSSAI associated with 3GPP access;

if the mapped S-NSSAI(s) for the S-NSSAI in the stored allowed NSSAI or partially allowed NSSAI for the current PLMN or SNPN are stored in the UE and all of the mapped S-NSSAI(s) are included in the extended rejected NSSAI IE or partially rejected NSSAI IE;

4) remove from the stored mapped S-NSSAI(s) for the allowed NSSAI or partially allowed NSSAI (if available and if the UE is roaming or is a non-subscribed SNPN) the S-NSSAI(s) if any included in the

i) rejected NSSAI for the failed or revoked NSSAA for each and every access type;

ii) mapped S-NSSAI(s) for the rejected NSSAI for the current PLMN or SNPN for each and every access type;

iii) mapped S-NSSAI(s) for the rejected NSSAI for the current registration area associated with the same access type;

iv) mapped S-NSSAI(s) for the rejected NSSAI for the maximum number of UEs reached associated with the same access type; or

v) partially rejected NSSAI associated with 3GPP access;

5) if the UE receives the S-NSSAI(s) included in the rejected NSSAI IE or if the UE receives the S-NSSAI(s) included in the extended rejected NSSAI IE in non-roaming case when not in SNPN access operation mode or in the subscribed SNPN remove from the stored pending NSSAI for the current PLMN and its equivalent PLMN(s) in the registration area or the current SNPN the S-NSSAI(s) if any included in the

i) rejected NSSAI for the failed or revoked NSSAA for each and every access type;

ii) rejected NSSAI for the current PLMN or SNPN for each and every access type;

iii) rejected NSSAI for the current registration area associated with the same access type; or

iv) rejected NSSAI for the maximum number of UEs reached associated with the same access type;

6) if the UE receives the S-NSSAI(s) included in the extended rejected NSSAI IE in roaming case or in a non-subscribed SNPN remove from the stored pending NSSAI for the current PLMN and its equivalent PLMN(s) in the registration area or the current SNPN the S-NSSAI(s) if any included in the

i) rejected NSSAI for the current PLMN or SNPN for each and every access type;

ii) rejected NSSAI for the current registration area associated with the same access type; or

iii) rejected NSSAI for the maximum number of UEs reached associated with the same access type

if the mapped S-NSSAI(s) for the S-NSSAI in the stored pending NSSAI are stored in the UE and all of the mapped S-NSSAI(s) are included in the extended rejected NSSAI IE; and

7) remove from the stored mapped S-NSSAI(s) for the pending NSSAI (if available and if the UE is roaming or is in a non-subscribed SNPN) the S-NSSAI(s) if any included in the

i) rejected NSSAI for the failed or revoked NSSAA for each and every access type;

ii) mapped S-NSSAI(s) for the rejected NSSAI for the current PLMN or SNPN for each and every access type;

iii) mapped S-NSSAI(s) for the rejected NSSAI for the current registration area associated with the same access type; or

iv) mapped S-NSSAI(s) for the rejected NSSAI for the maximum number of UEs reached associated with the same access type;

if the UE receives the CONFIGURATION UPDATE COMMAND message with the registration requested bit of the configuration update indication IE set to “registration requested” and contains no other parameters (see subclauses 5.4.4.2 and 5.4.4.3) the UE shall delete any stored rejected NSSAI and partially rejected NSSAI

when the UE

1) enters state 5GMM-DEREGISTERED following an unsuccessful registration for 5GMM causes other than #62 “No network slices available” for the current PLMN or SNPN;

2) successfully registers with a new PLMN or a new SNPN;

3) enters state 5GMM-DEREGISTERED following an unsuccessful registration with a new PLMN or a new SNPN; or

4) performs inter-system change from N1 mode to S1 mode and the UE successfully completes tracking area update procedure;

and the UE is not registered with the PLMN or SNPN which provided the rejected NSSAI over another access the rejected NSSAI for the current PLMN or SNPN and the rejected NSSAI for the failed or revoked NSSAA shall be deleted

when the UE receives ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message provided with S-NSSAI and the PLMN ID in the protocol configuration options IE or extended protocol configuration options IE (see subclause 6.5.1.3 of 3GPP TS 24.301 [15]) the UE shall remove the S-NSSAI associated with the PLMN ID from the rejected NSSAI for the current PLMN when the UE receives ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message provided with S-NSSAI and the PLMN ID in the protocol configuration options IE or extended protocol configuration options IE (see subclause 6.5.1.3 of 3GPP TS 24.301 [15]) the UE may remove the S-NSSAI from the rejected NSSAI for the maximum number of UEs reached for each and every access type if any and stop the timer T3526 associated with the S-NSSAI if running

when the UE

1) deregisters over an access type;

2) successfully registers in a new registration area over an access type;

3) enters state 5GMM-DEREGISTERED or 5GMM-REGISTERED following an unsuccessful registration in a new registration area over an access type; or

4) performs inter-system change from N1 mode to S1 mode and the UE successfully completes tracking area update procedure;

the rejected NSSAI for the current registration area corresponding to the access type and the partially rejected NSSAI shall be deleted when a new partially rejected NSSAI is received without any S-NSSAI(s) the UE shall delete any stored partially rejected NSSAI for the current registration area;

d) when the UE receives the pending NSSAI in the REGISTRATION ACCEPT message the UE shall replace any stored pending NSSAI for this PLMN or SNPN with the new pending NSSAI received in the REGISTRATION ACCEPT message for this PLMN or SNPN if the UE does not receive the pending NSSAI in the REGISTRATION ACCEPT message and the “NSSAA to be performed” indicator is not set to “Network slice-specific authentication and authorization is to be performed” in the 5GS registration result IE of the REGISTRATION ACCEPT message the UE shall delete the stored pending NSSAI if any for this PLMN and its equivalent PLMN(s) in the registration area or this SNPN

if the registration area contains TAIs belonging to different PLMNs which are equivalent PLMNs then for each of the equivalent PLMNs the UE shall replace any stored pending NSSAI with the pending NSSAI received in the registered PLMN

when the UE

1) deregisters with the current PLMN or SNPN using explicit signalling or enters state 5GMM-DEREGISTERED for the current PLMN or SNPN;

2) successfully registers with a new PLMN not in the list of equivalent PLMNs or a new SNPN;

3) enters state 5GMM-DEREGISTERED following an unsuccessful registration with a new PLMN or SNPN; or

4) successfully initiates an attach or tracking area update procedure in S1 mode and the UE is operating in single-registration mode;

and the UE is not registered with the PLMN or SNPN which provided pending NSSAI over another access the pending NSSAI for the current PLMN and its equivalent PLMN(s) in the registration area or the current SNPN shall be deleted;

e) when the UE receives the network slicing indication IE with the network slicing subscription change indication set to "Network slicing subscription changed" in the REGISTRATION ACCEPT message or in the CONFIGURATION UPDATE COMMAND message the UE shall delete the network slicing information for each of the PLMNs or SNPNs that the UE has slicing information stored for (excluding the current PLMN or SNPN) the UE shall delete any stored rejected NSSAI and stop any timer T3526 associated with a deleted S-NSSAI in the rejected NSSAI for the maximum number of UEs reached if running the UE shall not delete the default configured NSSAI additionally the UE shall update the network slicing information for the current PLMN or SNPN (if received) as specified above in bullets a) b) c) and d);

f) when the UE receives the new default configured NSSAI included in the default configured NSSAI update data in the payload container IE of DL NAS TRANSPORT message the UE shall replace any stored default configured NSSAI with the new default configured NSSAI in case of SNPN the UE shall replace the stored default configured NSSAI associated with the selected entry of the "list of subscriber data" or the PLMN subscription with the new default configured NSSAI;

g) when the UE receives the on-demand NSSAI in the REGISTRATION ACCEPT message or CONFIGURATION UPDATE COMMAND message the UE shall replace any stored on-demand NSSAI for the serving PLMN with the new on-demand NSSAI; and

h) when the UE receives a CONFIGURATION UPDATE COMMAND message or REGISTRATION ACCEPT message and an S-NSSAI is removed from the allowed NSSAI the partially allowed NSSAI or the configured NSSAI the UE shall stop the timers T3584 and T3585 associated with the S-NSSAI and serving PLMN or SNPN if running if the timers were running for multiple other PLMNs or equivalent SNPNs (see subclause 6.2.8) the UE shall stop the timers for all such PLMNs or equivalent SNPNs

#### 4.6.2.3 provision of NSSAI to lower layers in 5GMM-IDLE mode

the UE NAS layer may provide the lower layers with an NSSAI (either requested NSSAI or allowed NSSAI) when the UE in 5GMM-IDLE mode sends an initial NAS message

the AMF may indicate via the NSSAI inclusion mode IE of a REGISTRATION ACCEPT message an NSSAI inclusion mode in which the UE shall operate over the current access within the current PLMN or SNPN if any (see subclauses 5.5.1.2.4 and 5.5.1.3.4) where the NSSAI inclusion mode is chosen among the following NSSAI inclusion modes described in table 4.6.2.3.1

table 4.6.2.3.1 NSSAI inclusion modes and NSSAI which shall be provided to the lower layers

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Initial NAS message | NSSAI inclusion mode A | NSSAI inclusion mode B | NSSAI inclusion mode C | NSSAI inclusion mode D |
| REGISTRATION REQUEST message: i) including the 5GS registration type IE set to "initial registration" | Requested NSSAI, if any | Requested NSSAI, if any | Requested NSSAI, if any | No NSSAI |
| REGISTRATION REQUEST message: i) including the 5GS registration type IE set to "mobility registration updating"; and ii) initiated by case other than case g) or n) in subclause 5.5.1.3.2 | Requested NSSAI, if any | Requested NSSAI, if any | Requested NSSAI, if any | No NSSAI |
| REGISTRATION REQUEST message: i) including the 5GS registration type IE set to "mobility registration updating"; and ii) initiated by case g) or n) in subclause 5.5.1.3.2 | Allowed NSSAI, and partially allowed NSSAI, if any | Allowed NSSAI, and partially allowed NSSAI, if any | No NSSAI | No NSSAI |
| REGISTRATION REQUEST message: i) including the 5GS registration type IE set to "periodic registration updating" | Allowed NSSAI, and partially allowed NSSAI, if any | Allowed NSSAI, and partially allowed NSSAI, if any | No NSSAI | No NSSAI |
| SERVICE REQUEST message | Allowed NSSAI, and partially allowed NSSAI, if any | See NOTE 1 | No NSSAI | No NSSAI |
| NOTE 1: All the S-NSSAIs of the PDU sessions that have the user-plane resources requested to be re-established by the service request procedure or the S-NSSAIs of a control plane interaction triggering the service request is related to (see 3GPP TS 23.501 [8])  NOTE 2: For a REGISTRATION REQUEST message which is triggered by emergency services, a DEREGISTRATION REQUEST message, and a SERVICE REQUEST message which is triggered by emergency services (e.g. a SERVICE REQUEST message includes the service type IE set to "emergency services" or "emergency services fallback", a SERVICE REQUEST message triggered for emergency services includes the service type IE set to “high priority access” as specified in subclause 5.6.1.2.1), no NSSAI is provided to the lower layers. If the UE performs initial registration for onboarding services in SNPN or is registered for onboarding services in SNPN, the UE NAS layer shall not provide the lower layers with an NSSAI.  NOTE 3: The mapped configured S-NSSAI(s) from the S-NSSAI(s) of the HPLMN are not included as part of the S-NSSAIs in the requested NSSAI or the allowed NSSAI when it is provided to the lower layers. | | | | |

the UE shall store the NSSAI inclusion mode

a) indicated by the AMF if the AMF included the NSSAI inclusion mode IE in the REGISTRATION ACCEPT message; or

b) if the AMF did not include the NSSAI inclusion mode IE in the REGISTRATION ACCEPT message

1) if the UE is pre-configured by operator to operate by default to according to mode c in the HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present) (see the DefaultNSSAIInclusionMode leaf of the NAS configuration MO in 3GPP TS 24.368 [17] or the USIM file EFNASCONFIG in 3GPP TS 31.102 [22]) then mode C;

2) otherwise

i) mode d for 3GPP access and trusted non-3GPP access; or

ii) mode b for untrusted non-3GPP access and wireline access

together with the identity of the current PLMN or SNPN and access type in a non-volatile memory in the ME as specified in annex c

the UE shall apply the NSSAI inclusion mode received in the REGISTRATION ACCEPT message over the current access within the current PLMN and its equivalent PLMN(s) if any or the current SNPN in the current registration area

when a UE performs a registration procedure to a PLMN which is not a PLMN in the current registration area or an SNPN if the UE has no NSSAI inclusion mode for the PLMN or the SNPN stored in a non-volatile memory in the ME the UE shall provide the lower layers with

a) no NSSAI if the UE is performing the registration procedure over 3GPP access; or

b) requested NSSAI if the UE is performing the registration procedure over non-3GPP access

when a UE performs a registration procedure after an inter-system change from S1 mode to N1 mode if the UE has no NSSAI inclusion mode for the PLMN stored in a non-volatile memory in the ME and the registration procedure is performed over 3GPP access the UE shall not provide the lower layers with any NSSAI over the 3GPP access

#### 4.6.2.4 network slice-specific authentication and authorization

the UE and network may support network slice-specific authentication and authorization

a serving PLMN or SNPN shall perform network slice-specific authentication and authorization for the S-NSSAI(s) of the HPLMN or the subscribed SNPN which are subject to it based on subscription information the UE shall indicate whether it supports network slice-specific authentication and authorization in the 5GMM capability IE in the REGISTRATION REQUEST message as specified in subclauses 5.5.1.2.2 and 5.5.1.3.2

the upper layer stores an association between each S-NSSAI and its corresponding credentials for the network slice-specific authentication and authorization

NOTE 1 the credentials for network slice-specific authentication and authorization and how to provision them in the upper layer are out of the scope of 3GPP

the network slice-specific authentication and authorization procedure shall not be performed unless the primary authentication and key agreement procedure as specified in the subclause 5.4.1 has successfully been completed

the AMF informs the UE about S-NSSAI(s) for which network slice-specific authentication and authorization (except for re-NSSAA) will be performed or is ongoing in the pending NSSAI the AMF informs the UE about S-NSSAI(s) for which NSSAA procedure is completed as success in the allowed NSSAI or in the partially allowed NSSAI the AMF informs the UE about S-NSSAI(s) for which NSSAA procedure is completed as failure in the rejected NSSAI for the failed or revoked NSSAA the AMF stores and handles allowed NSSAI partially allowed NSSAI pending NSSAI rejected NSSAI and 5GS registration result in the REGISTRATION ACCEPT message according to subclauses 5.5.1.2.4 and 5.5.1.3.4

NOTE 2 the AMF maintains the NSSAA procedure status for each S-NSSAI as specified in 3GPP TS 29.518 [20B] and the NSSAA procedure status for each S-NSSAI is not impacted by NSAC as specified in subclauses 4.6.2.5 and 4.6.3.1

NOTE 3 upon completion of NSSAA procedures it can happen that the total number of S-NSSAIs which need to be included in the allowed NSSAI exceeds eight in this case it is up to the AMF implementation on how to pick up the S-NSSAIs included in the allowed NSSAI

NOTE 4 it can happen that one or more S-NSSAIs included in the received allowed NSSAI are not the S-NSSAIs that the UE intends to register to in this case it is up to the UE implementation on how to use these S-NSSAIs

to perform network slice-specific authentication and authorization for an S-NSSAI the AMF invokes an EAP-based network slice-specific authentication and authorization procedure for the S-NSSAI see subclause 5.4.7 and 3GPP TS 23.502 [9] using the EAP framework as described in 3GPP TS 33.501 [24]

the AMF updates the allowed NSSAI the partially allowed NSSAI and the rejected NSSAI using the generic UE configuration update procedure as specified in the subclause 5.4.4 after the network slice-specific authentication and authorization procedure is completed

the AMF shall send the pending NSSAI containing all S-NSSAIs for which the network slice-specific authentication and authorization procedure (except for re-NSSAA) will be performed or is ongoing in the REGISTRATION ACCEPT message the AMF shall also include in the REGISTRATION ACCEPT message the allowed NSSAI containing one or more S-NSSAIs from the requested NSSAI which are allowed by the AMF and for which network slice-specific authentication and authorization is not required if any the AMF shall also include in the REGISTRATION ACCEPT message the partially allowed NSSAI containing one or more S-NSSAIs from the requested NSSAI which are allowed by the AMF in a list of TAs within the current registration area and for which network slice-specific authentication and authorization is not required if any

the network slice-specific re-authentication and re-authorization procedure or the network slice-specific authorization revocation procedure can be invoked by the network for a UE supporting NSSAA at any time after the network performs the network slice-specific re-authentication and re-authorization procedure or network slice-specific authorization revocation procedure

a) if network slice-specific re-authentication and re-authorization fails or network slice-specific authorization is revoked for some but not all S-NSSAIs in the allowed NSSAI or the partially allowed NSSAI, the AMF updates the allowed NSSAI or the partially allowed NSSAI and the rejected NSSAI accordingly using the generic UE configuration update procedure as specified in the subclause 5.4.4 and inform the SMF to release all PDU sessions associated with the S-NSSAI for which network slice-specific re-authentication and re-authorization fails or network slice-specific authorization is revoked;

b) if network slice-specific re-authentication and re-authorization fails or network slice-specific authorization is revoked for all S-NSSAIs in the allowed NSSAI or the partially allowed NSSAI but there are one or more default S-NSSAIs which are not subject to network slice-specific authentication and authorization or for which the network slice-specific authentication and authorization has been successfully performed the AMF updates the allowed NSSAI or the partially allowed NSSAI containing these default S-NSSAIs and the rejected NSSAI accordingly using the generic UE configuration update procedure as specified in the subclause 5.4.4 the AMF shall also inform the SMF to release all PDU sessions associated with the S-NSSAI for which network slice-specific re-authentication and re-authorization fails or network slice-specific authorization is revoked; or

c) if network slice-specific re-authentication and re-authorization fails or network slice-specific authorization is revoked for all S-NSSAIs in the allowed NSSAI or the partially allowed NSSAI and all default S-NSSAIs are subject to network slice-specific authentication and authorization and the network slice-specific authentication and authorization has not been successfully performed for any of these default S-NSSAIs then AMF performs the network-initiated de-registration procedure and includes the rejected NSSAI in the DEREGISTRATION REQUEST message as specified in the subclause 5.5.2.3 except when the UE has an emergency PDU session established or the UE is establishing an emergency PDU session in this case the AMF shall send the CONFIGURATION UPDATE COMMAND message containing rejected NSSAI and inform the SMF to release all PDU sessions associated with the S-NSSAI for which network slice-specific re-authentication and re-authorization fails or network slice-specific authorization is revoked after the emergency PDU session is released the AMF performs the network-initiated de-registration procedure as specified in the subclause 5.5.2.3

the UE does not include in the requested NSSAI any of the S-NSSAIs from the pending NSSAI that the UE stores regardless of the access type when the UE storing a pending NSSAI intends to register to one or more additional S-NSSAIs not included in the pending NSSAI the UE initiates the registration procedure with a requested NSSAI containing these S-NSSAIs as described in subclause 5.5.1.3.2 in this case the requested NSSAI shall also include one or more S-NSSAIs from the allowed NSSAI or the partially allowed NSSAI if the UE still wants to use the S-NSSAI(s) from the allowed NSSAI or the partially allowed NSSAI

during the registration procedure when the AMF receives a requested NSSAI from a UE over an access type for which there is a pending NSSAI including one or more S-NSSAIs that were previously requested over the same access type the AMF considers S-NSSAIs included in the requested NSSAI and S-NSSAIs in the pending NSSAI that were previously requested over the same access type as requested S-NSSAIs by the UE the AMF handles the requested S-NSSAIs as described in subclause 5.5.1.3.4

when performing the network slice-specific re-authentication and re-authorization procedure if the S-NSSAI is included in the allowed NSSAI for both 3GPP and non-3GPP accesses and the UE is registered to both 3GPP and non-3GPP accesses in the same PLMN then the AMF selects an access type to perform network slice-specific re-authentication and re-authorization based upon operator policy

if network slice-specific authorization is revoked for an S-NSSAI that is in the current allowed NSSAI for an access type or for an S-NSSAI that is in the current partially allowed NSSAI for 3GPP access type the AMF shall

a) provide a new allowed NSSAI or a new partially allowed NSSAI excluding the S-NSSAI for which the network slice-specific authorization is revoked; and

b) provide a new rejected NSSAI for the failed or revoked NSSAA including the S-NSSAI for which the network slice-specific authorization is revoked with the rejection cause "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization"

to the UE using the generic UE configuration update procedure as specified in the subclause 5.4.4 and inform the SMF to release all PDU sessions associated with the S-NSSAI for which the network slice-specific authorization is revoked for this access type

if the UE requests the establishment of a new PDU session or the modification of a PDU session for an S-NSSAI for which the AMF is performing network slice-specific re-authentication and re-authorization procedure the AMF may determine to not forward the 5GSM message to the SMF as described in subclause 5.4.5.2.4

NOTE 5 if the AMF receives the HTTP code set to "4xx" or "5xx" as specified in 3GPP TS 29.500 [20AA] or the AMF detects that the NSSAAF failure as specified in 3GPP TS 29.526 [21A] during the NSSAA procedure for an S-NSSAI then the AMF considers the NSSAA procedure has failed for this S-NSSAI

#### 4.6.2.5 mobility management based network slice admission control

a serving PLMN or SNPN can perform network slice admission control for the S-NSSAI(s) subject to NSAC to monitor and control the number of registered UEs per network slice the timing of the network slice admission control is managed by the EAC mode per network slice which can be either activated or deactivated for the network performing network slice admission control the EAC mode is activated when the number of UEs associated with the S-NSSAI reaches a certain threshold (see 3GPP TS 23.502 [9])

if the EAC mode is activated for an S-NSSAI the AMF performs network slice admission control before the S-NSSAI subject to NSAC is included in the allowed NSSAI or the partially allowed NSSAI sent to the UE during a registration procedure (including initial registration or mobility registration updating from another AMF) if the AMF determines that the maximum number of UEs has been reached for

a) one or more S-NSSAIs but not all S-NSSAIs in the requested NSSAI then the AMF includes the allowed NSSAI or the partially allowed NSSAI and the rejected NSSAI accordingly in the REGISTRATION ACCEPT message as specified in the subclauses 5.5.1.2.4 and 5.5.1.3.4;

b) all S-NSSAIs in the requested NSSAI but there are one or more default S-NSSAIs which can be allowed to the UE then the AMF includes the allowed NSSAI or the partially allowed NSSAI containing these default S-NSSAIs and the rejected NSSAI accordingly in the REGISTRATION ACCEPT message as specified in the subclauses 5.5.1.2.4 and 5.5.1.3.4; or

c) all S-NSSAIs in the requested NSSAI and there are no default S-NSSAIs which can be allowed to the UE then the AMF includes the rejected NSSAI accordingly in the REGISTRATION REJECT message as specified in the subclauses 5.5.1.2.5 and 5.5.1.3.5

if the EAC mode is deactivated for an S-NSSAI the AMF performs network slice admission control after the S-NSSAI subject to NSAC is included in the allowed NSSAI or the partially allowed NSSAI sent to the UE while the AMF is waiting for response from the NSACF for the S-NSSAI the AMF processes the NAS signalling message related to the S-NSSAI as usual i.e like S-NSSAI in the allowed NSSAI or the partially allowed NSSAI after the network performs the network slice admission control if the AMF determines that the maximum number of UEs has been reached for

a) one or more S-NSSAIs but not all S-NSSAIs in the allowed NSSAI or the partially allowed NSSAI then the AMF updates the allowed NSSAI or the partially allowed NSSAI and the rejected NSSAI accordingly using the generic UE configuration update procedure as specified in the subclause 5.4.4;

b) for all S-NSSAIs in the allowed NSSAI or the partially allowed NSSAI but there are one or more default S-NSSAIs which can be allowed to the UE then the AMF updates the allowed NSSAI or the partially allowed NSSAI containing these default S-NSSAIs and the rejected NSSAI accordingly using the generic UE configuration update procedure as specified in the subclause 5.4.4; or

c) for all S-NSSAIs in the allowed NSSAI or the partially allowed NSSAI and there are no default S-NSSAIs which can be allowed to the UE then the AMF performs the network-initiated de-registration procedure and includes the rejected NSSAI in the DEREGISTRATION REQUEST message as specified in the subclause 5.5.2.3 except when the UE has an emergency PDU session established or the UE is establishing an emergency PDU session

when the UE has an emergency PDU session established or the UE is establishing an emergency PDU session the AMF updates the rejected NSSAI using the generic UE configuration update procedure as specified in the subclause 5.4.4 and informs the SMF to release all PDU sessions associated with the S-NSSAI during the generic UE configuration update procedure the AMF includes the 5GS registration result IE in the CONFIGURATION UPDATE COMMAND message and sets the emergency registered bit of the 5GS registration result IE to "Registered for emergency services" after the emergency PDU session is released the AMF performs the network-initiated de-registration procedure as specified in the subclause 5.5.2.3

based on operator policy the mobility management based network slice admission control is not applicable for the S-NSSAI used for emergency services or the mobility management based network slice admission control result is ignored for the S-NSSAI used for emergency services

based on operator policy the mobility management based network slice admission control is not applicable for the UEs configured for priority services or the mobility management based network slice admission control result is ignored for the UEs configured for priority services

NOTE a UE configured for priority services can be identified based on the RRC establishment cause received from the NG-RAN or based on the MPS priority information in the user's subscription context obtained from the UDM

the mobility management based network slice admission control is not applicable to a UE that is registering or registered for onboarding services in SNPN

#### 4.6.2.6 provision of NSAG information to lower layers

the support for NSAG information by the UE and the network respectively is optional the NSAG information provided by the network and stored in the UE includes a list of NSAGs each of which contains

a) an NSAG ID;

b) a list of S-NSSAI(s) which are associated with the NSAG and shall be part of the configured NSSAI;

NOTE 0 an alternative S-NSSAI is added to the configured NSSAI if not included yet

c) a priority value that is associated with the NSAG; and

NOTE 1 the AMF can take local configuration UE 5GMM capabilities subscribed S-NSSAIs the mapping information between the S-NSSAI to be replaced and the alternative S-NSSAI HPLMN etc to determine the NSAG priority information for the associated NSAG to a UE

d) optionally a list of TAIs in which the NSAG is valid if it is not provided by the network the NSAG is valid in the PLMN or SNPN which has sent the NSAG information and its equivalent PLMN(s)

NOTE 2 if the NSAG for the PLMN and its equivalent PLMN(s) have different associations with S-NSSAIs then the AMF includes a list of TAIs in the NSAG information

the UE NAS layer shall provide the lower layers with

a) the most recent NSAG information stored in the UE (see subclause 4.6.2.2);

b) the allowed NSSAI and the partially allowed NSSAI (if any) or the requested NSSAI for the purpose of network slice-based cell reselection (see 3GPP TS 23.501 [8]); and

c) zero or more S-NSSAIs related to an access attempt for the purpose of network slice-based random access when the access attempt is made by the UE in 5GMM-IDLE mode or 5GMM-CONNECTED mode with RRC inactive indication determined as follows

i) requested NSSAI (if any) if an access attempt occurred due to the REGISTRATION REQUEST message;

ii) NSSAI(s) associated with all the PDU sessions included in the uplink data status IE (if any) PDU session status IE (if any) or allowed PDU session status IE (if any) if an access attempt occurred due to the SERVICE REQUEST message or CONTROL PLANE SERVICE REQUEST message;

iii) the S-NSSAI associated with the PDU session if an access attempt occurred due to

- an uplink user data packet to be sent for a PDU session with suspended user-plane resources;

- an UL NAS TRANSPORT which carries a 5GSM message for a PDU session associated with an S-NSSAI (if any); or

- CIoT user data to be sent in a CONTROL PLANE SERVICE REQUEST message or an UL NAS TRANSPORT message;

iv) no S-NSSAI if an access attempt occurred due to

- the deregistration procedure;

- a PDU session establishment request not associated with an S-NSSAI;

- the service request procedure for the UE-initiated NAS transport procedure for sending SMS LPP message UPP-CMI container SLPP message SOR transparent container UE policy container UE parameters update transparent container or a location services message; or

- emergency services; or

v) the allowed NSSAI (if any) and the partially allowed NSSAI (if any) if an access attempt occurred for other reason than those specified in bullets i) - iv)

#### 4.6.2.7 mobility management based network slice replacement

the support for network slice replacement by a UE or network is optional if the UE and network support network slice replacement and the AMF determines that an S-NSSAI included in the allowed NSSAI needs to be replaced with an alternative S-NSSAI the AMF provides

a) the alternative S-NSSAI in the allowed NSSAI if not included yet;

b) the alternative S-NSSAI in the configured NSSAI if not included yet;

c) the alternative S-NSSAI in the NSAG information if not included yet and the UE supports NSAG; and

d) the alternative NSSAI including the mapping information between the S-NSSAI to be replaced and the corresponding alternative S-NSSAI

to the UE during the generic UE configuration update procedure or during the registration procedure as follows

a) for non-roaming UE the AMF provides the mapping information between the S-NSSAI included in the allowed NSSAI and the alternative S-NSSAI to the UE; or

NOTE 1 in non-roaming scenarios the alternative S-NSSAI does not have to be part of the subscribed S-NSSAI(s) in the UE subscription

b) for roaming UE

1) if the S-NSSAI included in the allowed NSSAI needs to be replaced (i.e. the S-NSSAI to be replaced is part of the VPLMN S-NSSAIs) the AMF provides the mapping information between the S-NSSAI included in the allowed NSSAI and the alternative S-NSSAI to the UE; and

2) if the S-NSSAI included in the mapped S-NSSAI(s) for the allowed NSSAI needs to be replaced (i.e. the S-NSSAI to be replaced is part of the HPLMN S-NSSAIs) the AMF provides the mapping information between the S-NSSAI to be replaced and the alternative S-NSSAI to the UE

NOTE 1A in roaming scenarios the alternative S-NSSAI being part of the HPLMN S-NSSAIs does not have to be part of the subscribed S-NSSAI(s) in the UE subscription

NOTE 2 it is up to AMF local policy to determine when to provide the mapping information between the S-NSSAI to be replaced and the alternative S-NSSAI to the UE which can be either when the alternative S-NSSAI is available and there is no established PDU session associated with the S-NSSAI to be replaced or when the UE has established the first PDU session associated with the S-NSSAI to be replaced

if the requested NSSAI contains alternative S-NSSAI(s) that are not subscribed S-NSSAI(s) the AMF shall verify the alternative S-NSSAI(s) based on the stored alternative NSSAI

if the alternative S-NSSAI is subject to NSSAA the alternative S-NSSAI provided by AMF shall be part of the subscribed S-NSSAI(s) in the UE subscription the AMF shall perform NSSAA procedure for such alternative S-NSSAI and perform network slice replacement as specified above after the NSSAA procedure for the alternative S-NSSAI is completed as success

if re-NSSAA procedure is ongoing for the S-NSSAI to be replaced the AMF shall continue with the re-NSSAA procedure and perform network slice replacement as specified above after the re-NSSAA procedure for the S-NSSAI to be replaced is completed as success

NOTE 2A when configuring the alternative S-NSSAI the maximum number of S-NSSAIs defined for the allowed NSSAI and configured NSSAI in subclause 4.6.2.2 are applicable

if the AMF determines that the replaced S-NSSAI is available again the AMF provides the updated alternative NSSAI excluding the replaced S-NSSAI and the corresponding alternative S-NSSAI to the UE during the UE configuration update procedure or during the registration procedure

if all the replaced S-NSSAI(s) in alternative NSSAI are available again the AMF provides the alternative NSSAI with length of alternative NSSAI contents set to 0 in the UE configuration update procedure or registration procedure

NOTE 3 if there is S-NSSAI location validity information for both the S-NSSAI to be replaced and the alternative S-NSSAI the NS-AoS of the alternative S-NSSAI is the same as or larger than the NS-AoS of the S-NSSAI to be replaced

if the UE is in a cell outside the NS-AoS of the replaced S-NSSAI but within the NS-AoS of the alternative S-NSSAI the AMF provides the updated allowed NSSAI and partially allowed NSSAI excluding the replaced S-NSSAI if included in the allowed NSSAI or partially allowed NSSAI during the UE configuration update procedure or during the registration procedure

if the alternative S-NSSAI is not part of the subscribed S-NSSAI(s) and

a) the replaced S-NSSAI is removed from the allowed NSSAI or the partially allowed NSSAI; or

b) the replaced S-NSSAI is available again

then the AMF shall provide updated allowed NSSAI or partially allowed NSSAI excluding the alternative S-NSSAI to the UE over the current access type during the UE configuration update procedure or during the registration procedure additionally if the alternative S-NSSAI is not included in allowed NSSAI or partially allowed NSSAI over the other access type

a) for case a) the AMF may also provide updated configured NSSAI excluding the alternative S-NSSAI to the UE during the UE configuration update procedure or during the registration procedure; or

b) for case b) the AMF shall also provide updated configured NSSAI excluding the alternative S-NSSAI to the UE during the UE configuration update procedure or during the registration procedure

based on SMF local configuration if the replaced S-NSSAI is subject to NSAC or the alternative S-NSSAI is subject to NSAC or both the SMF may perform NSAC for the replaced S-NSSAI or the alternative S-NSSAI or both

if the alternative S-NSSAI is not available and the replaced S-NSSAI is not yet available the AMF provides the updated alternative NSSAI excluding the replaced S-NSSAI and the alternative S-NSSAI to the UE during the UE configuration update procedure or during the registration procedure

#### 4.6.2.8 mobility management for optimised handling of temporarily available network slices

the UE and the network may support optimised handling of temporarily available network slices the support for S-NSSAI time validity information by the UE and the network respectively is optional

if the UE has indicated that it supports S-NSSAI time validity information then the AMF may include the S-NSSAI time validity information for one or more S-NSSAIs included in the configured NSSAI in the registration accept message or the CONFIGURATION UPDATE COMMAND message if the AMF determines that the S-NSSAI time validity information for an S-NSSAI in the configured NSSAI is changed the AMF may provide the UE with a new S-NSSAI time validity information for that S-NSSAI via the CONFIGURATION UPDATE COMMAND message

if the UE supporting S-NSSAI time validity information is configured with S-NSSAI time validity information for an S-NSSAI and

a) the S-NSSAI time validity information indicates that the S-NSSAI is available then the UE may request the S-NSSAI in the requested NSSAI in the REGISTRATION REQUEST message;

b) the S-NSSAI time validity information indicates that the S-NSSAI is not available then

i) the UE shall not include the S-NSSAI in the requested NSSAI in the REGISTRATION REQUEST message;

ii) the UE shall remove the S-NSSAI from the stored allowed NSSAI (if any) and the stored partially allowed NSSAI (if any) in the non-volatile memory in the ME as specified in annex C;

iii) the S-NSSAI time validity information indicates that the S-NSSAI will not become available again then the UE shall remove the S-NSSAI from the stored configured NSSAI in the non-volatile memory in the ME as specified in annex C; and

iv) the UE shall delete the entry from the alternative NSSAI (if any) containing the S-NSSAI in the replaced S-NSSAI or the alternative S-NSSAI as specified in subclause 4.6.2.2

NOTE 1 if the S-NSSAI to be removed is the only S-NSSAI in the allowed NSSAI and partially allowed NSSAI if applicable the UE can before the time validity expiry initiate the registration procedure for mobility and periodic registration update and include a different S-NSSAI from the configured NSSAI in the requested NSSAI IE of the REGISTRATION REQUEST message if the UE does not initiate the registration procedure for mobility and periodic registration update and the time validity for the only S-NSSAI in the allowed NSSAI and partially allowed NSSAI expires the UE locally enters the state 5GMM-DEREGISTERED

when the S-NSSAI time validity information of an S-NSSAI indicates that the S-NSSAI is not available then

a) if the AMF receives a requested NSSAI in the REGISTRATION REQUEST message with the S-NSSAI identifying the network slice the AMF shall

i) to a UE which has indicated that it supports S-NSSAI time validity information provide

1) a configured NSSAI including the S-NSSAI together with the S-NSSAI time validity information in the REGISTRATION ACCEPT message if the S-NSSAI will become available again; or

2) a configured NSSAI not including the S-NSSAI in the REGISTRATION ACCEPT message if the S-NSSAI will not become available again; or

ii) to a UE which has not indicated that it supports S-NSSAI time validity information reject the S-NSSAI for the current PLMN or SNPN if the registration request is accepted the AMF shall include a configured NSSAI not including the S-NSSAI;

b) if the AMF detects that the S-NSSAI is included in the allowed NSSAI or the partially allowed NSSAI of a UE which has

i) indicated that it supports S-NSSAI time validity information the AMF shall locally remove the S-NSSAI from the allowed NSSAI (if any) the partially allowed NSSAI (if any) and the entry from the alternative NSSAI (if any) containing the S-NSSAI in the replaced S-NSSAI or the alternative S-NSSAI; or

NOTE 2 if there is no S-NSSAI included in the allowed NSSAI and partially allowed NSSAI after local removal of the S-NSSAI from the allowed NSSAI or the partially allowed NSSAI the network locally enters the state 5GMM-DEREGISTERED for the UE

ii) not indicated that it supports S-NSSAI time validity information the AMF shall remove the S-NSSAI from the stored configured NSSAI (if any) allowed NSSAI (if any) and partially allowed NSSAI (if any) by sending the CONFIGURATION UPDATE COMMAND message

when the S-NSSAI time validity information of an S-NSSAI indicates that the S-NSSAI becomes available again the AMF shall update the configured NSSAI including the S-NSSAI to a UE which has not indicated that it supports S-NSSAI time validity information by sending CONFIGURATION UPDATE COMMAND message if the UE is subscribed to the S-NSSAI

the S-NSSAI time validity information is applicable for the current PLMN or SNPN regardless of the access type

#### 4.6.2.9 mobility management based network slice usage control

if the network supports network slice usage control the AMF monitors network slice usage by running a slice deregistration inactivity timer per S-NSSAI and access type if the UE supports network slice usage control the AMF may also provide on-demand NSSAI to the UE in the REGISTRATION ACCEPT message or in the CONFIGURATION UPDATE COMMAND message the on-demand NSSAI consists of one or more on-demand S-NSSAIs and optionally the slice deregistration inactivity timer per on-demand S-NSSAI

the slice deregistration inactivity timer is started using the stored slice deregistration inactivity timer value as follows

a) for a PDU session which is released using 5GSM signalling after a PDU session is released and there is no established PDU session including any MA PDU session associated with the S-NSSAI over the corresponding access type;

b) for a PDU session which is released locally

1) when the UE or AMF indicates via the PDU session status IE that a PDU session is now in 5GSM state PDU SESSION INACTIVE and there is no established PDU session including any MA PDU session associated with the S-NSSAI over the corresponding access type; or

2) when the UE or AMF receives the the PDU session status IE for which a PDU session that was previously in 5GSM state PDU SESSION ACTIVE is now indicated as being in 5GSM state PDU SESSION INACTIVE and there is no established PDU session including any MA PDU session associated with the S-NSSAI over the corresponding access type; or

c) successful completion of handover of PDU session to other access and there is no established PDU session including any MA PDU session associated with the S-NSSAI over the corresponding access type

the slice deregistration inactivity timer is stopped and reset

a) when at least a PDU session including any MA PDU session associated with the S-NSSAI is successfully established over the corresponding access type(s) or the S-NSSAI is removed from the allowed NSSAI or partially allowed NSSAI; or

b) when the UE enters the state 5GMM-DEREGISTERED

NOTE 0A if the PDU session is established with an alternative S-NSSAI then this PDU session is considered as associated with both the S-NSSAI to be replaced and with the alternative S-NSSAI

if the slice deregistration inactivity timer value is updated the AMF updates the stored timer value and may provide the updated timer value to the UE in the REGISTRATION ACCEPT message in a current or the next registration procedure for mobility and periodic registration update or the CONFIGURATION UPDATE COMMAND message

when the UE receives an updated slice deregistration inactivity timer value in the REGISTRATION ACCEPT message or the CONFIGURATION UPDATE COMMAND message from the AMF the UE shall update the stored timer value

upon expiry of the slice deregistration inactivity timer the AMF

a) for UE supporting network slice usage control shall locally remove the S-NSSAI from the allowed NSSAI over the corresponding access type in addition the AMF may send the CONFIGURATION UPDATE COMMAND message to the UE with the new allowed NSSAI; and

b) for UE not supporting network slice usage control shall provide the updated allowed NSSAI excluding the S-NSSAI in the CONFIGURATION UPDATE COMMAND message to the UE

if the AMF locally removes either the replaced S-NSSAI or the alternative S-NSSAI in the allowed NSSAI upon expiry of the associated slice deregistration inactivity timer the AMF shall delete the entry including the replaced S-NSSAI or the alternative S-NSSAI stored in the alternative NSSAI

the UE includes the on-demand S-NSSAI which the UE requests in the requested NSSAI during the registration procedure upon expiry of the slice deregistration inactivity timer the UE shall locally remove the S-NSSAI from the allowed NSSAI over the corresponding access type if the locally removed on-demand S-NSSAI is included in the entry of the stored alternative NSSAI the UE shall delete the entry as specified in subclause 4.6.2.2

NOTE 0 if the UE determines the on-demand S-NSSAI for a PDU session establishment as specified in subclause 4.2.2 of 3GPP TS 24.526 [19] the UE includes the on-demand S-NSSAI in the requested NSSAI during the registration procedure

On-demand NSSAI is associated with the configured NSSAI the on-demand S-NSSAI(s) is deleted by the UE from the stored on-demand NSSAI when the associated configured S-NSSAI(s) is deleted by the UE from the stored configured NSSAI

NOTE 1 based on regulatory requirements and operator policy the AMF ensures that the network slice usage control does not apply for the S-NSSAI used for emergency services

NOTE 2 in this version of the specification the network slice usage control feature is not supported in roaming scenarios

#### 4.6.2.10 mobility management aspects of handling network slices with NS-AoS not matching deployed tracking areas

an operator can choose to let the NS-AoS of an S-NSSAI not match the existing tracking area boundaries (see subclause 5.15.18 of 3GPP TS 23.501 [8]) in order to support this deployment option the operator has to ensure that an AMF covering the NS-AoS operates as described below

the support for S-NSSAI location validity information by the UE and the network respectively is optional if a UE supports S-NSSAI location validity information the UE indicates that it supports S-NSSAI location validity information during the registration procedure (see subclause 5.5.1) the AMF can provide a UE which has indicated that it supports S-NSSAI location validity information with S-NSSAI location validity information (see subclauses 5.4.4 and 5.5.1) the S-NSSAI location validity information consists of for each of the applicable S-NSSAI(s) in the configured NSSAI

a) an S-NSSAI; and

b) a list of cell identities of TA(s) belonging to the registration area where the related S-NSSAI(s) is available in some cells but not all cells of one or more TAs which represents the NS-AoS of the S-NSSAI

the UE shall consider itself to be inside the NS-AoS of the S-NSSAI if the cell identity of the current serving cell matches any of the identities in the S-NSSAI location validity information otherwise the UE shall consider itself to be outside the NS-AoS of the S-NSSAI

NOTE 1 the cell identity of the current serving cell is received from the lower layers

for an S-NSSAI in the S-NSSAI location validity information even if the S-NSSAI is included in the rejected NSSAI with a rejection cause value set to "S-NSSAI not available in the current registration area" or is included in the partially rejected NSSAI the UE is allowed to request the S-NSSAI if the UE determines that it is inside the NS-AoS of the S-NSSAI

NOTE 2 if the service area list for the service area restrictions is available in the UE the service area list is evaluated before the S-NSSAI location validity information

for an S-NSSAI limited by NS-AoS if the UE in 5GMM-CONNECTED mode does not support S-NSSAI location validity information and the AMF determines that

a) the UE is outside the NS-AoS then the AMF may

1) provide the UE with an allowed NSSAI or a partially allowed NSSAI excluding the S-NSSAI and optionally a configured NSSAI excluding the S-NSSAI; and

NOTE 3 if excluding the S-NSSAI limited by NS-AoS results in an empty allowed NSSAI or partially allowed NSSAI the AMF includes one or more default S-NSSAIs in the provided allowed NSSAI or partially allowed NSSAI

2) indicate to the SMF to release all PDU sessions associated with the S-NSSAI; or

b) the UE is in the NS-AoS then the AMF may update the configured NSSAI to include the S-NSSAI in the configured NSSAI

if the UE that does not support S-NSSAI location validity information requests a PDU session establishment for an S-NSSAI limited by NS-AoS and the AMF determines that the UE is outside the NS-AoS of the S-NSSAI the AMF may perform S-NSSAI based congestion control for the S-NSSAI as specified in subclauses 5.3.11 and 5.4.5

the S-NSSAI location validity information is only applicable to 3GPP access

#### 4.6.2.11 mobility management for partial network slice

a serving PLMN or SNPN can indicate the S-NSSAI(s) is allowed or rejected in some TA(s) but not all TAs of the registration area to the UE during the registration procedure as specified in subclause 5.5.1 and the generic UE configuration update procedure as specified in subclause 5.4.4 the support for the partial network slice by a UE or an AMF is optional

if the UE supports the partial network slice and includes the S-NSSAI(s) in the requested NSSAI and

a) if the S-NSSAI(s) is allowed in the current TA but not all TAs of the registration area and

1) if the S-NSSAI(s) is subject to NSAC for the maximum number of UEs the AMF should include the S-NSSAI(s) in the allowed NSSAI to the UE and limit the registration area so that the S-NSSAI(s) is allowed in all the TAs of the registration area;

2) if the S-NSSAI(s) is subject to NSSAA the AMF shall include the S-NSSAI(s) in

i) the pending NSSAI to the UE when the AMF is going to perform the network slice-specific authentication and authorization for the S-NSSAI(s); or

ii) the partially allowed NSSAI to the UE after the network slice-specific authentication and authorization for the S-NSSAI(s) has been successfully performed; and

3) otherwise the AMF shall include the S-NSSAI(s) in the partially allowed NSSAI to the UE; or

b) if the S-NSSAI(s) is rejected in the current TA but not all TAs of the registration area; and

1) if the S-NSSAI is subject to NSAC for the maximum number of UEs the AMF should include the S-NSSAI(s) in the partially rejected NSSAI to the UE;

2) if the S-NSSAI(s) is subject to NSSAA the AMF shall include the S-NSSAI(s) in

i) the partially rejected NSSAI to the UE when the AMF determines not to perform the network slice-specific authentication and authorization for the S-NSSAI(s);

ii) the pending NSSAI to the UE when the AMF is going to perform the network slice-specific authentication and authorization for the S-NSSAI(s); or

iii) either the partially allowed NSSAI or the partially rejected NSSAI to the UE after the network slice-specific authentication and authorization for the S-NSSAI(s) has been successfully performed;

NOTE 1 the AMF determines whether to perform the network slice-specific authentication and authorization procedure for the partial network slice based on its own local policy

3) if the S-NSSAI(s) is associated with a slice deregistration inactivity timer on the AMF side as specified in subclause 4.6.2.9 the AMF shall include the S-NSSAI(s) in the partially rejected NSSAI to the UE; and

4) otherwise the AMF shall include the S-NSSAI(s) in either the partially allowed NSSAI or the partially rejected NSSAI to the UE; or

c) if the partially allowed NSSAI the partially rejected NSSAI or both are changed the AMF shall provide the new partially allowed NSSAI the new partially rejected NSSAI or both to the UE

upon receiving the partially allowed NSSAI the UE shall regard the S-NSSAI(s) included in partially allowed NSSAI if any as the allowed S-NSSAI(s) for the current registration area and store the received partially allowed NSSAI as specified in subclause 4.6.2.2

upon receiving the partially rejected NSSAI the UE shall store the received partially rejected NSSAI as specified in subclause 4.6.2.2 the UE shall not attempt to include the S-NSSAI if any in the requested NSSAI if the current TAI is in the list of TAs for which S-NSSAI is rejected

the AMF shall ensure that there is also at least one S-NSSAI in the allowed NSSAI allocated to the UE as specified in subclause 5.15.2.1 of 3GPP TS 23.501 [8]

the mobility management for partial network slice is only applicable to 3GPP access

the mobility management for partial network slice is not applicable to a UE that is registering or registered for onboarding services in SNPN

### 4.6.3 session management aspects

#### 4.6.3.0 general

in order to enable PDU transmission in a network slice the UE may request establishment of a PDU session in a network slice towards a data network (DN) which is associated with an S-NSSAI and a data network name (DNN) if there is no established PDU session adequate for the PDU transmission the S-NSSAI included is part of allowed NSSAI of the serving PLMN or SNPN which is an S-NSSAI value valid in the serving PLMN or SNPN and in roaming scenarios the mapped S-NSSAI is also included for the PDU session if available see subclause 6.4.1 for further details the UE determines whether to establish a new PDU session or use one of the established PDU session(s) based on the URSP rules which include S-NSSAIs if any (see subclause 6.2.9) or based on UE local configuration as described in subclause 4.2.2 of 3GPP TS 24.526 [19]

#### 4.6.3.1 session management based network slice admission control

a serving PLMN or the HPLMN or SNPN can perform network slice admission control for the S-NSSAI(s) subject to NSAC to monitor and control the total number of established PDU sessions per network slice the SMF performs network slice admission control on the S-NSSAI during the PDU session establishment procedure if the maximum number of PDU sessions on a network slice associated with an S-NSSAI has been already reached the SMF rejects the PDU session establishment request using S-NSSAI based congestion control as specifed in subclause 6.2.8 and 6.4.1.4.2

the SMF performs network slice admission control on the S-NSSAI for a PDU session that is associated with the non-3GPP access when the UE requests to transfer a session from the non-3GPP access to the 3GPP access with the allowed PDU session status IE as described in subclause 5.6.1.4 if the maximum number of PDU sessions on a network slice associated with an S-NSSAI has been already reached the SMF rejects the request to establish the user-plane resources (see 3GPP TS 29.502 [20A])

based on operator policy the session management based network slice admission control is not applicable for the PDU session for emergency services or the session management based network slice admission control result is ignored for the PDU session for emergency services

based on operator policy the session management based network slice admission control is not applicable for the PDU session for priority services or the session management based network slice admission control result is ignored for the PDU session for priority services

NOTE 1 the SMF can use the Sbi-Message-Priority field as defined in TS 29.500 [20AA] to determine whether the PDU session is for priority services

the session management based network slice admission control is not applicable to PDU session established for onboarding services in SNPN

NOTE 2 for the MA PDU session during the PDU session establishment procedure the SMF performs network slice admission control only when it is newly established over the associated access type

NOTE 3 for a set of redundant PDU sessions the SMF performs network slice admission control for each PDU session independently

#### 4.6.3.2 support of network slice admission control and interworking with EPC

if EPS counting is required for a network slice the network performs network slice admission control for the S-NSSAI(s) subject to NSAC to monitor and control the number of UEs per network slice and number of PDU sessions per network slice during the PDN connection establishment procedure if the maximum number of UEs on a network slice associated with an S-NSSAI or the maximum number of PDU sessions on a network slice associated with an S-NSSAI have already been reached the network rejects the PDN connectivity request using ESM cause #26 "insufficient resources" as specifed in 3GPP TS 24.301 [15]

NOTE if there are more than one S-NSSAI associated with the APN used in the PDN connectivity request and some of but not all associated S-NSSAIs are not available due to either maximum number of UEs reached or maximum number of PDU sessions reached the network can use the associated S-NSSAI for which maximum number of UEs and maximum number of PDU sessions have not reached to avoid PDN connectivity request rejection

#### 4.6.3.3 session management based network slice data rate limitation control

a serving PLMN or the HPLMN can perform network slice data rate limitation control for the S-NSSAI(s) subject to network slice data rate limitation control to monitor and control the total data rate of established PDU sessions per network slice as specified in 3GPP TS 23.503 [10] if the maximum data rate of PDU sessions on a network slice associated with an S-NSSAI has been exceeded during the PDU session establishment procedure the SMF may reject the PDU session establishment request using S-NSSAI based congestion control as specified in subclause 6.2.8 and 6.4.1.4.2

a serving PLMN or the HPLMN can perform management of Slice-Maximum bit rate per UE (UE-Slice-MBR) as specified in 3GPP TS 23.503 [10] when the UE-Slice-MBR for the UE and S-NSSAI to which the PDU session is allocated is exceeded during the PDU session establishment procedure the SMF may reject the PDU session establishment request using S-NSSAI based congestion control as specified in subclause 6.2.8 and 6.4.1.4.2

NOTE 1 based on operator policy the network slice data rate limitation control can be not applicable for the S-NSSAI(s) used for emergency services or priority services

NOTE 2 the network slice data rate limitation control and UE-Slice-MBR management are performed by the PCF

#### 4.6.3.4 session management based network slice replacement

if

a) the UE and network support network slice replacement;

b) the UE is provided with the mapping information between the S-NSSAI to be replaced and the alternative S-NSSAI; and

c) the UE decides to establish a new PDU session with the S-NSSAI to be replaced

the UE provides both the S-NSSAI to be replaced and the alternative S-NSSAI during PDU session establishment procedure if the timer T3584 or timer T3585 is running for the S-NSSAI to be replaced the UE should not stop the timer during PDU session establishment procedure if the SMF receives both the S-NSSAI to be replaced and the alternative S-NSSAI during PDU session establishment procedure the SMF proceeds with the PDU session establishment procedure with the alternative S-NSSAI if the PDU session establishment request is accepted the SMF includes the alternative S-NSSAI in the PDU SESSION ESTABLISHMENT ACCEPT message the S-NSSAI for the established PDU session is the S-NSSAI to be replaced and the alternative S-NSSAI on the UE side

if the UE is provided with the mapping of the VPLMN S-NSSAI to a VPLMN alternative S-NSSAI the UE provides both the VPLMN alternative S-NSSAI and the VPLMN S-NSSAI during PDU session establishment procedure the AMF sends both VPLMN alternative S-NSSAI and VPLMN S-NSSAI to the SMF if the UE is provided with the mapping of the HPLMN S-NSSAI to an HPLMN alternative S-NSSAI the UE provides both the HPLMN alternative S-NSSAI and the HPLMN S-NSSAI during PDU session establishment procedure the AMF sends both HPLMN alternative S-NSSAI and HPLMN S-NSSAI to the SMF

if the SMF receives from the AMF an alternative S-NSSAI for the existing PDU session and

a) if the SMF decides to retain the existing PDU session (i.e the SMF can serve both the alternative S-NSSAI and the S-NSSAI to be replaced) the SMF sends the alternative S-NSSAI to the UE during network-requested PDU session modification procedure; or

b) if the SMF decides to re-activate the existing PDU session and

1) if the SSC mode of the PDU session is SSC mode 3 the SMF initiates PDU session modification procedure to trigger PDU session reactivation by the UE; or

2) if the SSC mode of the PDU session is SSC mode 1 or SSC mode 2 the SMF initiates PDU session release procedure to trigger PDU session reactivation by the UE and the UE provides both the S-NSSAI to be replaced and the alternative S-NSSAI during PDU session establishment procedure

when the replaced S-NSSAI becomes available again if the SMF receives from the AMF the replaced S-NSSAI for the existing PDU session and

a) if the SMF decides to retain the existing PDU session (i.e the SMF can serve the replaced S-NSSAI) the SMF sends the replaced S-NSSAI to the UE during network-requested PDU session modification procedure; or

b) if the SMF decides to re-activate the existing PDU session and

1) if the SSC mode of PDU session is SSC mode 3 the SMF sends the replaced S-NSSAI to the UE during PDU session modification procedure to trigger PDU session reactivation by the UE; or

2) if the SSC mode of the PDU session is SSC mode 1 or SSC mode 2 the SMF sends the replaced S-NSSAI to the UE during PDU session release procedure to trigger PDU session reactivation by the UE; and the UE provides the replaced S-NSSAI during PDU establishment procedure

if the timer T3584 or timer T3585 is running for the replaced S-NSSAI and the replaced S-NSSAI in alternative NSSAI is available and the AMF provides the updated allowed NSSAI and configured NSSAI to the UE the UE should stop the timer

#### 4.6.3.5 session management for optimized handling of temporarily available network slices

a network slice can be available temporarily subclause 4.6.2.8 addresses how the allowed NSSAI and partially allowed NSSAI are managed based on the S-NSSAI time validity information

if the S-NSSAI time validity information indicates that the S-NSSAI is available the UE may initiate a UE-requested PDU session establishment procedure to establish a PDU session associated with the S-NSSAI

if the S-NSSAI time validity information indicates that the S-NSSAI is not available then the UE shall

a) initiate UE-requested PDU session release procedure to release any PDU session associated with the S-NSSAI if the UE is in 5GMM-CONNECTED mode or in 5GMM-CONNECTED mode with RRC inactive indication; or

b) locally release any PDU session associated with the S-NSSAI if the UE is in 5GMM-IDLE mode

when the S-NSSAI time validity information in the AMF indicates that the S-NSSAI is not available independent of whether the UE is in 5GMM-CONNECTED mode 5GMM-CONNECTED mode with RRC inactive indication or in 5GMM-IDLE mode the AMF shall request the SMF to release any PDU session associated with the S-NSSAI

#### 4.6.3.6 session management for partial network slice

if the S-NSSAI is included in the partially allowed NSSAI and

a) if the current TAI is in the list of TAs for which the S-NSSAI is allowed the UE may initiate the UE-requested PDU session establishment procedure for the S-NSSAI; or

b) if the current TAI is not in the list of TAs for which the S-NSSAI is allowed the UE shall not initiate the UE-requested PDU session establishment procedure for the S-NSSAI

if an existing PDU session is established for the S-NSSAI included in the partially allowed NSSAI and the current TAI is in the list of TAs for which this S-NSSAI is allowed

a) the UE

1) may initiate the service request procedure to re-establish the user plane resources for the established PDU session; or

2) may initiate for the established PDU session either the UE-initiated NAS transport procedure to send CIoT user data to the SMF (see subclause 5.4.5.2.1 case h) or the service request procedure to send CIoT user data to the SMF (see subclause 5.6.1.1 case d); and

b) the SMF may initiate the network-initiated NAS transport procedure to send CIoT user data to the UE for the established PDU session (see subclause 5.4.5.3.1 case l)

if an existing PDU session is established for the S-NSSAI included in the partially allowed NSSAI and the current TAI is not in the list of TAs for which this S-NSSAI is allowed

a) the UE

1) shall maintain the 5GSM contexts for the established PDU session;

2) shall not initiate for the established PDU session the UE-initiated NAS transport procedure to send CIoT user data to the SMF (see subclause 5.4.5.2.1 case h) nor the service request procedure to send CIoT user data to the SMF (see subclause 5.6.1.1 case d);

3) shall not attempt to request the establishment of user plane resources for the established PDU session associated with this S-NSSAI; and

4) shall not initiate any UE-requested 5GSM procedure for the established PDU session except

i) the UE-requested PDU session release procedure; or

ii) the UE-requested PDU session modification procedure to set the 3GPP PS data off status to "deactivated" as specified in 3GPP TS 24.008 [13]; and

b) the SMF

1) shall maintain the 5GSM contexts for the established PDU session;

2) shall not initiate the network-initiated NAS transport procedure to send CIoT user data to the UE for the established PDU session (see subclause 5.4.5.3.1 case l); and

3) may initiate the network-requested PDU session release procedure for the established PDU session

if the SMF cannot determine that the UE is located in a TA within the list of TAs associated with the S-NSSAI of an existing PDU session established for this S-NSSAI the SMF may according to operator's policy

a) attempt to establish the user plane resources for the PDU session; or

b) initiate the network-initiated NAS transport procedure to send CIoT user data to the UE (see subclause 5.4.5.3.1 case l)

NOTE the session management for partial network slice is not applicable to the PDU session established for onboarding services in SNPN

#### 4.6.3.7 session management aspect of handling network slices with NS-AoS not matching deployed tracking areas

if a UE is outside the NS-AoS of an S-NSSAI for which a PDU session is established (see subclause 4.6.2.10) the UE shall not

a) attempt to request the establishment of user plane resources of any PDU session associated with this S-NSSAI; and

b) initiate the UE-initiated NAS transport procedure to send CIoT user data to the SMF (see subclause 5.4.5.2.1 case h) nor the service request procedure to send CIoT user data to the SMF (see subclause 5.6.1.1 case d) for the established PDU session

if a UE is outside the NS-AoS of an S-NSSAI for which a PDU session is established (see subclause 4.6.2.10) the SMF shall not

a) attempt to establish user plane resources of any PDU session associated with this S-NSSAI; and

b) initiate the network-initiated NAS transport procedure to send CIoT user data to the UE (see subclause 5.4.5.3.1 case l)

if a UE is outside the NS-AoS of an S-NSSAI for which a PDU session is established (see subclause 4.6.2.10) the UE shall not initiate for this PDU session any UE-requested 5GSM procedure except

a) the UE-requested PDU session release procedure; or

b) the UE-requested PDU session modification procedure to set the 3GPP PS data off status to "deactivated" as specified in 3GPP TS 24.008 [13]

NOTE a PDU session associated with an S-NSSAI is not released solely because a UE is outside the NS-AoS of the S-NSSAI

if a UE is outside the NS-AoS of an S-NSSAI (see subclause 4.6.2.10) the UE shall not initiate the UE-requested PDU session establishment procedure for this S-NSSAI

if the SMF cannot determine that the UE is located inside the NS-AoS of the S-NSSAI of an existing PDU session established for this S-NSSAI the SMF may according to operator's policy

a) attempt to establish the user plane resources for this PDU session; or

b) initiate the network-initiated NAS transport procedure to send CIoT user data to the UE for this PDU session (see subclause 5.4.5.3.1 case l)

## 4.7 NAS over non-3GPP access

### 4.7.1 general

from the UE's NAS perspective in general the procedures and messages defined for 5GMM and 5GSM are used over non-3GPP access as over 3GPP access however a number of aspects are different as described in the following subclauses

### 4.7.2 5GS mobility management aspects

#### 4.7.2.1 general

the mobility management procedures defined over 3GPP access are re-used over non-3GPP access with the following exceptions

a) the registration status and the 5GMM parameters of the UE's 3GPP access and non-3GPP access 5GMM state machine instances are independent in each of these accesses and can be different;

b) single-registration mode and dual-registration mode do not apply for 5GMM over non-3GPP access;

c) the RPLMN over non-3GPP access can be different from the RPLMN over 3GPP access the MCC of the RPLMN over 3GPP access and the MCC of the RPLMN over the non-3GPP access can also be different;

d) the registration for 3GPP access and for non-3GPP access are performed separately like for 3GPP access an access stratum connection exists before the UE can perform the registration procedure for non-3GPP access as at registration over non-3GPP access the UE is allocated a registration area which is associated with a single TAI list management of registration areas is not required and registration updating due to registration area change with the registered PLMN is not performed furthermore the registration procedure for periodic registration update is also not performed new registration at change of PLMN is required;

e) the 5GMM over non-3GPP access in the UE considers that the N1 NAS signalling connection is established when the lower layers indicate that the access stratum connection is established succcessfully;

f) the UE-initiated service request procedure via non-3GPP access is supported upon indication from the lower layers of non-3GPP access that the access stratum connection is established between the UE and the network the UE in 5GMM-REGISTERED state and in 5GMM-IDLE mode over non-3GPP access shall initiate the service request procedure via non-3GPP access the UE may indicate with the service request message the PDU session(s) associated with non-3GPP access to re-establish user-plane resources for which the UE has pending user data to be sent;

g) paging procedure is not performed via non-3GPP access;

h) service area restrictions do not apply for non-3GPP access other than the wireline access;

i) the establishment cause for non-3GPP access is determined according to subclause 4.7.2.2;

j) ecall inactivity procedure is not performed via non-3GPP access;

k) local area data network (LADN) does not apply for non-3GPP access;

l) the allowed PDU session status IE shall not be included in the REGISTRATION REQUEST message or the SERVICE REQUEST message sent over non-3GPP access;

m) DRX parameters do not apply for non-3GPP access;

n) mobile initiated connection only mode (MICO) does not apply for non-3GPP access;

o) CIoT 5GS optimizations do not apply for non-3GPP access;

p) unified access control does not apply for non-3GPP access;

q) UE radio capability signalling optimisation (RACS) does not apply for non-3GPP access;

r) closed access group (CAG) does not apply for non-3GPP access;

s) the N1 NAS signalling connection release the paging indication for voice services and reject the paging request do not apply for non-3GPP access the paging restriction IE shall not be included in the REGISTRATION REQUEST message the SERVICE REQUEST message or the CONTROL PLANE SERVICE REQUEST message sent over non-3GPP access the AMF shall not delete any stored paging restriction preferences for the UE and shall not stop restricting paging when receiving REGISTRATION REQUEST message SERVICE REQUEST message or CONTROL PLANE SERVICE REQUEST message over non-3GPP access;

t) the partially allowed NSSAI and the partially rejected NSSAI do not apply for non-3GPP access;

u) support for unavailability period (see subclause 5.3.26) does not apply for non-3GPP access;

v) disaster roaming services (see subclause 4.24) do not apply for non-3GPP access; and

w) RAT utilization control does not apply for non-3GPP access

#### 4.7.2.2 establishment cause for non-3GPP access

when establishment of an N1 NAS signalling connection over non-3GPP access is initiated the UE shall

a) determine one or more access identities to be associated with the establishment of the N1 NAS signalling connection as specified in subclause 4.5.2 and table 4.5.2.1;

b) select the establishment cause for non-3GPP access from the determined one or more access identities and the event which triggered initiation of the N1 NAS signalling connection over non-3GPP access by checking the rules specified in table 4.7.2.2.1; and

c) provide the selected establishment cause for non-3GPP access to the lower layers

while an MMTEL voice call is ongoing

- any

1) service request procedure; or

2) registration procedure;

initiated in 5GMM-IDLE mode is mapped to "MO MMTel voice call" type access attempt

while an MMTEL video call is ongoing and no MMTEL voice call is ongoing

- any

1) service request procedure; or

2) registration procedure;

initiated in 5GMM-IDLE mode is mapped to "MO MMTel video call" type access attempt

while an SMSoIP is ongoing no MMTEL video call is ongoing and no MMTEL voice call is ongoing

- any

1) service request procedure; or

2) registration procedure;

initiated in 5GMM-IDLE mode is mapped to "MO SMS over IP" type access attempt

if the access attempt matches more than one rule the establishment cause for non-3GPP access of the lowest rule number shall be used

table 4.7.2.2.1 mapping table for determination of establishment cause for non-3GPP access

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Rule # | Access identities | Type of access attempt | Requirements to be met | Establishment cause for non-3GPP access |
| 1 | 1 | Any | Any | mps-PriorityAccess |
| 2 | 2 | Any | Any | mcs-PriorityAccess |
| 3 | 11, 15 | Any | Any | highPriorityAccess |
| 4 | 12,13,14, | Any | Any | highPriorityAccess |
| 5 | 0 | Emergency | UE is attempting access for an emergency session (NOTE 1) | emergency |
| UE NAS initiated 5GMM specific procedures | Access attempt is for MO signalling | mo-Signalling |
| UE NAS initiated 5GMM connection management procedures or 5GMM NAS transport procedure | Access attempt is for MO data | mo-Data |
| MO SMS over NAS or MO SMS over IP | Access attempt is for MO SMS over NAS or MO SMS over IP | mo-SMS |
| MO MMTel voice call | Access attempt is for MO MMTel voice call | mo-VoiceCall |
| MO MMTel video call | Access attempt is for MO MMTel video call | mo-Videocall |
| NOTE 1: This includes 5GMM specific procedures while the service is ongoing and 5GMM connection management procedures required to establish a PDU session with request type = "initial emergency request" or "existing emergency PDU session", or to re-establish user-plane resources for such a PDU session.  NOTE 2: See subclause 4.5.2, table 4.5.2.1 for use of the access identities of 0, 1, 2, and 11-15. | | | | |

### 4.7.3 5GS session management aspects

the session management procedures defined over 3GPP access are re-used over non-3GPP access with the following exceptions

a) serving PLMN rate control does not apply for non-3GPP access;

b) small data rate control does not apply for non-3GPP access;

c) handling of 5GSM cause value #82 "maximum data rate per UE for user-plane integrity protection is too low" does not apply for non-3GPP access;

d) MBS does not apply for non-3GPP access;

e) support of redundant PDU sessions does not apply for non-3GPP access; and

f) void

### 4.7.4 limited service state over non-3GPP access

there are a number of situations in which the UE is unable to obtain normal service from a PLMN over non-3GPP access and the UE enters the limited service state over non-3GPP access these include

a) no USIM in the ME;

b) an "illegal UE" or "illegal ME" is received when registration network-initiated de-registration or service request is performed (any USIM in the ME is then considered "invalid");

c) a "5GS services not allowed" is received when a registration network-initiated de-registration or service request is performed;

d) a "PLMN not allowed" is received when registration network-initiated de-registration or service request is performed;

e) a "Tracking area not allowed" is received when a registration network-initiated de-registration or service request is performed;

f) a "Roaming not allowed in this tracking area" is received when a registration network-initiated de-registration or service request is performed;

g) void; or

h) a "Serving network not authorized" is received when a registration or service request is performed

in limited service state with a valid USIM in the UE the network selection is performed as defined in 3GPP TS 24.502 [18]

with the exception of performing initial registration for emergency services no registration requests are made until a valid USIM is present for registration for emergency services the PLMN of the current N3IWF or TNGF is considered as the selected PLMN for the duration the UE is registered for emergency services

### 4.7.5 NAS signalling using trusted WLAN access network

a trusted WLAN interworking function (TWIF) provides functionalities for a non-5G capable over WLAN (N5CW) device to access 5GCN including

a) NAS signalling over N1 NAS signalling connection with AMF; and

b) PDU session establishment modification and release on behalf of the N5CW device over N2 connection with the AMF

the TWIF registers on behalf of the N5CW device to an AMF according to subclause 5.5.1 by populating the parameters for the registration by using implementation specific default values which are the same for N5CW devices

the TWIF may request to establish a PDU session as specified in subclause 6.4.1.2 on behalf of the N5CW device upon receipt of an IP configuration request from the N5CW device by populating either all the required parameters or part of the required parameters for the PDU session establishment by using implementation specific default values from the TWIF's configuration only one PDU session is supported when N5CW device accessing 5GCN via the TWIF

NOTE 1 if part of the required parameters for the PDU session establishment is provided by the TWIF the remaining of the required parameters are determined by the AMF or the SMF based on the N5CW device's subscription information

upon loss of the IP address of the N5CW device the TWIF acting on behalf of the N5CW device shall initiate the UE-requested PDU session release procedure as defined in subclause 6.4.3

NOTE 2 the established PDU session on behalf of the N5CW device can be modified by the TWIF or the network

## 4.8 interworking with E-UTRAN connected to EPC

### 4.8.1 general

in order to interwork with E-UTRAN connected to EPC the UE supporting both S1 mode and N1 mode can operate in single-registration mode or dual-registration mode (see 3GPP TS 23.501 [8]) support of single-registration mode is mandatory for UEs supporting both S1 mode and N1 mode

during the EPS attach procedure (see 3GPP TS 24.301 [15]) or initial registration procedure (see subclause 5.5.1.2) the mode for interworking is selected if the UE supports both S1 mode and N1 mode and the network supports interworking the mode for interworking may also be selected during the EPS tracking area updating procedure (see 3GPP TS 24.301 [15]) or registration procedure for mobility and periodic registration update (see subclause 5.5.1.3)

for interworking between E-UTRAN connected to EPC and TNGF or N3IWF connected to 5GCN the UE shall operate as specified in either subclause 4.8.2.3 or subclause 4.8.3 which subclause the UE follows is chosen by the UE irrespective of the interworking without N26 interface indicator

### 4.8.2 Single-registration mode

#### 4.8.2.1 general

if the UE receives the indication that "interworking without N26 interface not supported" (see 3GPP TS 24.301 [15]) the UE operates as described in subclause 4.8.2.2

if the UE receives the indication that "interworking without N26 interface supported" and

a) the UE does not support dual-registration mode; or

b) the UE supporting dual-registration mode determines to operate in single-registration mode

the UE operates as described in subclause 4.8.2.3

#### 4.8.2.2 Single-registration mode with N26 interface

see subclause 5.1.4.2 for coordination between 5GMM and EMM and subclause 6.1.4.1 for coordination between 5GSM and ESM

#### 4.8.2.3 Single-registration mode without N26 interface

##### 4.8.2.3.1 interworking between NG-RAN and E-UTRAN

at inter-system change from N1 mode to S1 mode in EMM-IDLE mode when

a) the UE supports non-IP PDN type and at least one PDU session of unstructured PDU session type is active;

b) the UE supports IPv4 PDN type and at least one PDU session of IPv4 PDU session type is active;

c) the UE supports IPv6 PDN type and at least one PDU session of IPv6 PDU session type is active;

d) the UE supports IPv4v6 PDN type and at least one PDU session of IPv4v6 PDU session type is active; or

e) at least one PDU session of ethernet PDU session type is active and

1) the UE supports non-IP PDN type; or

2) the UE and the network support ethernet PDN type in S1 mode;

the UE shall proceed as follows

a) if the UE supports sending an ATTACH REQUEST message containing a PDN CONNECTIVITY REQUEST message with request type set to "handover" or "handover of emergency bearer services" to transfer a PDU session from N1 mode to S1 mode and the UE has received an "interworking without N26 interface supported" indication from the network the UE shall

1) enter substates EMM-DEREGISTERED.NORMAL-SERVICE and 5GMM- DEREGISTERED.NO-CELL-AVAILABLE for 3GPP access;

NOTE since MM context transfer is not possible between MME and AMF in a network that indicates "Interworking without N26 supported" it is up to the UE implementation as to how to keep the 5GMM and EMM states in the UE in sync

2) map the PDU session(s) which the UE intends to transfer to EPS to the default EPS bearer context of the corresponding PDN connection(s) as specified in subclause 6.1.4.2; and

3) initiate an EPS attach procedure and include in the ATTACH REQUEST message a PDN CONNECTIVITY REQUEST message with

- the request type set to "handover of emergency bearer services" to activate a default EPS bearer context for an active emergency PDU session if the session to be transferred is an emergency PDU session; or

- the request type set to "handover" message to activate a default EPS bearer context for an active non-emergency PDU session if the session to be transferred is a non-emergency PDU session if the selected PDU session is an MA PDU session established over 3GPP access the UE shall include the ATSSS request parameter in the protocol configuration options IE or the extended protocol configuration options IE of the ESM INFORMATION RESPONSE message

after successful completion of the EPS attach procedure the UE shall reset the registration attempt counter for 3GPP access and the attach attempt counter (see 3GPP TS 24.301 [15]) enter substates EMM-REGISTERED.NORMAL-SERVICE and 5GMM-REGISTERED.NO-CELL-AVAILABLE for 3GPP access and attempt to activate each of the other default EPS bearer contexts if any by initiating a stand-alone PDN connectivity procedure with request type set to "handover" for non-emergency PDU session or "handover of emergency bearer services" for emergency PDU session in the PDN CONNECTIVITY REQUEST message if the EPS attach procedure is unsuccessful the UE shall enter substates EMM-DEREGISTERED.NORMAL-SERVICE and 5GMM-DEREGISTERED.NO-CELL-AVAILABLE for 3GPP access; and

b) otherwise enter substates EMM-REGISTERED.NORMAL-SERVICE and 5GMM-REGISTERED.NO-CELL-AVAILABLE for 3GPP access and initiate a tracking area update procedure (see 3GPP TS 24.301 [15])

at inter-system change from N1 mode to S1 mode in EMM-IDLE mode when

a) the UE does not support non-IP PDN type or no PDU session of unstructured PDU session type is active;

b) the UE does not support IPv4 PDN type or no PDU session of IPv4 PDU session type is active;

c) the UE does not support IPv6 PDN type or no PDU session of IPv6 PDU session type is active;

d) the UE does not support IPv4v6 PDN type or no PDU session of IPv4v6 PDU session type is active; and

e) no PDU session of ethernet PDU session type is active or

1) the UE does not support non-IP PDN type; and

2) the UE the network or both do not support ethernet PDN type in S1 mode;

the UE shall enter substates EMM-DEREGISTERED.NORMAL-SERVICE and 5GMM-DEREGISTERED.NO-CELL-AVAILABLE for 3GPP access and initiate an attach procedure

at inter-system change from S1 mode to N1 mode in 5GMM-IDLE mode the UE shall

a) enter substate 5GMM-REGISTERED.NORMAL-SERVICE for 3GPP access and substate EMM-REGISTERED.NO-CELL-AVAILABLE;

b) map the default EPS bearer context(s) of the PDN connection(s) which the UE intends to transfer to 5GS if any to the corresponding PDU session(s) as specified in subclause 6.1.4.2; and

c) initiate the registration procedure for mobility and periodic registration update over 3GPP access indicating "mobility registration updating" in the 5GS registration type IE of the REGISTRATION REQUEST message (see subclause 5.5.1.3)

after having successfully registered in N1 mode over 3GPP access the UE shall reset the registration attempt counter for 3GPP access and the attach attempt counter or tracking area updating attempt counter (see 3GPP TS 24.301 [15]) and

a) if the UE supports the PDU session establishment procedure with request type set to "existing PDU session" or "existing emergency PDU session" to transfer a PDN connection from S1 mode to N1 mode and the UE has received an "interworking without N26 interface supported" indication from the network attempt to transfer the PDN connection(s) which the UE intends to transfer to 5GS if any from S1 mode to N1 mode by

- if the PDN connection which the UE intends to transfer is a PDN connection for emergency bearer services initiating the PDU session establishment procedure with request type set to "existing emergency PDU session" to transfer the PDN connection for emergency bearer services; and

- if the PDN connection which the UE intends to transfer is a non-emergency PDN connection initiating the PDU session establishment procedure with request type set to

1) "MA PDU request" if the PDN connection to be transferred is a user-plane resource of an MA PDU session; or

2) "existing PDU session" to transfer the non-emergency PDN connection; and

b) otherwise establish PDU session(s) corresponding to the PDN connection(s) which the UE intends to transfer to 5GS if any by initiating the PDU session establishment procedure with request type set to "initial request"

see subclause 5.1.4.3 for coordination between 5GMM and EMM and subclause 6.1.4.2 for coordination between 5GSM and ESM

##### 4.8.2.3.2 interworking between TNGF or N3IWF connected to 5GCN and E-UTRAN

if

a) the UE has registered in neither N1 mode over 3GPP access nor S1 mode yet; and

b) the UE has at least one active PDU session associated with non-3GPP access which the UE intends to transfer to EPS

the UE shall initiate an EPS attach procedure and include a PDN CONNECTIVITY REQUEST message with a request type in the ATTACH REQUEST message to activate a default EPS bearer context for one of the active PDU sessions which the UE intends to transfer to EPS (see 3GPP TS 24.301 [15]) the request type is set as follows

- if the PDU session which the UE intends to transfer is a non-emergency PDU session the request type is set to "handover"; and

- if the PDU session which the UE intends to transfer is an emergency PDU session the request type is set to "handover of emergency bearer services" and the default bearer to be activated is the default EPS bearer context for the emergency PDU session

NOTE 1 it is necessary for the UE to support sending an ATTACH REQUEST message containing a PDN CONNECTIVITY REQUEST message with request type set to "handover" or "handover of emergency bearer services" to transfer a PDU session from N1 mode to S1 mode for interworking between TNGF or N3IWF connected to 5GCN and E-UTRAN

NOTE 2 the order of PDU sessions to be tranferred to EPS is up to UE implementation

after successful completion of the EPS attach procedure where the activated default EPS bearer context is not for emergency service the UE shall initiate a UE requested PDN connectivity procedure with request type set to "handover" for non-emergency PDU session or "handover of emergency bearer services" for emergency PDU session in the PDN CONNECTIVITY REQUEST message to transfer each of the other PDU sessions which the UE intends to transfer to EPS if any

if

a) the UE has not registered in N1 mode over non-3GPP access yet; and

b) the UE has at least one active PDN connection which the UE intends to transfer to TNGF or N3IWF connected to 5GCN

the UE shall initiate an initial registration procedure over non-3GPP access (see subclause 5.5.1.2)

after successful completion of the 5GS initial registration in N1 mode over non-3GPP access the UE shall initiate a UE-requested PDU session establishment procedure with a request type to transfer each of the PDN connections which the UE intends to transfer to TNGF or N3IWF connected to 5GCN if any the request type is set as follows

- if the PDN connection which the UE intends to transfer is a PDN connection for emergency bearer services the request type is set to "existing emergency PDU session" to transfer the PDN connection for emergency bearer services; and

- if the PDN connection which the UE intends to transfer is a non-emergency PDN connection the request type is set to "existing PDU session" to transfer the non-emergency PDN connection

NOTE 3 if the UE has no active PDU session associated with non-3GPP access which the UE in N1 mode intends to transfer to EPS or no active PDN connection associated with 3GPP access which the UE in S1 mode intends to transfer to TNGF or N3IWF connected to 5GCN the interworking between TNGF or N3IWF connected to 5GCN and E-UTRAN is not supported

see subclause 6.1.4.2 for coordination between 5GSM and ESM

### 4.8.3 Dual-registration mode

if both 5GMM and EMM are enabled a UE operating in the dual-registration mode shall maintain independent contexts for 5GMM and EMM and this includes independent lists of equivalent PLMNs coordination between 5GMM and EMM is not needed except as specified in the present subclause subclause 5.1.5 and 5.3.13A

for dual-registration mode the following applies

a) a UE operating in the dual-registration mode may register to N1 mode only S1 mode only or to both N1 mode and S1 mode;

b) when the UE decides to operate in dual-registration mode (see subclause 5.5.1.2.4) NAS informs the lower layers about this;

c) if a UE is registered in N1 mode only then for registration in S1 mode the UE shall use

1) the same PLMN to which it is registered in N1 mode; or

2) an equivalent PLMN; and

d) if a UE is registered in S1 mode only then for registration in N1 mode the UE shall use

1) the same PLMN to which it is registered in S1 mode; or

2) an equivalent PLMN

NOTE 1 it is up to UE implementation how to handle the case when the UE is registered in both N1 mode and S1 mode and the PLMNs to which the UE is registered are not equivalent e.g search for a PLMN which is the same or equivalent to any of the registered ones

when no PDU session is active and the UE has not registered to S1 mode yet the UE may initiate the EPS attach procedure with PDN connection establishment if EMM-REGISTERED without PDN connection is not supported by the MME if EMM-REGISTERED without PDN connection is supported by the MME the UE may initiate either the EPS attach procedure without PDN connection establishment or the attach procedure with PDN connection establishment

when at least one PDU session is active and the UE has not registered to S1 mode yet the UE may initiate the EPS attach procedure if necessary the UE may transfer an active PDU session from N1 mode to S1 mode by initiating the EPS attach procedure with request type set to "handover" in the PDN CONNECTIVITY REQUEST message after successfully attached in S1 mode if necessary the UE may transfer other active PDU sessions from N1 mode to S1 mode by initiating the PDN connectivity procedure with request type set to "handover" in the PDN CONNECTIVITY REQUEST message

NOTE 2 it is up to UE implementation to determine which active PDU session is transferred from N1 mode to S1 mode

when the UE has not registered to N1 mode the UE may initiate the initial registration procedure after successfully registered in N1 mode if necessary the UE may transfer one or more active PDN connections from S1 mode to N1 mode by initiating the PDU session establishment procedure with request type set to "existing PDU session"

NOTE 3 it is up to UE implementation to determine which active PDN connection is transferred from S1 mode to N1 mode

if the MME supports EMM-REGISTERED without PDN connection the UE that transferred all PDN connections to the 5GS may stay in state EMM-REGISTERED otherwise the UE shall enter state EMM-DEREGISTERED upon transferring all PDN connection to the 5GS

NOTE 4 when the UE has registered in both N1 mode and S1 mode it is up to UE implementation to maintain the registration update to date in both N1 mode and S1 mode

see subclause 6.1.4 for coordination between 5GSM and ESM

see subclause 4.8.2.3.2 for interworking between TNGF or N3IWF connected to 5GCN and E-UTRAN

### 4.8.4 core network selection for UEs not using CIoT 5GS optimizations

if the UE is capable of both N1 mode and S1 mode when the UE needs to use one or more functionalities not supported in 5GS but supported in EPS and the UE is in 5GMM-IDLE mode the UE may disable the N1 mode capability for 3GPP access (see subclause 4.9.2)

if the UE is capable of both N1 mode and S1 mode and lower layers provide an indication that the current E-UTRA cell is connected to both EPC and 5GCN without also providing an indication that a target core network type was received from the NG-RAN the UE shall select a core network type (EPC or 5GCN) based on the PLMN selection procedures as specified in 3GPP TS 23.122 [5] and provide the selected core network type information to the lower layer during the initial registration procedure

if the UE is capable of both N1 mode and S1 mode and the lower layers have provided an indication that the current E-UTRA cell is connected to both EPC and 5GCN and an indication of whether the network supports IMS emergency services via either EPC or 5GCN or both (see 3GPP TS 36.331 [25A]) the UE selects a core network type (EPC or 5GCN) as specified in 3GPP TS 23.167 [6] subclause H.2 for initiating emergency calls when in the state 5GMM-DEREGISTERED.LIMITED-SERVICE or EMM-DEREGISTERED.LIMITED-SERVICE

NOTE 1 if the PLMN selection information provisioned in the USIM does not contain any prioritization between E-UTRAN and NG-RAN for a PLMN which core network type to select for that PLMN is up to UE implementation

if the UE is capable of both N1 mode and S1 mode and lower layers provide an indication that the current E-UTRA cell is connected to both EPC and 5GCN with

1) an indication that target core network type EPC was received from the NG-RAN the UE shall select the EPC and proceed with the appropriate EMM procedure as specified in 3GPP TS 24.301 [15]; or

2) an indication that target core network type 5GCN was received from the NG-RAN the UE shall select the 5GCN and proceed with the appropriate 5GMM procedure

NOTE 2 the NG-RAN can provide a target core network type to the UE during RRC connection release with redirection (see 3GPP TS 36.331 [25A] and 3GPP TS 38.331 [30])

### 4.8.4A core network selection and redirection for UEs using CIoT optimizations

#### 4.8.4A.1 core network selection

a UE that supports CIoT optimizations performs core network selection (i.e it selects EPC or 5GCN) if the lower layers have provided an indication that the current E-UTRA cell is connected to both EPC and 5GCN as specified in 3GPP TS 23.501 [8]

when selecting a PLMN as described in 3GPP TS 23.122 [5] the UE shall select a core network type (EPC or 5GCN) based on

a) indication from the lower layers about the CIoT EPS optimizations supported in EPC;

b) indication from the lower layers about the CIoT 5GS optimizations supported in 5GCN;

c) the CIoT EPS optimizations supported by the UE;

d) the CIoT 5GS optimizations supported by the UE;

e) the UE's preferred CIoT network behaviour for EPC; and

f) the UE's preferred CIoT network behaviour for 5GCN

the UE shall provide the selected core network type information to the lower layer during the initial registration procedure

#### 4.8.4A.2 redirection of the UE by the core network

the network that supports CIoT optimizations can redirect a UE between EPC and 5GCN as specified in subclause 5.31.3 of 3GPP TS 23.501 [8] the network can take into account the UE's N1 mode capability or S1 mode capability the CIoT network behaviour supported and preferred by the UE or the CIoT network behaviour supported by the network to determine the redirection

NOTE it is assumed that the network would avoid redirecting the UE back and forth between EPC and 5GCN

the network redirects the UE to EPC by rejecting the registration request or service request with the 5GMM cause #31 "Redirection to EPC required" as specified in subclause 5.5.1.2.5 5.5.1.3.5 and 5.6.1.5 upon receipt of reject message the UE disables the N1 mode capability for 3GPP access as specified in subclause 4.9.2 and enables the E-UTRA capability if it was disabled in order to move to EPC

when there is no ongoing registration procedure or service request procedure for a UE in 5GMM-CONNECTED mode if the AMF determines to redirect the UE to EPC the AMF shall initiate the generic UE configuration update procedure to indicate registration requested and release of the N1 NAS signalling connection not requested as described in subclause 5.4.4 the network then redirects the UE to EPC by rejecting the registration request as specified in subclause 5.5.1.3.5

the network that supports CIoT optimizations can also redirect a UE from EPC to 5GCN as specified in subclause 5.3.19.2 of 3GPP TS 24.301 [15]

## 4.9 disabling and re-enabling of UE's N1 mode capability

### 4.9.1 general

the UE shall re-enable the N1 mode capability when the UE powers off and powers on again the USIM is removed or an entry of the "list of subscriber data" with the SNPN identity of the SNPN is updated

### 4.9.2 disabling and re-enabling of UE's N1 mode capability for 3GPP access

the UE shall only disable the N1 mode capability for 3GPP access when in 5GMM-IDLE mode

when the UE is disabling the N1 mode capability for 3GPP access for a PLMN not due to redirection to EPC it should proceed as follows

a) select an E-UTRA cell which is not a restricted RAT as specified in clauses 4.2A connected to EPC or for the UE which supports CIoT EPS optimization select a satellite E-UTRA cell connected to EPC via "WB-E-UTRAN(LEO)" "WB-E-UTRAN(MEO)" or "WB-E-UTRAN(GEO)" of the registered PLMN or a PLMN from the list of equivalent PLMNs if the UE supports S1 mode and the UE has not disabled its E-UTRA capability as specified in 3GPP TS 24.301 [15];

b) if an E-UTRA cell connected to EPC or for the UE which supports CIoT EPS optimization if a satellite E-UTRA cell connected to EPC via "WB-E-UTRAN(LEO)" "WB-E-UTRAN(MEO)" or "WB-E-UTRAN(GEO)" of the registered PLMN or a PLMN from the list of equivalent PLMNs cannot be found the UE does not support S1 mode or the UE has disabled its E-UTRA capability as specified in 3GPP TS 24.301 [15] the UE may select another RAT which is not a restricted RAT as specified in clauses 4.2A of the registered PLMN or a PLMN from the list of equivalent PLMNs that the UE supports;

c) if another RAT of the registered PLMN or a PLMN from the list of equivalent PLMNs cannot be found then enter the state 5GMM-REGISTERED.PLMN-SEARCH or 5GMM-DEREGISTERED.PLMN-SEARCH or the UE does not have a registered PLMN then enter the state 5GMM-DEREGISTERED.PLMN-SEARCH and perform PLMN selection as specified in 3GPP TS 23.122 [5] if disabling of the N1 mode capability for 3GPP access was not due to a UE-initiated de-registration procedure for 5GS services over 3GPP access not due to switch-off the UE may re-enable the N1 capability for this PLMN selection as an implementation option if the UE does not have a registered PLMN instead of performing PLMN selection the UE may select another RAT of the selected PLMN if the UE has chosen a PLMN and the RAT is supported by the UE; or

d) if no other allowed PLMN and RAT combinations are available then

1) if the N1 mode capability for 3GPP access was disabled due to IMS voice not available for NG-RAN access

- if the UE has disabled its E-UTRA capability as specified in 3GPP TS 24.301 [15] the UE shall re-enable both the N1 mode capability for 3GPP access and the E-UTRA capability in order to remain registered for 5GS services or EPS services in the registered PLMN and how this is done is UE implementation dependent; or

- if the UE does not support S1 mode the UE shall re-enable the N1 mode capability for 3GPP access and remain registered for 5GS services in NG-RAN or satellite NG-RAN of the registered PLMN; or

2) otherwise the UE may re-enable the N1 mode capability for 3GPP access and indicate to lower layers to remain camped on NG-RAN cell or satellite NG-RAN cell of the registered PLMN

if the UE re-enables the N1 mode capability for 3GPP access then it may periodically scan for another PLMN and RAT combination which can provide EPS services or non-EPS services (if the UE supports EPS services or non-EPS services) how this periodic scanning is done is UE implementation dependent

NOTE 0 if EPS services or non-EPS services can be obtained from another PLMN and RAT combination to avoid ping pong the UE can disable the N1 mode capability again

when the UE is disabling the N1 mode capability for 3GPP access for an SNPN it should proceed as follows

a) enter the state 5GMM-REGISTERED.PLMN-SEARCH or 5GMM-DEREGISTERED.PLMN-SEARCH and perform SNPN selection as specified in 3GPP TS 23.122 [5] if disabling of the N1 mode capability for 3GPP access was not due to a UE-initiated de-registration procedure for 5GS services over 3GPP access not due to switch-off the UE may re-enable the N1 capability for this SNPN selection; or

b) if no other SNPN is available then the UE may re-enable the N1 mode capability for 3GPP access and indicate to lower layers to remain camped on NG-RAN cell of the registered SNPN

when the UE is disabling the N1 mode capability upon receiving cause value #31 "Redirection to EPC required" as specified in subclauses 5.5.1.2.5 5.5.1.3.5 and 5.6.1.5 it should proceed as follows

a) if the UE is in NB-N1 mode

1) if lower layers do not provide an indication that the current E-UTRA cell is connected to EPC or lower layers do not provide an indication that the current E-UTRA cell supports CIoT EPS optimizations that are supported by the UE search for a suitable NB-IoT cell connected to EPC according to 3GPP TS 36.304 [25C];

2) if lower layers provide an indication that the current E-UTRA cell is connected to EPC and the current E-UTRA cell supports CIoT EPS optimizations that are supported by the UE perform a core network selection to select EPC as specified in subclause 4.8.4A.1; or

3) if lower layers cannot find a suitable NB-IoT cell connected to EPC or there is no suitable NB-IoT cell connected to EPC which supports CIoT EPS optimizations that are supported by the UE the UE as an implementation option may indicate to lower layers to remain camped on E-UTRA cell connected to 5GCN may then start an implementation-specific timer and enter the state 5GMM-REGISTERED.LIMITED-SERVICE the UE may re-enable the N1 mode capability for 3GPP access at expiry of the implementation-specific timer if the timer had been started and may then proceed with the appropriate 5GMM procedure

b) if the UE is in WB-N1 mode

1) if lower layers do not provide an indication that the current E-UTRA cell is connected to EPC or lower layers do not provide an indication that the current E-UTRA cell supports CIoT EPS optimizations that are supported by the UE search for a suitable E-UTRA cell connected to EPC or for the UE which supports CIoT EPS optimization select a satellite E-UTRA cell connected to EPC via "WB-E-UTRAN(LEO)" "WB-E-UTRAN(MEO)" or "WB-E-UTRAN(GEO)" according to 3GPP TS 36.304 [25C];

2) if lower layers provide an indication that the current E-UTRA cell is connected to EPC and the current E-UTRA cell supports CIoT EPS optimizations that are supported by the UE then perform a core network selection to select EPC as specified in subclause 4.8.4A.1; or

3) if lower layers cannot find a suitable E-UTRA cell connected to EPC or if the lower layers cannot find a suitable satellite E-UTRA cell via "WB-E-UTRAN(LEO)" "WB-E-UTRAN(MEO)" or "WB-E-UTRAN(GEO)" or there is no suitable E-UTRA cell connected to EPC or there is no suitable satellite E-UTRA cell connected to EPC via "WB-E-UTRAN(LEO)" "WB-E-UTRAN(MEO)" or "WB-E-UTRAN(GEO)" which supports CIoT EPS optimizations that are supported by the UE the UE as an implementation option may indicate to lower layers to remain camped on E-UTRA cell connected to 5GCN may then start an implementation-specific timer and enter the state 5GMM-REGISTERED.LIMITED-SERVICE the UE may re-enable the N1 mode capability for 3GPP access at expiry of the implementation-specific timer if the timer had been started and may then proceed with the appropriate 5GMM procedure

when the UE supporting both N1 mode and S1 mode needs to stay in E-UTRA connected to EPC (e.g due to the domain selection for UE originating sessions as specified in subclause 4.3.2) in order to prevent unintentional handover or cell reselection from E-UTRA connected to EPC to NG-RAN connected to 5GCN the UE operating in single-registration mode shall disable the N1 mode capability for 3GPP access and

a) shall set the N1mode bit to "N1 mode for 3GPP access not supported" in the UE network capability IE (see 3GPP TS 24.301 [15]) of the ATTACH REQUEST message and the TRACKING AREA UPDATE REQUEST message in EPC; and

b) the UE NAS layer shall indicate the access stratum layer(s) of disabling of the N1 mode capability for 3GPP access

if the UE is required to disable the N1 mode capability for 3GPP access and select E-UTRA or another RAT and the UE is in the 5GMM-CONNECTED mode

- if the UE has a persistent PDU session then the UE waits until the radio bearer associated with the persistent PDU session has been released;

- otherwise the UE shall locally release the established NAS signalling connection;

and enter the 5GMM-IDLE mode before selecting E-UTRA or another RAT

if the UE is disabling its N1 mode capability for 3GPP access before selecting E-UTRA or another RAT the UE shall not perform the UE-initiated de-registration procedure of subclause 5.5.2.2

the UE shall re-enable the N1 mode capability for 3GPP access when the UE performs PLMN selection SNPN selection or SNPN selection for onboarding services over 3GPP access unless

a) disabling of the N1 mode capability for 3GPP access was due to a UE-initiated de-registration procedure for 5GS services over 3GPP access not due to switch-off;

b) the UE has already re-enabled the N1 mode capability for 3GPP access when performing items c) or d) above; or

c) the UE disables the N1 mode capability for 3GPP access for cases described in subclauses 5.5.1.2.7 and 5.5.1.3.7

if the disabling of N1 mode capability for 3GPP access was due to IMS voice is not available over NG-RAN access and the UE's usage setting is "voice centric" the UE shall re-enable the N1 mode capability for 3GPP access when the UE's usage setting is changed from "voice centric" to "data centric" as specified in subclauses 4.3.3

the UE should memorize the identity of the PLMN or SNPN where N1 mode capability for 3GPP access was disabled and should use that stored information in subsequent PLMN or SNPN selections as specified in 3GPP TS 23.122 [5]

if the disabling of N1 mode capability for 3GPP access was due to successful completion of an emergency services fallback the criteria to enable the N1 mode capability again are UE implementation specific

the UE shall disable the N1 mode capability for 3GPP access if requested by the upper layers (e.g see subclause U.2.2.6.4 in 3GPP TS 24.229 [14]) if the UE disabled the N1 mode capability for 3GPP access based on the request from the upper layers (e.g see subclause U.2.2.6.4 in 3GPP TS 24.229 [14]) the criteria to re-enable the N1 mode capability for 3GPP access after the completion of an emergency service are UE implementation specific

if the N1 mode capability for 3GPP access was disabled due to the UE initiated de-registration procedure for 3GPP access or for 3GPP access and non-3GPP access and the UE is operating in single-registration mode (see subclause 5.5.2.2.3) upon request of the upper layers to re-register for 5GS services over 3GPP access or the UE needs to come out of unavailability period and resume normal services the UE shall enable the N1 mode capability for 3GPP access again

as an implementation option the UE may start a timer for enabling the N1 mode capability for 3GPP access when the UE disables the N1 mode capability for 3GPP access the UE should memorize the identity of the PLMNs or SNPNs where N1 mode capability for 3GPP access was disabled on expiry of this timer

a) if the UE is in iu mode or A/Gb mode and is in idle mode as specified in 3GPP TS 24.008 [13] the UE should enable the N1 mode capability for 3GPP access;

b) if the UE is in iu mode and a PS signalling connection exists but no RR connection exists the UE may abort the PS signalling connection before enabling the N1 mode capability for 3GPP access;

c) if the UE is in S1 mode and is in EMM-IDLE mode as specified in 3GPP TS 24.301 [15] the UE should enable the N1 mode capability for 3GPP access; and

d) if the UE is in iu mode or A/Gb mode and an RR connection exists the UE should delay enabling the N1 mode capability for 3GPP access until the RR connection is released if the UE is in S1 mode and is in EMM-CONNECTED mode as specified in 3GPP TS 24.301 [15] the UE should delay enabling the N1 mode capability for 3GPP access until the NAS signalling connection in S1 mode is released

when the UE enables the N1 mode capability for 3GPP access the UE shall remove the PLMN or SNPN from the memorized identity of the PLMNs or SNPNs where N1 mode capability for 3GPP access was disabled

NOTE 1 as described in 3GPP TS 23.122 [5] if the UE is in automatic PLMN selection mode or automatic SNPN selection mode the UE does not consider the memorized PLMNs as PLMN selection candidates for NG-RAN access technology or satellite NG-RAN access technology or the memorized SNPN as SNPN selection candidates till the timer expires

if the N1 mode was disabled for a particular PLMN due to no available slice in that PLMN and the timer T3526 has expired then the UE may re-enable the N1 mode for the PLMN and start a registration procedure for mobility and periodic registration update with a requested NSSAI containing the S-NSSAI for which the associated T3526 has expired in this case the UE shall stop the timer TNSU for the PLMN and remove the PLMN ID from the memorized identity of the PLMNs where N1 mode is disabled due to no available network slices

the UE may disable the N1 mode capability for currently camped PLMN or SNPN over 3GPP access (see 3GPP TS 23.122 [5]) if no network slice is available for the camped PLMN or SNPN (see subclauses 5.5.1.2.5 and 5.5.1.3.5) if the disabling of N1 mode capability for 3GPP access was due to no network slices available the UE should memorize the identity of the PLMN or SNPN where N1 mode is disabled due to no available network slices or the list of SNPNs where N1 mode is disabled due to no available network slices respectively as an implementation option the UE may start a timer TNSU for enabling the N1 mode capability that was disabled due to no available network slices for the 3GPP access the value of timer TNSU is UE implementation specific the UE should remove the memorized identity of the PLMNs or SNPNs where N1 mode is disabled due to no available network slice upon

a) the expiry of the timer TNSU; or

b) receiving REGISTRATION ACCEPT message or a CONFIGURATION UPDATE COMMAND message containing the network slicing indication IE with the network slicing subscription change indication set to “Network slicing subscription changed”

NOTE 1A if a network slice is temporarily unavailable to the UE due to the S-NSSAI time validity information or the S-NSSAI location validity information as described in subclauses 4.6.2.8 and 4.6.2.10 respectively and no other network slice is available to the UE for the camped PLMN or SNPN as an implementation option the UE can keep the N1 mode capability enabled for currently camped PLMN or SNPN over 3GPP access

if the UE receives ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message provided with S-NSSAI and the PLMN ID in the protocol configuration options IE or extended protocol configuration options IE (see subclause 6.5.1.3 of 3GPP TS 24.301 [15]) the UE may remove the PLMN ID from the memorized identity of the PLMNs where N1 mode is disabled due to no available network slices

if the UE attempts to establish an emergency PDU session in a PLMN or SNPN where N1 mode capability was disabled due to the UE's registration attempt counter have reached 5 the UE may enable N1 mode capability for that PLMN memorized by the UE

NOTE 2 if N1 mode capability is disabled due to the UE's registration attempt counter reaches 5 the value of the timer for re-enabling N1 mode capability is recommended to be the same as the value of T3502 which follows the handling specified in subclause 5.3.8 if the value of T3502 is indicated as zero by the network an implementation specific non-zero value can be used for the timer for re-enabling N1 mode capability

if the UE supports access to an SNPN providing access for localized services in SNPN and access for localized services in SNPN is enabled then

- the UE may re-enable the N1 mode capability for 3GPP access if disabled for that SNPN when

1) the validity information of the SNPN contained in the "credentials holder controlled prioritized list of preferred SNPNs for access for localized services in SNPN" changes from not met to met; or

2) the validity information of a GIN broadcasted by an SNPN contained in the "credentials holder controlled prioritized list of preferred GINs for access for localized services in SNPN" changes from not met to met; and

- the UE need not re-enable N1 mode capability for 3GPP access for that SNPN if the N1 mode capability for 3GPP access for that SNPN was disabled due to 5GMM cause value #27 (N1 mode not allowed)

NOTE 3 if the UE receives a reject message with a 5GMM cause value and the N1 mode capability is disabled again for the SNPN it is up to UE implementation whether to re-enable N1 mode capability for the SNPN if the validity information of the SNPN is still met

### 4.9.3 disabling and re-enabling of UE's N1 mode capability for non-3GPP access

when the UE disables the N1 mode capability for non-3GPP access the UE NAS layer shall not initiate any 5GS NAS procedures towards the network over non-3GPP access

when the UE supporting both N1 mode and S1 mode needs to stay in non-3GPP access connected to EPC (e.g due to the domain selection for UE originating sessions as specified in subclause 4.3.2) in order to prevent unintentional selection of a non-3GPP access network connected to 5GCN the UE operating in single-registration mode shall not transfer any PDN connection to a non-3GPP access network connected to the 5GCN

if the disabling of N1 mode capability for non-3GPP access was due to IMS voice is not available over non-3GPP access in 5GS and the UE's usage setting is "voice centric" the UE shall re-enable the N1 mode capability for non-3GPP access when the UE's usage setting is changed from "voice centric" to "data centric" as specified in subclauses 4.3.3

the UE shall re-enable the N1 mode capability for non-3GPP access when a new PLMN or SNPN is selected over non-3GPP access

the UE may disable the N1 mode capability for the currently camped PLMN or SNPN over non-3GPP access if no network slice is available for the camped PLMN or SNPN

as an implementation option the UE may start a timer for re-enabling the N1 mode capability for non-3GPP access after the N1 mode capability for non-3GPP access was disabled on the expiry of this timer the UE should re-enable the N1 mode capability for non-3GPP access

### 4.9.4 disabling and re-enabling of UE's satellite NG-RAN capability

disable of the satellite NG-RAN capability shall only be performed when the UE is in 5GMM-IDLE mode

when disabling the satellite NG-RAN capability the UE

a) may disable the NR NTN access capability (see 3GPP TS 38.304 [28] and 3GPP TS 38.306 [28A]);

b) shall memorize the identity of the PLMN where the satellite NG-RAN capability was disabled; and

c) shall use that stored information in subsequent PLMN selections as specified in 3GPP TS 23.122 [6]

NOTE as an implementation option the UE can disable satellite NG-RAN capability by disabling N1 mode capability for satellite NG-RAN access

as an implementation option the UE may start a timer for enabling satellite NG-RAN capability and on expiry of this timer UE shall remove the PLMN from the memorized identity of the PLMNs where the satellite NG-RAN capability was disabled

if the disabling of satellite NG-RAN capability was due to IMS voice is not available and the UE's usage setting is "voice centric" the UE shall re-enable the satellite NG-RAN capability when the UE's usage setting is changed from "voice centric" to "data centric" as specified in subclauses 4.3.3

## 4.10 interworking with ePDG connected to EPC

in order to interwork with ePDG connected to EPC the UE shall operate as specified in either subclause 4.8.2.3 or subclause 4.8.3 which subclause the UE follows is chosen by the UE irrespective of the interworking without N26 interface indicator

the UE shall not attempt to transfer PDU sessions with PDU session type "Ethernet" or "Unstructured" to an ePDG connected to EPC

NOTE 1 PDU sessions with PDU session type "Ethernet" or "Unstructured" cannot be transferred to an ePDG connected to EPC because PDN connections with PDN type "non-IP" or PDN type "Ethernet" are not supported over ePDG connected to EPC

the UE shall not attempt to transfer PDU sessions with the selected SSC mode set to "SSC mode 2" or "SSC mode 3" to an ePDG connected to EPC

## 4.11 UE configuration parameter updates

the 5GS in a PLMN supports updating UE parameters via NAS signalling the feature enables the HPLMN to securely and dynamically re-configure the UE configuration parameters stored on the USIM and the ME

- in this release of the specification updates of the following USIM configuration parameters are supported

- routing indicator

- in this release of specification updates of the following ME configuration parameters are supported

- default configured NSSAI

- disaster roaming information

the 5GS in an SNPN supports updating UE parameters via NAS signalling the feature enables the SNPN to securely and dynamically re-configure the UE configuration parameter stored on the USIM if the UE used the USIM for registration to the SNPN

- in this release of the specification updates of the following USIM configuration parameters are supported

- routing indicator

- in this release of specification updates of the following ME configuration parameters are supported

- routing indicator

- default configured NSSAI

the update of UE configuration parameters is initiated by the network using the network-initiated downlink NAS transport procedure as described in subclause 5.4.5.3 the ME acknowledgement of successful reception of the updated UE configuration parameter information is sent back to the network using the UE-initiated uplink NAS transport procedure as described in subclause 5.4.5.2

## 4.12 access traffic steering switching and splitting (ATSSS)

the ATSSS feature is an optional feature that may be supported by the UE and the 5GCN

the ATSSS feature enables a multi-access PDU connectivity service which can exchange PDUs between the UE and a data network by simultaneously using one 3GPP access network and one non-3GPP access network the multi-access PDU connectivity service is realized by establishing a multi-access PDU session i.e a PDU session that can have user-plane resources on two access networks

NOTE 1 MA PDU session is not applicable for CIoT 5GS optimization in this release of specification

the UE can request an MA PDU session when the UE is registered via both 3GPP and non-3GPP accesses or when the UE is registered via one access only the MA PDU session management is performed based on the PDU session management procedures

the detailed description of the procedures for ATSSS between the UE and the network across one 3GPP access network and one non-3GPP access network are specified in 3GPP TS 24.193 [13B]

NOTE 2 in this version of the specification PDU set handling is not supported in an MA PDU session

## 4.13 support of NAS signalling using wireline access network

a 5G-RG a W-AGF acting on behalf of an FN-RG or a W-AGF acting on behalf of an N5GC device can use wireline access network to access the 5GCN by using NAS signalling procedures as described in 3GPP TS 23.501 [8] 3GPP TS 23.502 [9] and 3GPP TS 23.316 [6D]

wireline access is a type of non-3GPP access

a 5G-RG simultaneously connected to the same 5GCN of a PLMN over a 3GPP access and a wireline access is connected to a single AMF

5G-RG maintains the N1 NAS signalling connection with the AMF over the wireline access network after all the PDU sessions for the 5G-RG over that access have been released or handed over to 3GPP access

the 5G-RG connected to 5GCN via NG-RAN is specified in 3GPP TS 23.316 [6D]

when accessing the 5GCN over 3GPP access in addition to requirements specified for the 5G-RG in the present document the 5G-RG shall also perform requirements (e.g 5GMM 5GSM related requirements) specified in the present document for a UE accessing 5GCN over 3GPP access when accessing the 5GCN over wireline access in addition to requirements specified for the 5G-RG in the present document the 5G-RG shall also perform requirements (e.g 5GMM 5GSM related requirements) specified in the present document for a UE accessing 5GCN over non-3GPP access if a requirement specified for the 5G-RG in the present document contradicts a requirement specified for the UE in the present document the 5G-RG shall perform the requirement specified in the present document for the 5G-RG

for the scenario of FN-RG which does not support N1 mode the W-AGF acting on behalf of the FN-RG exchanges NAS signalling messages with an AMF

for the scenario of N5GC device which does not support N1 mode the W-AGF acting on behalf of the N5GC device exchanges NAS signalling messages with an AMF

for the scenario of AUN3 device which does not support N1 mode the 5G-RG acting on behalf of the AUN3 device exchanges NAS signalling messages with an AMF if the 5G-RG is not registered and connected to the 5GCN over wireline access the 5G-RG acting on behalf of an AUN3 device shall not initiate the initial registration procedure on behalf of the AUN3 device

NOTE 1 the 5G-RG acting on behalf of an AUN3 device maintains a 5GMM context for each AUN3 device behind it the AMF maintains a 5GMM context for each AUN3 device the AMF is not aware of any association between the 5GMM context of the 5G-RG and the 5GMM context of the AUN3 device

when the 5G-RG acting on behalf of an AUN3 device initiates the initial registration procedure on behalf of the AUN3 device the 5G-RG shall not include the requested NSSAI in the REGISTRATION REQUEST message

for the scenario of NAUN3 device which does not support N1 mode the 5G-RG acting on behalf of a connectivity group consisting of one or more NAUN3 devices exchanges NAS signalling messages with an AMF

NOTE 2 it is also possible for 5G-RG that is connected to 5GCN via NG-RAN to act on behalf of a connectivity group consisting of one or more NAUN3 devices as specified in 3GPP TS 23.316 [6D]

in addition to requirements specified for the W-AGF acting on behalf of the FN-RG (or on behalf of the N5GC device) in the present document the W-AGF acting on behalf of the FN-RG (or on behalf of the N5GC device) shall also perform requirements specified in the present document for a UE accessing 5GCN over non-3GPP access if a requirement specified for the W-AGF acting on behalf of the FN-RG (or on behalf of the N5GC device) in the present document contradicts a requirement specified for the UE in the present document the W-AGF acting on behalf of the FN-RG (or on behalf of the N5GC device) shall perform requirement specified in the present document for the W-AGF acting on behalf of the FN-RG (or on behalf of the N5GC device)

the PDU session authentication and authorization procedure is not supported in a PDU session established by the W-AGF acting on behalf of the FN-RG or on behalf of the N5GC device

the W-AGF acting on behalf of the N5GC device requests the establishment of a PDU session on behalf of the N5GC device upon registration only one PDU session per N5GC device is supported

the 5G-RG acting on behalf of an AUN3 device requests the establishment of a PDU session on behalf of the AUN3 device upon registration only one PDU session per AUN3 is supported

the 5G-RG acting on behalf of a connectivity group consisting of one or more NAUN3 devices requests the establishment of a PDU session on behalf of the connectivity group only one PDU session per the connectivity group is supported where all the NAUN3 devices in the connectivity group share the same PDU session

a 5G-RG or an FN-RG provide a non-3GPP access network to UEs a UE connected to a non-3GPP access network provided by the 5G-RG or the FN-RG can access to the 5GCN via the N3IWF or via the TNGF as described in 3GPP TS 23.316 [6D]

the 5G-RG or the W-AGF acting on behalf of the FN-RG shall indicate "ANDSP not supported by the UE" in the UE policy classmark IE during the UE-initiated UE state indication procedure as specified in subclause D.2.2

the 5G-RG or the W-AGF acting on behalf of the FN-RG shall indicate "Reporting URSP rule enforcement not supported by the UE" in the UE policy classmark IE during the UE-initiated UE state indication procedure as specified in subclause D.2.2

the Non-3GPP QoS assistance information (N3QAI) is introduced to enable a 5G-RG to perform the QoS differentiation for the UE behind the 5G-RG the AUN3 device behind the 5G-RG or the NAUN3 device behind the 5G-RG the network may provide the N3QAI associated with the QoS flow during the PDU session establishment procedure as defined in subclause 6.4.1 or during the PDU session modification procedure as defined in subclause 6.4.2

NOTE 3 how the 5G-RG applies N3QAI is outside the scope of the present document

if the AMF receives an indication from the W-AGF that there is no 5G-RG connected to the same wireline for an AUN3 device as specified in 3GPP TS 23.316 [6D] the AMF shall locally de-register the AUN3 device

## 4.14 Non-public network (NPN)

### 4.14.1 general

two types of NPN can be deployed using 5GS SNPN (see subclause 4.14.2) and PNI-NPN (see subclause 4.14.3)

### 4.14.2 Stand-alone non-public network (SNPN)

if the UE is not SNPN enabled the UE is always considered to be not operating in SNPN access operation mode if the UE is SNPN enabled the UE can operate in SNPN access operation mode details of activation and deactivation of SNPN access operation mode at the SNPN-enabled UE are up to UE implementation

the functions and procedures of NAS described in the present document are applicable to an SNPN and an SNPN-enabled UE unless indicated otherwise the key differences brought by the SNPN to the NAS layer are as follows

a) instead of the PLMN selection process the SNPN selection process is performed by a UE operating in SNPN access operation mode (see 3GPP TS 23.122 [5] and 3GPP TS 24.502 [18] for further details on the SNPN selection);

b) a "permanently forbidden SNPNs" list and a "temporarily forbidden SNPNs" list are managed per access type independently (i.e 3GPP access or non-3GPP access) and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both per entry of the "list of subscriber data" or if the UE supports access to an SNPN using credentials from a credentials holder per the PLMN subscription by a UE operating in SNPN access operation mode instead of forbidden PLMN lists if the UE supports onboarding services in SNPN an additional "permanently forbidden SNPNs for onboarding services in SNPN" list and an additional "temporarily forbidden SNPNs for onboarding services in SNPN" list are managed if the UE supports access to an SNPN providing access for localized services in SNPN an additional "permanently forbidden SNPNs for access for localized services in SNPN" list and an additional "temporarily forbidden SNPNs for access for localized services in SNPN" list per entry of the "list of subscriber data" and per the PLMN subscription are managed for 3GPP access only these lists shall be maintained across activation and deactivation of SNPN access operation mode;

NOTE 0 on timer T3245 expiry when the UE supports access to an SNPN using credentials from a credentials holder using PLMN subscription and the UE is not operating in SNPN access operation mode as an implementation option the UE can delete the list of "temporarily forbidden SNPNs" and "permanently forbidden SNPNs" and additionally the list of "permanently forbidden SNPNs for access for localized services in SNPN" and list of "temporarily forbidden SNPNs for access for localized services in SNPN" if the UE supports access to an SNPN providing access for localized services in SNPN

NOTE 0a if an S-NSSAI dedicated by the SNPN to provide access to localized services in SNPN is used then network slice-based cell reselection (see 3GPP TS 23.501 [8]) can be used to steer the UE to camp on a cell of TA(s) where the localized services in SNPN are available

c) inter-system change to and from S1 mode is not supported;

d) void;

e) CAG is not supported in SNPN access operation mode;

f) with respect to the 5GMM cause values

1) 5GMM cause values #74 "Temporarily not authorized for this SNPN" and #75 "Permanently not authorized for this SNPN" are supported whereas these 5GMM cause values cannot be used in a PLMN; and

2) 5GMM cause values #11 "PLMN not allowed" #31 "Redirection to EPC required" #73 "Serving network not authorized" and #76 "Not authorized for this CAG or authorized for CAG cells only" are not supported whereas these 5GMM cause values can be used in a PLMN;

g) a list of "5GS forbidden tracking areas for roaming" and a list of "5GS forbidden tracking areas for regional provision of service" are managed per SNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both entry of the "list of subscriber data" or if the UE supports access to an SNPN using credentials from a credentials holder,PLMN subscription (see 3GPP TS 23.122 [5]);

h) when accessing SNPN services via a PLMN using 3GPP access access to 5GCN of the SNPN is performed using 5GMM procedures for non-3GPP access 5GMM parameters for non-3GPP access the UE is performing access to SNPN over non-3GPP access and the UE is not operating in SNPN access operation mode over 3GPP access when accessing PLMN services via a SNPN using 3GPP access access to 5GCN of the PLMN is performed using 5GMM procedures for non-3GPP access 5GMM parameters for non-3GPP access the UE is not performing access to SNPN over non-3GPP access and the UE is operating in SNPN access operation mode over 3GPP access from the UE's NAS perspective accessing PLMN services via an SNPN and accessing SNPN services via a PLMN are treated as untrusted non-3GPP access if the UE is accessing the PLMN using non-3GPP access the access to 5GCN of the SNPN via PLMN is not specified in this release of the specification

emergency services are not supported in an SNPN when a UE accesses SNPN services via a PLMN;

i) when registered to an SNPN the UE shall use only the UE policies provided by the registered SNPN;

j) inclusion of a TAI of an SNPN other than the registered SNPN into the registration area is not supported the AMF of an SNPN shall only include into the registration area one or more TAIs of the registered SNPN;

j1) inclusion of a TAI of an SNPN other than the registered SNPN into the LADN service area is not supported the AMF of an SNPN shall only include one or more TAIs of the registered SNPN into the LADN service area;

j2) inclusion of a TAI of an SNPN other than the registered SNPN into the allowed area or the non-allowed area of the 3GPP access service area restrictions is not supported the AMF of an SNPN shall include only one or more TAIs of the registered SNPN into the allowed area or the non-allowed area of the 3GPP access service area restrictions;

k) void;

l) void;

m) UE mobility between SNPNs in 5GMM-CONNECTED mode is supported when the SNPNs are equivalent SNPNs for the selected entry of the "list of subscriber data" or the selected PLMN subscription UE mobility between SNPNs in 5GMM-IDLE mode is supported when the UE supports access to an SNPN using credentials from a credentials holder or when the SNPNs are equivalent SNPNs or both for the selected entry of the "list of subscriber data" or the selected PLMN subscription UE mobility between an SNPN and a PLMN is not supported;

n) CIoT 5GS optimizations are not supported;

o) void;

p) when registering or registered to an SNPN the UE shall handle the 5GS mobile identity as described in subclause 5.5.1.2.2;

q) when registering or registered to an SNPN the UE shall only consider

1) a last visited registered TAI visited in the same SNPN as an available last visited registered TAI; or

2) a last visited registered TAI visited using the same entry of the "list of subscriber data" or the same PLMN subscription as an available last visited registered TAI if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both;

NOTE 1 if the last visited registered TAI is assigned by an SNPN other than the current SNPN the serving AMF can determine the SNPN assigning the last visited registered TAI using the NID provided by the UE

r) emergency service fallback is not supported;

s) when registering or registered for onboarding services in SNPN the UE shall not provide the requested NSSAI to the network;

s1) when performing initial registration for onboarding services in SNPN the UE shall set the 5GS registration type value to "SNPN onboarding registration";

t) when registering or registered for onboarding services in SNPN the AMF shall not provide the configured NSSAI the allowed NSSAI or the rejected NSSAI to the UE shall use the S-NSSAI included in the AMF onboarding configuration data for onboarding services in SNPN and shall not perform NSSAA procedure for S-NSSAI used for onboarding services in SNPN;

u) the UE can access an SNPN indicating that onboarding is allowed using default UE credentials for primary authentication in order for the UE to be configured with one or more entries of the "list of subscriber data";

x) ecall over IMS is not supported in SNPN access operation mode and the UE ignores any USIM configuration for ecall only mode;

y) when registering or registered for onboarding services in SNPN the AMF shall store in the 5GMM context of the UE an indication that the UE is registered for onboarding services in SNPN;

z) a UE with multiple valid entries of "list of subscriber data" or one or more valid USIMs and one or more valid entries of "list of subscriber data" capable of initiating and maintaining simultaneous separate registration states over 3GPP access with PLMN(s) or SNPN(s) using identities and credentials associated with those entries of "list of subscriber data" or USIMs and entries of "list of subscriber data" and supporting one or more of the N1 NAS signalling connection release the paging indication for voice services the reject paging request the paging restriction and the paging timing collision control may use procedures defined for MUSIM UE even if the UE does not include multiple valid USIMs;

za) when the UE is registering or registered for onboarding services in SNPN the network slice admission control is not performed;

NOTE 2 if the network determines that the UE cannot register to the onboarding SNPN due to lack of resources for the network slice used for onboarding the AMF can reject the UE with 5GMM cause #22 "congestion"

zb) when the UE is registered for onboarding services in SNPN (as specified in subclause 3.1) the UE determines that the number dialled is an emergency number and emergency services are not supported in the SNPN the UE shall perform a local de-registration and utilize the procedures specified in 3GPP TS 23.167 [6] and 3GPP TS 24.229 [14] to select a domain for the emergency session attempt;

NOTE 3 the UE can select PS domain for emergency session attempt

v) void; and

w) RAT utilization control does not apply

### 4.14.3 public network integrated non-public network (PNI-NPN)

a PNI-NPN is made available by means of e.g dedicated DNNs or by one or more S-NSSAIs allocated for it a CAG can be optionally used in order to prevent UEs not allowed to access a PNI-NPN from accessing the PNI-NPN the key enablers for the CAG in the NAS layer are as follows

a) CAG selection (see 3GPP TS 23.122 [5]); and

b) provisioning of a "CAG information list" as specified in 3GPP TS 23.122 [5] from network to UE via the generic UE configuration update procedure the registration procedure the service request procedure and the network-initiated de-registration procedure

the "CAG information list" provisioned by the network if available is stored in the non-volatile memory in the ME as specified in annex c the "CAG information list" stored in the ME is kept when the UE enters 5GMM-DEREGISTERED state annex c specifies condition under which the "CAG information list" stored in the ME is deleted additionally when a USIM is inserted if

- no "CAG information list" is stored in the non-volatile memory of the ME; or

- the SUPI from the USIM does not match the SUPI stored together with the "CAG information list" in the non-volatile memory of the ME;

and the UE has a "CAG information list" stored in the USIM (see 3GPP TS 31.102 [22]) the UE shall store the "CAG information list" from the USIM into the ME as specified in annex c the "Allowed CAG list" included in the entry for the HPLMN or EHPLMN in "CAG information list" stored in the USIM can contain a range of CAG-IDs

the UE supporting CAG may perform the initial registration for emergency services via a non-CAG cell in a PLMN for which the UE has an "indication that the UE is only allowed to access 5GS via CAG cells" or via a CAG cell for which none of CAG-ID(s) is authorized based on the "Allowed CAG list" (see 3GPP TS 23.122 [5]) for the selected PLMN if a UE supporting CAG having an emergency PDU session is camping on

a) a CAG cell and none of the CAG-ID(s) of the CAG cell is authorized based on the "Allowed CAG list" for the current PLMN in the UE's subscription; or

b) a non-CAG cell in a PLMN for which the UE's subscription contains an "indication that the UE is only allowed to access 5GS via CAG cells";

the AMF shall behave as specified in subclause 5.4.4.2 5.5.1.3.4 or 5.6.1.4.1

NOTE the emergency services in a PLMN for which the UE's subscription contains an "indication that the UE is only allowed to access 5GS via CAG cells" can be subject to local regulation

if a UE supporting enhanced CAG information is in a CAG cell with a CAG-ID which

a) was authorized based on the "Allowed CAG list" associated with the current PLMN in the "CAG information list" stored in the ME; and

b) becomes not authorized based on the "Allowed CAG list" (e.g. time validity information no longer matches UE's current time); and

none of the CAG-ID(s) supported by the current CAG cell is currently authorized based on the "Allowed CAG list" of the entry for the current PLMN in the stored "CAG information list" and

a) the entry for the current PLMN in the "CAG information list" does not include an "indication that the UE is only allowed to access 5GS via CAG cells" then the UE shall abort ongoing UE initialted 5GMM procedures if any locally release the NAS signalling connection if any enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C] with the stored "CAG information list"; or

b) the entry for the current PLMN in the stored "CAG information list" includes an "indication that the UE is only allowed to access 5GS via CAG cells" and

1) one or more CAG-ID(s) are authorized based on the "Allowed CAG list" of the entry for the current PLMN in the stored "CAG information list" the UE shall abort ongoing UE initialted 5GMM procedures if any locally release the NAS signalling connection if any enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C] with the stored "CAG information list"; or

2) no CAG-ID is authorized based on the "Allowed CAG list" of the entry for the current PLMN in the stored "CAG information list" and

i) the UE does not have an emergency PDU session then the UE shall abort ongoing UE initialted 5GMM procedures if any locally release the NAS signalling connection if any enter the state 5GMM-REGISTERED.PLMN-SEARCH and shall apply the PLMN selection process defined in 3GPP TS 23.122 [5] with the stored "CAG information list"; or

ii) the UE has an emergency PDU session then the UE shall perform a local release of all PDU sessions associated with 3GPP access except for the emergency PDU session and enter the state 5GMM-REGISTERED.LIMITED-SERVICE

## 4.15 time synchronization and time sensitive communication

### 4.15.1 general

a 5GS can support time synchronization and TSC (see 3GPP TS 23.501 [8] 3GPP TS 23.502 [9] and 3GPP TS 23.503 [10]) this subclause describes NAS-specific aspects of the 5GS features to support time synchronization and TSC interworking with EPS is not supported for a PDU session for time synchronization or TSC

### 4.15.2 void

#### 4.15.2.1 void

#### 4.15.2.2 void

#### 4.15.2.3 void

### 4.15.3 time synchronization

two types of synchronization processes are supported by the 5GS 5GS synchronization and (g)PTP domain synchronization (see 3GPP TS 23.501 [8])

for 5GS synchronization the lower layers provide the 5G internal system clock signalled via the NG-RAN (see 3GPP TS 38.331 [30]) and the UE forwards the 5G internal system clock to the DS-TT(s)

for (g)PTP domain synchronization the UE supports forwarding (g)PTP messages (see 3GPP TS 23.501 [8] 3GPP TS 23.502 [9] and 3GPP TS 24.535 [19A]) for all (g)PTP domains associated with a PDU session

a) if the UE receives (g)PTP message via the PDU session the UE forwards the (g)PTP messages to the DS-TT associated with the PDU session; or

b) if the UE receives (g)PTP messages from the DS-TT associated with the PDU session the UE forwards the (g)PTP messages via the PDU session

depending on the 5G access stratum-based time distribution or (g)PTP-based time distribution the network timing synchronization status of the nodes involved in the operation (e.g. NG-RAN nodes NW-TTs) may change using the 5GMM protocol the network can request a supporting UE to reconnect to the network upon receiving an indication of a change in the RAN timing synchronization status

### 4.15.4 user plane node management

a 5G system (5GS) can act as a user plane node of an external network (e.g IEEE TSN bridge) or a 5GS can be independently used to enable TSC for these purposes information available at a UE is provided to the network and port management information containers are exchanged between a DS-TT and a TSN AF or a TSCTSF (see 3GPP TS 24.539 [19BA])

during a UE-requested PDU session establishment procedure if the UE supports transfer of port management information containers then the UE indicates that transfer of port management information container is supported and the UE provides a DS-TT ethernet port MAC address (if the PDU session type is Ethernet) port management information container and a UE-DS-TT residence time (if available) to the network (see subclause 6.4.1.2)

once the UE has successfully established a PDU session and the UE has indicated that transfer of port management information container is supported during the UE-requested PDU session establishment procedure (see subclause 6.4.1.2) then port management information containers are exchanged via a UE-requested PDU session modification procedure and a network-requested PDU session modification procedure (see subclauses 6.3.2 and 6.4.2) the UE receiving a port management information container from the network shall forward the port management information container to the DS-TT the SMF receiving a port management information container from the UE shall operate as described in 3GPP TS 23.502 [9]

## 4.16 UE radio capability signalling optimisation

UE radio capability signalling optimisation (RACS) is a feature that is optional at both the UE and the network and which aims to optimise the transmission of UE radio capability over the radio interface (see 3GPP TS 23.501 [8]) RACS works by assigning an identifier to represent a set of UE radio capabilities this identifier is called the UE radio capability ID a UE radio capability ID can be either manufacturer-assigned or network-assigned the UE radio capability ID is an alternative to the signalling of the radio capabilities container over the radio interface

in this release of the specification RACS is applicable to neither NB-N1 mode nor non-3GPP access

if the UE supports RACS

a) the UE shall indicate support for RACS by setting the RACS bit to "RACS supported" in the 5GMM capability IE of the REGISTRATION REQUEST message;

b) if the UE performs a registration procedure for initial registration and the UE has an applicable UE radio capability ID for the current UE radio configuration in the selected network the UE shall include the UE radio capability ID in the UE radio capability ID IE as a non-cleartext IE in the REGISTRATION REQUEST message if both a network-assigned UE radio capability ID and a manufacturer-assigned UE radio capability ID are applicable the UE shall include the network-assigned UE radio capability ID in the REGISTRATION REQUEST message;

c) if the radio configuration at the UE changes (for instance because the UE has disabled a specific radio capability) then

1) if the UE has an applicable UE radio capability ID for the new UE radio configuration the UE shall initiate a registration procedure for mobility and periodic registration update the UE shall include the applicable UE radio capability ID in the UE radio capability ID IE of the REGISTRATION REQUEST message and shall include the 5GS update type IE in the REGISTRATION REQUEST message with the NG-RAN-RCU bit set to "UE radio capability update needed" if both a network-assigned UE radio capability ID and a manufacturer-assigned UE radio capability ID are applicable the UE shall include the network-assigned UE radio capability ID in the REGISTRATION REQUEST message; and

2) if the UE does not have an applicable UE radio capability ID for the new UE radio configuration the UE shall initiate a registration procedure for mobility and periodic registration update and include the 5GS update type IE in the REGISTRATION REQUEST message with the NG-RAN-RCU bit set to "UE radio capability update needed";

NOTE performing the registration procedure for mobility and periodic registration update and including the 5GS update type IE in the REGISTRATION REQUEST message with the NG-RAN-RCU bit set to "UE radio capability update needed" without a UE radio capability ID included in the REGISTRATION REQUEST message can trigger the network to assign a new UE radio capability ID to the UE

d) upon receiving a network-assigned UE radio capability ID in the REGISTRATION ACCEPT message or the CONFIGURATION UPDATE COMMAND message the UE shall store the network-assigned UE radio capability ID and the PLMN ID or SNPN identity of the serving network and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the selected entry of the "list of subscriber data" or the selected PLMN subscription along with a mapping to the current UE radio configuration in its non-volatile memory as specified in annex c the UE shall be able to store at least the last 16 received network-assigned UE radio capability IDs with the associated PLMN ID or SNPN identity and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the selected entry of the "list of subscriber data" or the selected PLMN subscription and the mapping to the corresponding UE radio configuration;

e) the UE shall not use a network-assigned UE radio capability ID assigned by a PLMN in PLMNs equivalent to the PLMN which assigned it or by an SNPN in SNPNs equivalent to the SNPN which assigned it;

f) upon receiving a UE radio capability ID deletion indication IE set to "Network-assigned UE radio capability IDs deletion requested" in the REGISTRATION ACCEPT message or the CONFIGURATION UPDATE COMMAND message the UE shall delete all network-assigned UE radio capability IDs stored at the UE for the serving network initiate a registration procedure for mobility and periodic registration update and include an applicable manufacturer-assigned UE radio capability ID for the current UE radio configuration if available at the UE in the UE radio capability ID IE of the REGISTRATION REQUEST message; and

g) if the UE performs a registration procedure for mobility and periodic registration update due to entering a tracking area that is not in the list of tracking areas that the UE previously registered in the AMF and the UE has an applicable UE radio capability ID for the current UE radio configuration in the selected network the UE shall include the UE radio capability ID in the UE radio capability ID IE as a non-cleartext IE in the REGISTRATION REQUEST message if both a network-assigned UE radio capability ID and a manufacturer-assigned UE radio capability ID are applicable the UE shall include the network-assigned UE radio capability ID in the REGISTRATION REQUEST message

if the network supports RACS

a) the network may assign a network-assigned UE radio capability ID to a UE which supports RACS by including a UE radio capability ID IE in the REGISTRATION ACCEPT message or in the CONFIGURATION UPDATE COMMAND message;

b) the network may trigger the UE to delete all network-assigned UE radio capability IDs stored at the UE for the serving network by including a UE radio capability ID deletion indication IE set to "Network-assigned UE radio capability IDs deletion requested" in the REGISTRATION ACCEPT message or in the CONFIGURATION UPDATE COMMAND message; and

c) the network may send an IDENTITY REQUEST message to the UE that supports RACS to retrieve the PEI if not available in the network

## 4.17 5GS mobility management in NB-N1 mode

a UE in NB-N1 mode (see 3GPP TS 36.331 [25A]) shall calculate the value of the applicable NAS timer indicated in table 10.2.1 plus 240s

the timer value obtained is used as described in the appropriate procedure subclause of this specification the NAS timer value shall be calculated at start of a NAS procedure and shall not re-calculate the use of the NAS timer value until the NAS procedure is completed restarted or aborted

when an AMF that supports NB-N1 mode performs NAS signalling with a UE which is using NB-N1 mode the AMF shall calculate the value of the applicable NAS timer indicated in table 10.2.2 plus 240s

the timer value obtained is used as described in the appropriate procedure subclause of this specification the NAS timer value shall be calculated at start of a NAS procedure and shall not re-calculate the use of the NAS timer value until the NAS procedure is completed restarted or aborted

## 4.18 5GS session management in NB-N1 mode

a UE in NB-N1 mode (see 3GPP TS 36.331 [25A]) shall calculate the value of the applicable NAS timer indicated in table 10.3.1 plus 180s

the timer value obtained is used as described in the appropriate procedure subclause of this specification the NAS timer value shall be calculated at start of a NAS procedure and shall not re-calculate the use of the NAS timer value until the NAS procedure is completed restarted or aborted

when an SMF that supports NB-N1 mode performs NAS signalling with a UE which is using NB-N1 mode the SMF shall calculate the value of the applicable NAS timer indicated in table 10.3.2 plus 180s

the timer value obtained is used as described in the appropriate procedure subclause of this specification the NAS timer value shall be calculated at start of a NAS procedure and shall not re-calculate the use of the NAS timer value until the NAS procedure is completed restarted or aborted

## 4.19 5GS mobility management in WB-N1 mode for IoT

in WB-N1 mode a UE operating in category CE can operate in either CE mode a or CE mode b (see 3GPP TS 36.306 [25D]) if a UE that supports CE mode b and operates in WB-N1 mode the UE's usage setting is not set to "voice centric" (see 3GPP TS 23.501 [8]) and

a) the use of enhanced coverage is not restricted by the network; or

b) CE mode b is not restricted by the network (see 3GPP TS 23.501 [8]);

the UE shall apply the value of the applicable NAS timer indicated in table 10.2.1 for WB-N1/CE mode

a UE that supports CE mode b and operates in WB-N1 mode shall not apply the value of the applicable NAS timer indicated in table 10.2.1 for WB-N1/CE mode before receiving an indication from the network that the use of enhanced coverage is not restricted or CE mode b is not restricted as described in this subclause

the NAS timer value obtained is used as described in the appropriate procedure subclause of this specification the NAS timer value shall be calculated at start of a NAS procedure and shall not be re-calculated until the NAS procedure is completed restarted or aborted

the support of CE mode b by a UE is indicated to the AMF by lower layers and shall be stored by the AMF when an AMF that supports WB-N1 mode performs NAS signalling with a UE which supports CE mode b and operates in WB-N1 mode the UE's usage setting is not set to "voice centric" (see 3GPP TS 23.501 [8]) and the AMF determines that

a) the use of enhanced coverage is not restricted for the UE; or

b) CE mode b is not restricted for the UE (see 3GPP TS 23.501 [8]);

the AMF shall calculate the value of the applicable NAS timer indicated in table 10.2.2 for WB-N1/CE mode

the NAS timer value obtained is used as described in the appropriate procedure subclause of this specification the NAS timer value shall be calculated at start of a NAS procedure and shall not be re-calculated until the NAS procedure is completed restarted or aborted

## 4.20 5GS session management in WB-N1 mode for IoT

in WB-N1 mode a UE operating in category CE can operate in either CE mode a or CE mode b (see 3GPP TS 36.306 [25D]) if a UE that supports CE mode b and operates in WB-N1 mode and the UE's usage setting is not set to "voice centric" (see 3GPP TS 23.501 [8]) and

a) the use of enhanced coverage is not restricted by the network; or

b) CE mode b is not restricted by the network (see 3GPP TS 23.501 [8]);

the UE shall apply the value of the applicable NAS timer indicated in table 10.3.1 for WB-N1/CE mode

a UE that supports CE mode b and operates in WB-N1 mode shall not apply the value of the applicable NAS timer indicated in table 10.3.1 for WB-N1/CE mode before receiving an indication from the network that the use of enhanced coverage is not restricted or CE mode b is not restricted as described in this subclause

the NAS timer value obtained is used as described in the appropriate procedure subclause of this specification the NAS timer value shall be calculated at start of a NAS procedure and shall not be re-calculated until the NAS procedure is completed restarted or aborted

if the use of extended NAS timer is indicated by the AMF (see 3GPP TS 23.501 [8] and 3GPP TS 23.502 [9]) the SMF shall calculate the value of the applicable NAS timer indicated in table 10.3.2 for WB-N1/CE mode

the NAS timer value obtained is used as described in the appropriate procedure subclause of this specification the NAS timer value shall be calculated at start of a NAS procedure and shall not be re-calculated until the NAS procedure is completed restarted or aborted

4.21 authentication and key management for applications (AKMA)

the UE may support AKMA

the purpose of AKMA is to provide authentication and key management to applications based on 3GPP credentials used for 5GS access as specified in 3GPP TS 33.535 [24A] which allows the UE to securely exchange data with an AKMA application function

upon receiving a request from the upper layers to obtain AKMA anchor key (KAKMA) and AKMA key identifier (A-KID) the UE supporting AKMA shall derive the KAKMA and the AKMA temporary identifier (A-TID) from the valid KAUSF if available as specified in 3GPP TS 33.535 [24A] shall further derive the A-KID from the A-TID as specified in 3GPP TS 33.535 [24A] and shall provide KAKMA and A-KID to the upper layers

the UE supporting AKMA shall notify the upper layers whenever there is a change of the KAUSF upon reception of an EAP-success message in subclauses 5.4.1.2.2.8 5.4.1.2.3.1 and 5.4.1.2.3A.1 or upon reception of SECURITY MODE COMMAND message in subclauses 5.4.2.3

during an ongoing primary authentication and key agreement procedure (see subclause 5.4.1) if the UE receives a request from upper layers to obtain KAKMA and A-KID the UE shall derive the KAKMA and A-TID after the completion of the ongoing primary authentication and key agreement procedure shall further derive the A-KID from the A-TID as specified in 3GPP TS 33.535 [24A] and shall provide KAKMA and A-KID to the upper layers

NOTE 1 the upper layers derive the AKMA application key (KAF) from KAKMA as specified in 3GPP TS 33.535 [24A]

NOTE 2 the knowledge of whether a certain application needs to use AKMA or not is application specific and is out of the scope of 3GPP

NOTE 3 the exact method of securing the data exchange at the upper layers using KAF is application specific and is out of the scope of 3GPP

NOTE 4 the upper layers request the UE NAS layer to provide KAKMA and A-KID before the upper layers initiate communication with an AKMA application function

NOTE 5 upon receiving a request from the upper layers to obtain KAKMA and A-KID if there is no KAUSF available the UE NAS layer cannot derive the KAKMA and A-KID and provides an indication to the upper layers that KAKMA and A-KID cannot be generated

4.22 uncrewed aerial vehicle identification authentication and authorization

### 4.22.1 general

a 5GS can support UAV identification authentication and authorization (see 3GPP TS 23.256 [6AB]) this subclause describes NAS-specific aspects of the 5GS features to support UAV identification authentication authorization and C2 communication authorization

before accessing 5GS for UAS services the UE supporting UAS services must have an assigned CAA-level UAV ID the UE can be registered to 5GS for UAS services if there is a valid aerial subscription in the UE's subscription

### 4.22.2 authentication and authorization of UAV

the 5GS supports the USS UAV authorization and authentication (UUAA) procedure for a UE supporting UAS services depending on operator policy or regulatory requirements the UUAA-MM procedure can be performed by the UE and the AMF at a registration procedure as specified in subclause 5.5.1.2 the UUAA-SM procedure can be performed by the UE and the SMF at a PDU session establishment procedure as specified in subclause 6.4.1.2 or both can be performed the UE shall support UUAA-MM and UUAA-SM and the network shall support UUAA-SM and may optionally support UUAA-MM the UUAA procedure needs to be performed by 5GS with USS successfully before the connectivity for UAS services is established

during the registration procedure as described in subclause 5.5.1.2 the UE supporting UAS services provides CAA-level UAV ID to the AMF and the AMF may trigger the UUAA-MM procedure if the UE supporting UAS services does not provide CAA-level UAV ID to the AMF and the network is configured to perform UUAA-MM at registration procedure the AMF may accept the registration request and shall mark in the UE's 5GMM context that the UE is not allowed to request UAS services if the UE wants to use the UAS services by providing the CAA-Level UAV ID later on the UE shall perform the registration procedure for mobility and periodic registration update

when a UE supporting UAS services requests to establish a PDU session as described in subclause 6.4.1.2 for USS communication the UE provides CAA-level UAV ID to the network and the SMF may trigger the UUAA-SM procedure based on the DNN and S-NSSAI combination for aerial services according to the user's subscription data and the CAA-level UAV ID provided by the UE

if the UE does not provide CAA-level UAV ID and the user’s subscription data for the UE requires the UUAA-SM the network rejects the UE-requested PDU session establishment procedure for the UAS services

the UE supporting UAS services shall not provide CAA-level UAV ID to the network over non-3GPP access and the network shall not perform UUAA procedure for non-3GPP access and shall ensure that the UE is not allowed to access any aerial services in non-3GPP access

if provided by the upper layers the UE supporting UAS services provides to the network the USS address during the registration procedure or PDU session establishment procedure so that the network uses the information to discover the USS

NOTE 1 based on the current location of the UAV upper layers can select the USS address from the list of USS addresses where each entry contains a USS address and a corresponding geographical area

NOTE 2 the parameters (e.g. CAA-level UAV ID or USS address) sent by a UE supporting UAS services to the network for UAS services are included in the Service-level-AA container IE which is a non-cleartext IE

after successful UUAA procedure either the AMF or the SMF may initiate re-authentication of the UAV when required by the USS if UUAA-MM fails during a re-authentication and there are PDU sessions established using UAS services the AMF shall request the SMF to perform the release of these PDU sessions and may trigger a network-initiated de-registration procedure based on operator policy if UUAA-SM fails during a re-authentication the SMF shall release the PDU session related to re-authentication

if the UUAA is revoked the PDU session related to the UAS services shall be released by the SMF based on operator policy the AMF may decide to keep the UE registered or trigger a de-registration procedure

### 4.22.3 authorization of C2 communication

the 5GS supports USS authorization of C2 communication for pairing of UAV and UAV-C the pairing of UAV and UAV-C needs to be authorized by USS successfully before the user plane connectivity for C2 communication (over uu or over NR-PC5) is enabled for C2 authorization procedure the UE supporting UAS services provides to the network with CAA-level UAV ID

the USS authorization of UAV flight can also be performed during the C2 authorization procedure the UE supporting UAS services provides the UAV flight authorization information to the network if provided by upper layers

NOTE 1 the C2 authorization payload in the service-level-AA payload can include one some or all of the pairing information for C2 communication an indication of the request for direct C2 communication pairing information for direct C2 communication and the UAV flight authorization information (see subclauses 6.4.1.2 and 6.4.2.2)

the UE supporting UAS services can establish a PDU session for the C2 communication by providing the CAA-level UAV ID and the C2 authorization payload the SMF upon reception of the UE's request for the PDU session establishment determines that authorization is required based on the DNN and S-NSSAI combination of the PDU session is for aerial services according to user's subscription data and the CAA-level UAV ID included in the request

if a UE supporting UAS services uses a common PDU session for both USS communication and C2 communication the C2 communication can be authorized using UUAA-SM procedure during the PDU session establishment procedure or during the PDU session modification procedure if the pairing of UAV and UAV-C is revoked the network shall disable C2 communication for the PDU session the SMF upon reception of the UE's request for the PDU session establishment determines that authorization is required based on the DNN and S-NSSAI combination of the PDU session is for aerial services according to user's subscription data and the CAA-level UAV ID included in the request

NOTE 2 the network can disable C2 communication for the PDU session e.g. by removing the QoS flow for C2 communication during PDU session modification procedure as decribed in subclauses 6.3.2.2

if a UE supporting UAS services uses separate PDU sessions for respectively USS communication and C2 communication the C2 communication is authorized using UUAA-SM during the PDU session establishment procedure if the pairing of UAV and UAV-C is revoked the PDU session for C2 communication shall be released by the SMF

during the registration procedure for UAS services direct C2 communication can be authorized as described in subclause 5.5.1.2 a UE supporting A2X over NR-PC5 can perform registration procedure for UAS services including a request for authorization of direct C2 communication by providing CAA-level UAV ID and C2 authorization payload

### 4.22.4 void

### 4.22.5 support of no-transmit zone

the UE supporting UAS services can have no-transmit zone assistance information

the no-transmit zone assistance information is a list of entries where each entry indicates one or more restricted frequency bands of a no-transmit zone a geographic area where the no-transmit zone is valid and zero or more time periods indicating when the no-transmit zone is valid if no time period is included in an entry the no-transmit zone is valid regardless of the time each geographic area is indicated by a 4-point polygon as specified in 3GPP TS 23.032 [4B] and minimum and maximum values of altitude each point of polygon is indicated by longitude and latitude each time period is indicated by minimum and maximum values of date and time in UTC

NOTE 1 enforcement of a no-transmit zone based on the no-transmit zone assistance information depends on local regulation and is UE implementation specific

NOTE 2 subject to local regulation the UE is not expected to transmit signalling or data when in a no-transmit zone

## 4.23 NAS over Non-Terrestrial network

### 4.23.1 general

a 5GS can support 3GPP satellite NG-RAN access technology (see 3GPP TS 23.501 [8]) this subclause describes NAS-specific aspects of the 5GS features to support 3GPP satellite NG-RAN access technology

### 4.23.2 list of "PLMNs not allowed to operate at the present UE location"

for 3GPP satellite NG-RAN the UE shall store a list of "PLMNs not allowed to operate at the present UE location" each entry consists of

a) the PLMN identity of the PLMN which sent a message including 5GMM cause value #78 "PLMN not allowed to operate at the present UE location" via satellite NG-RAN access technology; and

b) the geographical location if known by the UE where 5GMM cause value #78 was received on satellite NG-RAN access technology; and

c) if the geographical location exists a UE implementation specific distance value

before storing a new entry in the list the UE shall delete any existing entry with the same PLMN identity upon storing a new entry the UE starts a timer instance associated with the entry with an implementation specific value that shall not be set to a value smaller than the timer value indicated by the network in the lower bound timer value IE if any if the lower bound timer value IE was not provided by the network the value of the timer shall be set based on the UE implementation

the UE is allowed to attempt to access a PLMN via satellite NG-RAN access technology which is part of the list of "PLMNs not allowed to operate at the present UE location" only if

a) the current UE location is known a geographical location is stored for the entry of this PLMN and the distance to the current UE location is larger than a UE implementation specific value; or

b) the access is for emergency services (see 3GPP TS 23.122 [5] for further details)

NOTE 1 when the UE is accessing network for emergency services it is up to operator and regulatory policies whether the network needs to determine if the UE is in a location where network is not allowed to operate

NOTE 2 while location determination is ongoing to ensure that operator and regulatory policies are met the AMF can perform DNN-based or S-NSSAI based congestion control as specified in subclauses 5.3.10 and 5.3.11 to prevent the UE from accessing network

the list shall accommodate three or more entries the maximum number of entries is an implementation decision when the list is full and a new entry has to be inserted the oldest entry shall be deleted

each entry shall be removed if for the entry

a) the UE successfully registers via satellite NG-RAN access technology to the PLMN stored in the entry except when the UE registers for emergency services; or

b) the timer instance associated with the entry expires

the UE may delete the entry in the list if the current UE location is known a geographical location is stored for the entry of this PLMN and the distance to the current UE location is larger than a UE implementation specific value

if the UE is in 5GMM-DEREGISTERED.LIMITED-SERVICE state and an entry from the list of "PLMNs not allowed to operate at the present UE location" is removed the UE shall perform PLMN selection according to 3GPP TS 23.122 [5]

when the UE is switched off the UE shall keep the list of "PLMNs not allowed to operate at the present UE location" in its non-volatile memory the UE shall delete the list of "PLMNs not allowed to operate at the present UE location" if the USIM is removed

if the UE is switched off when the timer instance associated with the entry in the list is running the UE shall behave as follows when the UE is switched on and the USIM in the UE remains the same

let t1 be the time remaining for timer instance associated with the entry in the list to timeout at switch off and let t be the time elapsed between switch off and switch on if t1 is greater than t then the timer shall be restarted with the value t1 – t if t1 is equal to or less than t then the timer need not be restarted and considered expired if the UE is not capable of determining t then the UE shall restart the timer with the value t1

### 4.23.3 5GS mobility management via a satellite NG-RAN cell

for 5GS mobility management via a satellite NG-RAN cell the UE shall apply the value of the applicable NAS timer indicated in table 10.2.1 for access via a satellite NG-RAN cell

NOTE 1 the applied NAS timer values are based on the current satellite NG-RAN access RAT type determined based on information from lower layers

NOTE 1A if the satellite NG-RAN access RAT type is NR(LEO) NAS timer extensions specific to satellite NG-RAN access are not applied

the NAS timer value obtained by the UE is used as described in the appropriate procedure subclause of this specification the NAS timer value shall be calculated at start of a NAS procedure and shall not be re-calculated until the NAS procedure is completed restarted or aborted

the access via a satellite NG-RAN cell by a UE is indicated to the AMF by lower layers and shall be stored by the AMF when an AMF that supports access via satellite NG-RAN cells performs NAS signalling with a UE via satellite NG-RAN cells the AMF shall calculate the value of the applicable NAS timer indicated in table 10.2.2 for access via a satellite NG-RAN cell

NOTE 2 the applied NAS timer values are based on the current satellite NG-RAN access RAT type determined based on information from lower layers

NOTE 2A if the satellite NG-RAN access RAT type is NR(LEO) NAS timer extensions specific to satellite NG-RAN access are not applied

the NAS timer value obtained by the network is used as described in the appropriate procedure subclause of this specification the NAS timer value shall be calculated at start of a NAS procedure and shall not be re-calculated until the NAS procedure is completed restarted or aborted

### 4.23.4 5GS session management via a satellite NG-RAN cell

for 5GS session management via a satellite NG-RAN cell the UE shall apply the value of the applicable NAS timer indicated in table 10.3.1 for access via a satellite NG-RAN cell

NOTE 1 the applied NAS timer values are based on the current satellite NG-RAN access RAT type determined based on information from lower layers

NOTE 1A if the satellite NG-RAN access RAT type is NR(LEO) NAS timer extensions specific to satellite NG-RAN access are not applied

the NAS timer value obtained by the UE is used as described in the appropriate procedure subclause of this specification the NAS timer value shall be calculated at start of a NAS procedure and shall not be re-calculated until the NAS procedure is completed restarted or aborted

if the use of extended NAS timer for access via a satellite NG-RAN cell is indicated by the AMF (see 3GPP TS 23.501 [8] and 3GPP TS 23.502 [9]) the SMF shall calculate the value of the applicable NAS timer indicated in table 10.3.2 for access via a satellite NG-RAN cell

the NAS timer value obtained by the network is used as described in the appropriate procedure subclause of this specification the NAS timer value shall be calculated at start of a NAS procedure and shall not be re-calculated until the NAS procedure is completed restarted or aborted

### 4.23.5 handling multiple tracking area codes from the lower layers

when a UE camps on a satellite NG-RAN cell the UE may receive multiple TACs from the lower layers the UE shall construct TAIs from the multiple TACs (i.e concatenate the identity of the current PLMN and each of the TACs) and select a TAI as follows

a) if at least one TAI belongs to the current registration area of the UE the UE shall select a TAI which belongs to the current registration area of the UE according to the followings

if there are multiple TAIs which belong to the current registration area of the UE the UE shall select a TAI as follows

1) if there is a TAI which belongs to the list of "allowed tracking area" (if any) and does not belong to the list of "non-allowed tracking areas" (if any) the UE shall select a TAI which belongs to the list of "allowed tracking area" (if any) and does not belong to the list of "non-allowed tracking areas" (if any) in this case if there are multiple TAIs which belong to the list of "allowed tracking area" (if any) and does not belong to the list of "non-allowed tracking areas" (if any) then the UE shall consider each of these TAIs equal and select a TAI in an implementation-specific way (e.g taking into account LADN service area information) if these multiple TAIs contain the previous current TAI the current TAI can be left unchanged

2) if there is no TAI which belongs to the list of "allowed tracking area" (if any) and does not belong to the list of "non-allowed tracking areas" (if any) or neither the list of "allowed tracking area" nor the list of "non-allowed tracking areas" is available then the UE shall consider each of these TAIs equal and select a TAI in an implementation-specific way (e.g taking into account LADN service area information) if these multiple TAIs contain the previous current TAI the current TAI can be left unchanged

b) if the current registration area is not available in the UE or no TAI belongs to the current registration area of the UE and

1) there is a TAI which belongs to neither the list of "5GS forbidden tracking areas for roaming" nor the list of "5GS forbidden tracking areas for regional provision of service" the UE shall select a TAI which belongs to neither the list of "5GS forbidden tracking areas for roaming" nor the list of "5GS forbidden tracking areas for regional provision of service" in this case if there are multiple TAIs which belong to neither the list of "5GS forbidden tracking areas for roaming" nor the list of "5GS forbidden tracking areas for regional provision of service" then the UE shall consider each of these TAIs equal and select a TAI in an implementation-specific way

2) all TAIs belong to the list of "5GS forbidden tracking areas for roaming" or the list of "5GS forbidden tracking areas for regional provision of service" then the UE shall consider each of these TAIs equal and select a TAI in an implementation-specific way

the UE shall consider the selected TAI as the current TAI the UE shall select a TAI when

a) the UE receives multiple TACs from the lower layers; or

b) the UE has received multiple TACs from the lower layers upon starting to camping on the current cell and the registration area the list of "allowed tracking areas" the list of "non-allowed tracking areas" the list of "5GS forbidden tracking areas for roaming" or the list of "5GS forbidden tracking areas for regional provision of service" is updated

handling of the list of "5GS forbidden tracking areas for roaming" and the list of "5GS forbidden tracking areas for regional provision of service" is specified in subclause 5.3.13

## 4.24 minimization of service interruption

the UE and the network may support minimization of service interruption (MINT) MINT aims to enable a UE to obtain service from a PLMN offering disaster roaming services when a disaster condition applies to the UE determined PLMN with disaster condition

if the UE supports MINT the indication of whether disaster roaming is enabled in the UE the indication of 'applicability of "lists of PLMN(s) to be used in disaster condition" provided by a VPLMN' the one or more "list of PLMN(s) to be used in disaster condition" disaster roaming wait range and disaster return wait range provisioned by the network if available are stored in the non-volatile memory in the ME as specified in annex c and are kept when the UE enters 5GMM-DEREGISTERED state annex c specifies condition under which the indication of whether disaster roaming is enabled in the UE the indication of 'applicability of "lists of PLMN(s) to be used in disaster condition" provided by a VPLMN' the one or more "lists of PLMN(s) to be used in disaster condition" disaster roaming wait range and disaster return wait range stored in the ME are deleted

upon selecting a PLMN for disaster roaming as specified in 3GPP TS 23.122 [5]

a) if the UE does not have a stored disaster roaming wait range the UE shall perform a registration procedure for disaster roaming services on the selected PLMN as described in subclause 5.5.1; and

b) if the UE has a stored disaster roaming wait range the UE shall generate a random number within the disaster roaming wait range and start a timer with the generated random number while the timer is running the UE shall not initiate registration on the selected PLMN except if the UE needs to request an emergency PDU session in which case the UE shall initiate the registration procedure set the 5GS registration type IE to "emergency registration" in the REGISTRATION REQUEST message and keep the timer running upon expiration of the timer if the UE does not have an emergency PDU session the UE shall perform a registration procedure for disaster roaming services as described in subclause 5.5.1 if still camped on the selected PLMN if the UE has an emergency PDU session when the timer expires the registration procedure for disaster roaming services as described in subclause 5.5.1 shall be performed after the release of the emergency PDU session if the UE is still camped on the selected PLMN

if the UE is switched off when the timer for disaster roaming wait range is running the UE shall behave as follows when the UE is switched on the USIM in the UE remains the same and the UE selects the PLMN for disaster roaming

- let t1 be the time remaining for the timer for disaster roaming wait range timeout at switch off and let t be the time elapsed between switch off and switch on if t1 is greater than t then the timer shall be restarted with the value t1 – t if t1 is equal to or less than t then the timer need not be restarted if the UE is not capable of determining t then the UE shall restart the timer with the value t1

upon determining that a disaster condition has ended as specified in 3GPP TS 23.122 [6]

a) the UE shall stop the timer started with a generated random number within the disaster roaming wait range if running;

b) the UE shall perform PLMN selection as specified in 3GPP TS 23.122 [5] except if the UE already selected an allowable PLMN as specified in 3GPP TS 23.122 [6]; and

c) if the UE selects the UE determined PLMN with disaster condition and has a stored disaster return wait range which is

1) provided by the PLMN providing disaster roaming services; or

2) provided by the selected PLMN

the UE shall generate a random number within the disaster return wait range start a timer with the generated random number value and enter 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION state or 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE state if registered while the timer is running the UE shall not initiate registration on the selected PLMN except if the UE needs to request an emergency PDU session in which case the UE shall initiate the registration procedure set the 5GS registration type IE to "emergency registration" in the REGISTRATION REQUEST message and keep the timer running upon expiration of the timer if the UE does not have an emergency PDU session the UE shall perform a registration procedure if still camped on the selected PLMN if the UE has an emergency PDU session when the timer expires the registration procedure as described in subclause 5.5.1 shall be performed after the release of the emergency PDU session if the UE is still camped on the selected PLMN

otherwise the UE shall perform registration procedure in the selected PLMN

if the UE is switched off when the timer for disaster return wait range is running the UE shall behave as follows when the UE is switched on the USIM in the UE remains the same and the UE selects the UE determined PLMN with disaster condition

- let t1 be the time remaining for the timer for disaster return wait range timeout at switch off and let t be the time elapsed between switch off and switch on if t1 is greater than t then the timer shall be restarted with the value t1 – t if t1 is equal to or less than t then the timer need not be restarted if the UE is not capable of determining t then the UE shall restart the timer with the value t1

when the AMF assigns a registration area to the UE registered for disaster roaming services the AMF shall only include TAIs covering the area with the disaster condition

when the AMF determines that the disaster condition has ended and the UE which is registered for disaster roaming services has an emergency PDU session the AMF shall initiate the generic UE configuration update procedure to indicate that the UE is registered for emergency services as described in subclause 5.4.4.2

interworking with EPS is not supported for UEs that are registered for disaster roaming services when registering for disaster roaming services the UE indicates to the network that S1 mode is not supported as described in subclause 5.5.1.2.2 while registered for disaster roaming services and upon a need to establish an emergency PDU session or perform emergency services fallback the UE initiates the registration procedure for mobility and periodic registration update and indicates that S1 mode is supported as described in subclause 5.5.1.3.2

if the UE is registered for disaster roaming services and the registered PLMN is removed from forbidden PLMN lists due to reasons specified in subclause 4.4.6 or annex c in 3GPP TS 23.122 [5] then UE shall initiate the de-registration procedure and perform PLMN selection as specified in 3GPP TS 23.122 [5]

## 4.25 support of MUSIM features

a network and a MUSIM UE may support one or more of the MUSIM features (i.e the N1 NAS signalling connection release the paging indication for voice services the reject paging request the paging restriction and the paging timing collision control)

if MUSIM UE supports one or more MUSIM features the UE indicates support of one or more MUSIM features (except for the paging timing collision control) during the registration procedure if the UE has indicated support of the N1 NAS signalling connection release or the reject paging request or both and the UE supports the paging restriction the UE indicates support of the paging restriction

if the UE indicates support of one or more MUSIM features and the network decides to accept one or more MUSIM features the network indicates the support of one or more MUSIM features during the registration procedure the network only indicates the support of the paging restriction together with the support of either N1 NAS signalling connection release or the reject paging request

the network does not indicate support for any MUSIM feature to the UE during the registration for emergency services

if the UE is not currently registered for emergency service and the UE receives the CONFIGURATION UPDATE COMMAND message with the 5GS registration result IE value set to "Registered for emergency services" then UE shall behave as if the network did not indicate support for any MUSIM feature in the last registration procedure if the network has sent CONFIGURATION UPDATE COMMAND message with the 5GS registration result IE value set to "Registered for emergency services" then network shall behave as if it did not indicate support for any MUSIM feature in the last registration procedure

if a UE stops fulfilling the condition to be considered a MUSIM UE as defined in subclause 3.1 and the UE has negotiated support of one or more MUSIM features then the UE shall initiate a registration procedure for mobility and periodic registration update to indicate that all the MUSIM features are not supported (except for the paging timing collision control) as specified in subclause 5.5.1.3

a MUSIM UE operating in NB-N1 mode or in WB-N1 mode CE mode b does not indicate the support for paging indication for voice services during the registration procedure towards the network

## 4.26 support for personal IoT network service

the 5GS can support the personal IoT network (PIN) service (see 3GPP TS 23.501 [8])

the PIN enables the personal IoT network elements (PINEs) to communicate with each other via PIN direct communication PIN indirect communication or PIN-DN communication for the PIN indirect communication and PIN-DN communication a UE acting as a PIN element with gateway capability (PEGC) enables the PINEs behind the PEGC to connect to the network and to communicate with other PINEs within the PIN or with the DN via the PDU session established for PIN a PEGC may serve one or more PINs the PEGC establishes only one PDU session for each PIN the PEGC establishes different PDU sessions for different PINs based on different DNNs and S-NSSAIs the PEGC may establish only one PDU session for multiple PINs if traffic differentiation for multiple PINs is not required in 5GS

NOTE 1 the PIN direct communication is out of the scope of 3GPP

the PIN PEGC and PINEs are managed by PIN element with management capability (PEMC) and optionally the corresponding application function each PIN contains at least one PEGC and at least one PEMC the PIN architecture is captured in 3GPP TS 23.501 [8]

the 5GS supports the delivery of URSP rules which include the PIN ID to a PEGC registered to 5GS (see 3GPP TS 23.501 [8] and 3GPP TS 23.503 [10]) the 5GS is enhanced to support the PDU session management for PIN to ensure the end-to-end QoS requirement

the end-to-end QoS requirement for each PINE over PIN indirect communication and over PIN-DN communication includes

a) the QoS requirement in the 3GPP access network; and

b) the QoS requirement in the non-3GPP access network

the N3QAI is introduced to enable a PEGC to perform the QoS differentiation for the PINEs in the non-3GPP access network if the UE supports receiving the N3QAI the network may provide the N3QAI associated with the QoS flow during the PDU session establishment procedure as defined in subclause 6.4.1 or during the PDU session modification procedure as defined in subclause 6.4.2

NOTE 2 how the PEGC applies N3QAI is outside the scope of the present document

the non-3GPP delay budget refers to the delay budget between the PEGC and the PINE in the non-3GPP access network if the UE supports providing the non-3GPP delay budget the UE may provide the network with the non-3GPP delay budget for the one or more QoS flows associated with the PDU sessions for a PIN during the PDU session modification procedure as defined in subclause 6.4.2 the network takes into account the received non-3GPP delay budget to ensure the end-to-end QoS requirement of a PINE

NOTE 3 the support of a 5G-RG or a FN-RG acting as a PEGC is not specified in this release of specification

NOTE 4 the support of redundant PDU sessions does not apply for PIN

## 4.27 mobile base station relay support

a 5GS can support a MBSR-UE and a UE accessing to MBSR (see subclause 5.35A of 3GPP TS 23.501 [8]) this subclause describes NAS-specific aspects of the 5GS features to support the authorization of the MBSR-UE and the control of the UE access via MBSR

the AMF authorizes the UE's request to act as a MBSR based on the subscription information the AMF can indicate to the MBSR-UE that it is allowed or not allowed to operate as MBSR during registration procedure as specified in subclause 5.5.1.2

enhanced CAG information can be used for the control of UE's access via MBSR CAG identifier is used to control the access of UE via MBSR the 5GCN supports the UE access control based on the PLMND ID and CAG identifier broadcast by the MBSR and the CAG-ID authorized based on "Allowed CAG list" in the PLMN's entry of "CAG information list" stored in the UE time validity information can be provided to the UE together with the CAG identifier for accessing to MBSR in order to control that UE not accessing the MBSR cell outside of the time validity information for the UE not supporting CAG functionality the 5GCN can control the access of the UE with managing the forbidden tracking area

## 4.28 NAS-specific aspects of mobile gNB with wireless access backhauling (MWAB)

### 4.28.1 general

a 5GS can support an MWAB-UE and a UE accessing via an MWAB (see subclause 5.49 of 3GPP TS 23.501 [8]) this subclause describes NAS-specific aspects of 5GS features to support authorization of the MWAB-UE and control of the UE access via the MWAB

the MWAB-UE is served by a BH PLMN or BH SNPN the MWAB-UE establishes one or more PDU sessions for MWAB using UE local configuration and URSP rules of the MWAB-UE according to 3GPP TS 24.526 [19]

NOTE 1 the one or more PDU sessions for MWAB enable the MWAB to communicate with the core network of the MWAB broadcasted PLMN or MWAB broadcasted SNPN some of the one or more PDU sessions for MWAB can carry communication associated with emergency services provided to a UE served by the MWAB

NOTE 2 the one or more PDU sessions for MWAB are associated with an S-NSSAI for MWAB

BH PLMN or BH SNPN can be the same as or different from the MWAB broadcasted PLMN or MWAB broadcasted SNPN if the MWAB is configured to support emergency services for served UEs the BH PLMN or BH SNPN is in the same country as the MWAB broadcasted PLMN or MWAB broadcasted SNPN

### 4.28.2 authorization of MWAB-UE

a UE is authorized to act as the MWAB-UE if the UE is allowed to establish the one or more PDU sessions for MWAB otherwise the UE is not authorized to act as the MWAB-UE

NOTE 1 whether the UE is allowed to establish the one or more PDU sessions for MWAB and thus is authorized to act as the MWAB-UE can be influenced e.g by LADN service area information if DNN of a PDU session for MWAB is LADN S-NSSAI time validity information S-NSSAI location validity information or DNN based or S-NSSAI based congestion control

NOTE 2 if a dedicated S-NSSAI for MWAB is not included in the allowed NSSAI provided in the generic UE configuration update or the registration procedure for mobility registration update then the AMF serving MWAB-UE can delay the notification of the SMF associated with a PDU session associated with the S-NSSAI and DNN combination for MWAB to initiate the network-requested PDU session release procedure (see subclause 5.49.3 of 3GPP TS 23.501 [8]) for a locally configured time

### 4.28.3 control of UE access via MWAB

Editor's note (WI:VMR\_Ph2 CR:6452) further details on control of the UE access via MWAB is FFS

## 4.29 support of indirect network sharing

a 5GS can support indirect network sharing between a hosting operator and participating operators as specified in 3GPP TS 23.501 [8] the AMF may support indirect network sharing

NOTE 1 in this version of the specification the support of indirect network sharing has no UE impact

NOTE 2 in case of indirect network sharing the AMF of hosting operator acts towards to the UE as the AMF of the selected PLMN or the RPLMN

NOTE 3 in order to support indirect network sharing deployment when a UE of participating operator registers in the HPLMN the HPLMN can include a PLMN ID representing the participating operator in the list of equivalent PLMNs

NOTE 4 in case of indirect network sharing if the UE is not allowed to access the selected PLMN which represents the participating operator the AMF of hosting operator can reject the registration request using an existing cause value

in case of indirect network sharing during the generic UE configuration update procedure (see subclause 5.4.4) the registration procedure for initial registration (see subclause 5.5.1.2) or the registration procedure for mobility and periodic registration update (see subclause 5.5.1.3) if the selected PLMN ID is the PLMN ID of the HPLMN or an EHPLMN of the UE the AMF of hosting operator shall determine the available S-NSSAI(s) of hosting operator corresponding to the S-NSSAI(s) of participating operator provided by the UE and shall only use the corresponding S-NSSAI(s) of participating operator towards the UE

NOTE 5 in this case the AMF of hosting operator uses the determined S-NSSAI(s) of hosting operator and the corresponding S-NSSAI(s) of participating operator towards other network functions (e.g SMF)

NOTE 6 if the selected PLMN ID is different from the PLMN ID of the HPLMN or an EHPLMN of the UE the AMF of hosting operator can use S-NSSAI(s) of hosting operator as S-NSSAI(s) of serving PLMN and corresponding mapped HPLMN S-NSSAI(s)

# 5 elementary procedures for 5GS mobility management

## 5.1 overview

### 5.1.1 general

the main function of the 5GS mobility management (5GMM) sublayer is to support the identification security mobility of a UE as well as generic message transport

a further function of the 5GMM sublayer is to provide connection management services to the other sublayer(s)

NOTE in a satellite NG-RAN access a GNSS fix time in lower layers can delay transmission of an initial UL NAS message by up to 100 seconds (GNSS cold state)

### 5.1.2 types of 5GMM procedures

depending on how they can be initiated three types of 5GMM procedures can be distinguished

a) 5GMM common procedures

5GMM common procedure can always be initiated when the UE is in 5GMM-CONNECTED mode the procedures belonging to this type are

1) initiated by the network

i) network-initiated NAS transport;

ii) primary authentication and key agreement;

iii) security mode control;

iv) generic UE configuration update;

v) identification; and

vi) network slice-specific authentication and authorization;

2) initiated by the UE

UE-initiated NAS transport

3) initiated by the UE or the network and used to report certain error conditions detected upon receipt of 5GMM protocol data

5GMM status

b) 5GMM specific procedures

at any time only one UE initiated 5GMM specific procedure can be running for each of the access network(s) that the UE is camping on the procedures belonging to this type are

1) initiated by the UE and used e.g to register to the network for 5GS services and establish a 5GMM context to update the location/parameter(s) of the UE

registration

2) initiated by the UE or the network and used to deregister from the network for 5GS services and to release a 5GMM context

de-registration

3) initiated by the UE and used to deregister from the network for 5GS services and to release a 5GMM context

ecall inactivity procedure

c) 5GMM connection management procedures

1) initiated by the UE and used to establish a secure connection to the network or to request the resource reservation for sending data or both

service request

the service request procedure can only be initiated if no UE initiated 5GMM specific procedure is ongoing for each of the access network(s) that the UE is camping on

2) initiated by the network and used to request the establishment of an N1 NAS signalling connection or to request re-establishment of user-plane resources for the PDU session(s) associated with 3GPP access or to request re-establishment of user-plane resources of the PDU session(s) associated with non-3GPP access over 3GPP access; not applicable for the non-3GPP access network

paging

3) initiated by the network and used to request re-establishment of user-plane resources of the PDU session(s) associated with non-3GPP access over 3GPP access or to deliver 5GSM downlink signalling messages associated with non-3GPP access over 3GPP access when the UE is in 5GMM-CONNECTED mode over 3GPP access and in 5GMM-IDLE mode over non-3GPP access; or

initiated by the network and used to request re-establishment of user-plane resources of the PDU session(s) associated with 3GPP access over 3GPP access or to deliver downlink signalling associated with 3GPP access over 3GPP access when the UE is in 5GMM-CONNECTED mode over non-3GPP access and when the UE is in 5GMM-IDLE mode over 3GPP access and not in MICO mode

notification

NOTE 1 in NB-N1 mode the UE NAS using 5GS services with control plane CIoT 5GS optimization can wait for the lower layers to complete the transmission of the previous UL NAS TRANSPORT messages carrying control plane user data before providing subsequent NAS messages other implementations are possible

NOTE 2 when providing NAS messages to the lower layers for transmission the UE NAS using 5GS services with control plane CIoT 5GS optimization can prioritize sending NAS signalling messages over the UL NAS TRANSPORT messages carrying control plane user data how the UE performs this prioritization is implementation specific

### 5.1.3 5GMM sublayer states

#### 5.1.3.1 general

in the following subclauses the 5GS mobility management (5GMM) sublayer of the UE and the network is described by means of different state machines the 5GMM sublayer states is managed per access type independently i.e 3GPP access or non-3GPP access in subclause 5.1.3.2 the states of the 5GMM sublayer are introduced

#### 5.1.3.2 5GMM sublayer states

##### 5.1.3.2.1 5GMM sublayer states in the UE

###### 5.1.3.2.1.1 general

in the following subclauses the possible 5GMM sublayer states of the UE are described and shown in figure 5.1.3.2.1.1.1

NOTE not all possible transitions are shown in this figure

figure 5.1.3.2.1.1.1 5GMM main states in the UE

###### 5.1.3.2.1.2 main states

5.1.3.2.1.2.1 5GMM-NULL

5GS services are disabled in the UE no 5GS mobility management function shall be performed in this state

5.1.3.2.1.2.2 5GMM-DEREGISTERED

in the state 5GMM-DEREGISTERED no 5GMM context has been established and the UE location is unknown to the network and hence it is unreachable by a network in order to establish a 5GMM context the UE shall start the initial registration procedure

5.1.3.2.1.2.3 5GMM-REGISTERED-INITIATED

a UE enters the state 5GMM-REGISTERED-INITIATED after it has started the initial registration procedure or the registration procedure for mobility and periodic registration update and is waiting for a response from the network

5.1.3.2.1.2.4 5GMM-REGISTERED

in the state 5GMM-REGISTERED a 5GMM context has been established additionally one or more PDU session(s) may be established at the UE the UE may initiate the non-initial registration procedure for mobility and periodic registration update and the service request procedure the UE in the state 5GMM-REGISTERED over non-3GPP access shall not initiate the periodic registration update procedure

5.1.3.2.1.2.5 5GMM-DEREGISTERED-INITIATED

a UE enters the state 5GMM-DEREGISTERED-INITIATED after it has requested release of the 5GMM context by starting the de-registration procedure and is waiting for a response from the network

5.1.3.2.1.2.6 5GMM-SERVICE-REQUEST-INITIATED

a UE enters the state 5GMM-SERVICE-REQUEST-INITIATED after it has started the service request procedure and is waiting for a response from the network

###### 5.1.3.2.1.3 substates of state 5GMM-DEREGISTERED

5.1.3.2.1.3.1 general

the state 5GMM-DEREGISTERED is subdivided into a number of substates as described in this subclause the following substates are not applicable to non-3GPP access

a) 5GMM-DEREGISTERED.PLMN-SEARCH

b) 5GMM-DEREGISTERED.NO-CELL-AVAILABLE; and

c) 5GMM-DEREGISTERED.eCALL-INACTIVE

valid subscriber data are available for the UE before it enters the substates except for the substate 5GMM-DEREGISTERED.NO-SUPI

5.1.3.2.1.3.2 5GMM-DEREGISTERED.NORMAL-SERVICE

the substate 5GMM-DEREGISTERED.NORMAL-SERVICE is chosen in the UE when a suitable cell has been found and the PLMN SNPN or tracking area is not in the forbidden list

5.1.3.2.1.3.3 5GMM-DEREGISTERED.LIMITED-SERVICE

the substate 5GMM-DEREGISTERED.LIMITED-SERVICE is chosen in the UE when it is known that a selected cell for 3GPP access or TA for non-3GPP access is unable to provide normal service (e.g the selected cell over 3GPP access is in a forbidden PLMN or SNPN or is in a forbidden tracking area or TA for non-3GPP access is forbidden) or the selected cell is a CAG cell for which none of CAG-ID(s) is authorized based on the "Allowed CAG list" in the entry of the "CAG information list" for the PLMN or the selected cell is a non-CAG cell in a PLMN for which there exists an "indication that the UE is only allowed to access 5GS via CAG cells" in the entry of the "CAG information list" for the PLMN or the selected cell is a CAG cell belonging to a PLMN and the "CAG information list" does not contain an entry for the PLMN

5.1.3.2.1.3.4 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION

the substate 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION is chosen in the UE if the initial registration procedure failed due to a missing response from the network or due to the circumstances described in subclauses 5.2.2.3.7 5.5.1.2.4 5.5.1.2.5 5.5.1.2.7 5.5.1.3.4 5.5.2.3.2 and 5.5.2.3.4

5.1.3.2.1.3.5 5GMM-DEREGISTERED.PLMN-SEARCH

the substate 5GMM-DEREGISTERED.PLMN-SEARCH is chosen in the UE if the UE is searching for PLMNs or SNPNs this substate is left either when a cell has been selected (the new substate is NORMAL-SERVICE or LIMITED-SERVICE) or when it has been concluded that no cell is available at the moment (the new substate is NO-CELL-AVAILABLE)

this substate is not applicable to non-3GPP access

5.1.3.2.1.3.6 5GMM-DEREGISTERED.NO-SUPI

the substate 5GMM-DEREGISTERED.NO-SUPI is chosen in the UE if the N1 mode is enabled and the UE has no valid subscriber data available (USIM not available the USIM is considered invalid by the UE or an entry of the "list of subscriber data" with the SNPN identity of the SNPN is considered invalid by the UE)

5.1.3.2.1.3.7 5GMM-DEREGISTERED.NO-CELL-AVAILABLE

no 5G cell can be selected this substate is entered either after a first intensive search failed when in substate 5GMM-DEREGISTERED.PLMN-SEARCH or unavailability period is activated for 3GPP access cells are searched for at a low rhythm no 5GS services are offered

this substate is not applicable to non-3GPP access

5.1.3.2.1.3.8 5GMM-DEREGISTERED.eCALL-INACTIVE

the substate 5GMM-DEREGISTERED.eCALL-INACTIVE is chosen in the UE when

a) the UE is configured for ecall only mode as specified in 3GPP TS 31.102 [22];

b) timer T3444 and timer T3445 have expired or are not running;

c) a PLMN has been selected as specified in 3GPP TS 23.122 [5];

d) the UE does not need to perform an ecall over IMS; and

e) the UE does not need to perform a call to a non-emergency MSISDN or URI for test or terminal reconfiguration service

in this substate the UE shall not initiate any signalling towards the network except to originate an ecall over IMS or a call to a non-emergency MSISDN or URI for test or terminal reconfiguration service

this substate is not applicable to non-3GPP access

5.1.3.2.1.3.9 5GMM-DEREGISTERED.INITIAL-REGISTRATION-NEEDED

valid subscriber data are available for the UE and for some reason a registration procedure for initial registration has to be performed as soon as possible this substate can be entered if the access is barred due to unified access control (see subclause 4.5.4) or if the network rejects the N1 NAS signalling connection establishment

###### 5.1.3.2.1.4 substates of state 5GMM-REGISTERED

5.1.3.2.1.4.1 general

the state 5GMM-REGISTERED is subdivided into a number of substates as described in this subclause the following substates are not applicable to non-3GPP access

a) 5GMM-REGISTERED.PLMN-SEARCH

b) 5GMM-REGISTERED.NON-ALLOWED-SERVICE; and

c) 5GMM-REGISTERED.NO-CELL-AVAILABLE

5.1.3.2.1.4.2 5GMM-REGISTERED.NORMAL-SERVICE

the substate 5GMM-REGISTERED.NORMAL-SERVICE is chosen by the UE as the primary substate when the UE enters the state 5GMM-REGISTERED and

- for 3GPP access the cell the UE selected is known to be in an allowed area (see subclause 5.3.5.2); or

- for wireline access the wireline access service area restrictions are not enforced

5.1.3.2.1.4.3 5GMM-REGISTERED.NON-ALLOWED-SERVICE

the substate 5GMM-REGISTERED.NON-ALLOWED-SERVICE is chosen in the UE if

- for 3GPP access the cell the UE selected is known to be in a non-allowed area (see subclause 5.3.5.2); or

- for wireline access the wireline access service area restrictions are enforced

this substate is applicable only to 3GPP access and to wireline access

5.1.3.2.1.4.4 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE

the substate 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE is chosen by the UE if the registration procedure for mobility and periodic registration update failed due to a missing response from the network or due to the circumstances described in subclauses 5.3.9 5.5.1.3.5 and 5.5.1.3.7 no 5GMM procedure except registration procedure for mobility and periodic registration update (i.e the 5GS registration type IE set to "mobility registration updating" or "periodic registration updating" in the REGISTRATION REQUEST message) and de-registration procedure shall be initiated by the UE in this substate no data shall be sent or received

NOTE 1 the registration procedure for mobility and periodic registration update over non-3GPP access can be triggered by e.g the change of S1 UE network capability or renegotiating some parameters

NOTE 2 this substate is entered irrespective whether

a) the UE is camped on a cell which is in the registration area and the current TAI is not in the list of "allowed tracking areas"; or

b) the current TAI is in the list of "non-allowed tracking areas"

5.1.3.2.1.4.5 5GMM-REGISTERED.LIMITED-SERVICE

the substate 5GMM-REGISTERED.LIMITED-SERVICE is chosen in the UE if the cell the UE selected is known not to be able to provide normal service

NOTE when the UE is registered to the network via CAG cell and none of the CAG-ID(s) supported by the current CAG cell is authorized based on the "Allowed CAG list" of the entry for the registered PLMN in the received "CAG information list" then the cell the UE selected is not able to provide normal service

5.1.3.2.1.4.6 5GMM-REGISTERED.PLMN-SEARCH

the substate 5GMM-REGISTERED.PLMN-SEARCH is chosen in the UE while the UE is searching for PLMNs or SNPNs

this substate is not applicable to non-3GPP access

5.1.3.2.1.4.7 5GMM-REGISTERED.NO-CELL-AVAILABLE

5G coverage has been lost MICO mode is active in the UE or unavailability period is activated for 3GPP access if MICO mode is active the UE can deactivate MICO mode at any time by activating the AS layer when the UE needs to send mobile originated signalling or user data otherwise the UE shall not initiate any 5GMM procedure except for cell and PLMN reselection

this substate is not applicable to non-3GPP access

5.1.3.2.1.4.8 5GMM-REGISTERED.UPDATE-NEEDED

this state can be entered if the UE has to perform a registration procedure for mobility and periodic registration update but

a) the access is barred due to unified access control when in 3GPP access;

b) the network rejects the N1 NAS signalling connection establishment when in 3GPP access or in non-3GPP access; or

c) the UE in 5GMM-CONNECTED mode with RRC inactive indication receives an indication from the lower layers that the resumption of the RRC connection has failed and for access is barred for all categories except categories '0' and '2' as specified in subclause 5.3.1.4

no 5GMM procedure except

a) registration procedure for mobility and periodic registration update;

b) service request procedure as a response to paging or notification; and

c) de-registration procedure

shall be initiated by the UE in this substate

NOTE this substate is entered irrespective whether

a) the UE is camped on a cell which is in the registration area and the current TAI is not in the list of "allowed tracking areas"; or

b) the current TAI is in the list of "non-allowed tracking areas"

##### 5.1.3.2.2 5GS update status in the UE

in order to describe the detailed UE behaviour the 5GS update (5U) status pertaining to a specific subscriber is defined

if the UE is not operating in SNPN access operation mode (see 3GPP TS 23.501 [8]) the 5GS update status is stored in a non-volatile memory in the USIM if the corresponding file is present in the USIM else in the non-volatile memory in the ME as described in annex c

if the UE is operating in SNPN access operation mode the 5GS update status for each SNPN whose SNPN identity is included in the "list of subscriber data" configured in the ME (see 3GPP TS 23.122 [5]) is stored in the non-volatile memory in the ME as described in annex c

the 5GS update status value is changed only after the execution of a registration network-initiated de-registration 5GS based primary authentication and key agreement service request paging procedure or due to change in the current TAI which does not belong to the current registration area while T3346 is running

5U1 UPDATED

the last registration attempt was successful

5U2 NOT UPDATED

the last registration or service request attempt failed procedurally e.g no response or reject message was received from the AMF

5U3 ROAMING NOT ALLOWED

the last registration service request or registration for mobility or periodic registration update attempt was correctly performed but the answer from the AMF was negative (because of roaming or subscription restrictions)

##### 5.1.3.2.3 5GMM sublayer states in the network side

###### 5.1.3.2.3.1 general

in the following subclauses the possible 5GMM sublayer states of the network are described and shown in figure 5.1.3.2.3.1.1

NOTE not all possible transitions are shown in this figure

figure 5.1.3.2.3.1.1 5GMM main states in the network

###### 5.1.3.2.3.2 5GMM-DEREGISTERED

in the state 5GMM-DEREGISTERED no 5GMM context has been established or the 5GMM context is marked as deregistered the UE is deregistered the network may answer to an initial registration procedure initiated by the UE the network may also answer to a de-registration procedure initiated by the UE

###### 5.1.3.2.3.3 5GMM-COMMON-PROCEDURE-INITIATED

the network enters the state 5GMM-COMMON-PROCEDURE-INITIATED after it has started a common 5GMM procedure and is waiting for a response from the UE

###### 5.1.3.2.3.4 5GMM-REGISTERED

in the state 5GMM-REGISTERED a 5GMM context has been established additionally one or more PDU session(s) may be established at the network

###### 5.1.3.2.3.5 5GMM-DEREGISTERED-INITIATED

the network enters the state 5GMM-DEREGISTERED-INITIATED after it has started a de-registration procedure and is waiting for a response from the UE

### 5.1.4 coordination between 5GMM and EMM

#### 5.1.4.1 general

if both 5GMM and EMM are enabled a UE operating in single-registration mode shall maintain one common registration for 5GMM for 3GPP access and EMM

coordination between 5GMM for 3GPP access and EMM for a UE which is capable of N1 mode and S1 mode and operates in dual-registration mode is not needed except as specified in subclause 4.8.3

the coordination between 5GMM for 3GPP access and EMM in subclauses 5.1.4.2 and 5.1.4.3 only applies to the UEs operating in single-registration mode

regarding the coordination of "SIM/USIM considered invalid" and "USIM considered invalid for 5GS services" between the various mobility management entities see subclause 5.1.5

#### 5.1.4.2 coordination between 5GMM for 3GPP access and EMM with N26 interface

a UE that is not registered shall be in state EMM-DEREGISTERED and state 5GMM-DEREGISTERED for 3GPP access

in N1 mode upon successful completion of a registration procedure over 3GPP access the UE operating in single-registration mode shall enter substates 5GMM-REGISTERED.NORMAL-SERVICE or 5GMM-REGISTERED.NON-ALLOWED-SERVICE as described in subclause 5.3.5.2 for 3GPP access and EMM-REGISTERED.NO-CELL-AVAILABLE the UE shall reset the registration attempt counter for 3GPP access and the attach attempt counter (see 3GPP TS 24.301 [15])

at inter-system change from S1 mode to N1 mode the UE shall enter substates 5GMM-REGISTERED.NORMAL-SERVICE or 5GMM-REGISTERED.NON-ALLOWED-SERVICE as described in subclause 5.3.5.2 for 3GPP accessand EMM-REGISTERED.NO-CELL-AVAILABLE and initiate a registration procedure for mobility and periodic registration update over 3GPP access indicating "mobility registration updating" in the 5GS registration type IE of the REGISTRATION REQUEST message (see subclause 5.5.1.3)

in S1 mode upon successful completion of an attach or tracking area updating procedure the UE operating in single-registration mode shall enter substates 5GMM-REGISTERED.NO-CELL-AVAILABLE for 3GPP access and EMM-REGISTERED.NORMAL-SERVICE the UE shall reset the registration attempt counter for 3GPP access and the attach attempt counter or tracking area updating attempt counter (see 3GPP TS 24.301 [15])

at inter-system change from N1 mode to S1 mode when there is no active PDU session for which interworking with EPS is supported as specified in subclause 6.1.4.1 and EMM-REGISTERED without PDN connection is not supported by the UE or the MME the UE shall enter state 5GMM-DEREGISTERED for 3GPP access and state EMM-DEREGISTERED and then initiate the EPS attach procedure if EMM-REGISTERED without PDN connection is supported by the UE and the MME the UE shall enter substates EMM-REGISTERED.NORMAL-SERVICE and 5GMM-REGISTERED.NO-CELL-AVAILABLE for 3GPP access and initiate a tracking area updating procedure

at inter-system change from N1 mode to S1 mode when there is at least one active PDU session for which interworking with EPS is supported as specified in subclause 6.1.4.1 the UE shall enter substates EMM-REGISTERED.NORMAL-SERVICE and 5GMM-REGISTERED.NO-CELL-AVAILABLE for 3GPP access and initiate a tracking area updating procedure (see 3GPP TS 24.301 [15])

#### 5.1.4.3 coordination between 5GMM for 3GPP access and EMM without N26 interface

a UE operating in the single-registration mode that is not registered over 3GPP access shall be in state EMM-DEREGISTERED and in state 5GMM-DEREGISTERED for 3GPP access

in N1 mode upon successful completion of a registration procedure over 3GPP access the UE operating in the single-registration mode shall enter substates 5GMM-REGISTERED.NORMAL-SERVICE or 5GMM-REGISTERED.NON-ALLOWED-SERVICE as described in subclause 5.3.5.2 for 3GPP access and EMM-REGISTERED.NO-CELL-AVAILABLE

at inter-system change from N1 mode to S1 mode in 5GMM-IDLE mode the UE shall behave as specified in subclause 4.8.2.3

in S1 mode upon successful completion of an attach or tracking area updating procedure the UE operating in the single-registration mode shall enter substates 5GMM-REGISTERED.NO-CELL-AVAILABLE for 3GPP access and EMM-REGISTERED.NORMAL-SERVICE

at inter-system change from S1 mode to N1 mode in 5GMM-IDLE mode the UE operating in the single-registration mode

a) if the UE is registered for normal service in S1 mode the UE shall enter substates EMM-REGISTERED.NO-CELL-AVAILABLE and 5GMM- REGISTERED.NORMAL-SERVICE for 3GPP access and then initiate the registration procedure for mobility and periodic registration update over 3GPP access indicating "mobility registration updating" in the 5GS registration type IE of the REGISTRATION REQUEST message (see subclause 5.5.1.3); or

b) if the UE is registered for emergency bearer services in S1 mode the UE shall initiate the initial registration for emergency services

### 5.1.5 coordination between 5GMM and GMM

coordination between 5GMM and GMM states is not required

regardless whether the UE is operating in single-registration mode or dual-registration mode

a) if the UE considers the SIM/USIM invalid for any of 3GPP access in N1 mode S1 mode A/Gb mode or iu mode then it considers the SIM/USIM invalid for all of them; and

b) if the UE considers the USIM invalid for 5GS services for any of 3GPP access in N1 mode S1 mode A/Gb mode or iu mode then it considers the USIM invalid for 5GS services for all of them

## 5.2 behaviour of the UE in state 5GMM-DEREGISTERED and state 5GMM-REGISTERED

### 5.2.1 general

in this subclause the detailed behaviour of the UE in the states 5GMM-DEREGISTERED and 5GMM-REGISTERED is described

### 5.2.2 UE behaviour in state 5GMM-DEREGISTERED

#### 5.2.2.1 general

the state 5GMM-DEREGISTERED is entered in the UE when

a) the de-registration is performed either by the UE or by the network (see subclause 5.5.2);

b) the registration request is rejected by the AMF (see subclause 5.5.1.2.5 and 5.5.1.3.5);

c) the service request is rejected by the AMF (see subclause 5.6.1);

d) the UE is switched on; or

e) the UE registered for emergency services is in 5GMM-IDLE mode and its periodic registration update timer expires (see subclause 5.3.7)

in state 5GMM-DEREGISTERED the UE shall behave according to the substate as explained in subclause 5.2.2.3

#### 5.2.2.2 primary substate selection

##### 5.2.2.2.1 selection of the substate after power on

for a UE configured for ecall only mode as specified in 3GPP TS 31.102 [22] timers T3444 and T3445 are considered to have expired at power on when the UE is switched on the substate shall be PLMN-SEARCH if the USIM is available and valid or there are valid entries in the "list of subscriber data" see 3GPP TS 23.122 [5] for further details

the substate chosen after PLMN-SEARCH following power on is

a) if no cell can be selected the substate shall be NO-CELL-AVAILABLE;

b) if the UE is not operating in SNPN access operation mode and no USIM is present or the USIM is considered invalid by the UE the substate shall be NO-SUPI;

c) if the UE is operating in SNPN access operation mode and

1) the selected entry in the "list of subscriber data" does not contain subscription identifier and no USIM is present or the USIM is considered invalid by the UE; or

2) no valid entry in the "list of subscriber data" exists;

the substate shall be NO-SUPI;

d) if a suitable cell has been found

1) the PLMN identity of the cell is not in one of the forbidden PLMN lists;

2) the SNPN is not an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) the UE is not to perform initial registration for onboarding services in SNPN and the SNPN identity of the cell is not in one of the "permanently forbidden SNPNs" list or the "temporarily forbidden SNPNs" list which are if the MS supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription ;

3) the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) and the SNPN identity of the cell is not in one of the "permanently forbidden SNPNs for access for localized services in SNPN" list or "temporarily forbidden SNPNs for access for localized services in SNPN" list associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription; or

4) the UE is to perform initial registration for onboarding services in SNPN and the SNPN identity of the cell is not in the "permanently forbidden SNPNs for onboarding services in SNPN" list and the "temporarily forbidden SNPNs for onboarding services in SNPN" list;

and the tracking area is not in one of the lists of 5GS forbidden tracking areas then the substate shall be NORMAL-SERVICE;

e) if the selected cell is known not to be able to provide normal service then the UE shall enter the substate LIMITED-SERVICE;

f) if the UE is in manual network selection mode and no cell of the selected PLMN or SNPN has been found the UE shall enter the substate NO-CELL-AVAILABLE; and

g) if the UE is configured for ecall only mode as specified in 3GPP TS 31.102 [22] the substate shall be eCALL-INACTIVE

#### 5.2.2.3 detailed description of UE behaviour in state 5GMM-DEREGISTERED

##### 5.2.2.3.1 NORMAL-SERVICE

the UE shall initiate an initial registration procedure if the timer T3346 is not running if timer T3346 is running the UE shall initiate an initial registration procedure on the expiry of timer T3346

the UE may initiate an initial registration procedure for emergency services or for a UE configured for high priority access in selected PLMN or SNPN even if timer T3346 is running

##### 5.2.2.3.2 LIMITED-SERVICE

the UE shall initiate an initial registration procedure when entering a cell which provides normal service

the UE may initiate initial registration for emergency services

##### 5.2.2.3.3 ATTEMPTING-REGISTRATION

the UE in 3GPP access

a) shall initiate an initial registration procedure on the expiry of timers T3502 T3511 or T3346;

b) may initiate an initial registration procedure for emergency services even if timers T3502 T3511 or T3346 are running;

b1) may initiate an initial registration procedure even if timer T3502 T3346 or T3447 is running if the UE is a UE configured for high priority access in selected PLMN;

b2) may initiate an initial registration procedure even if timer T3502 T3346 is running if the UE is a UE configured for high priority access in selected SNPN;

c) shall initiate an initial registration procedure when entering a new PLMN or SNPN except if

i) timer T3346 is running and the new PLMN or SNPN is equivalent to the PLMN or SNPN where the UE started timer T3346;

ii) the PLMN identity of the new cell is in the forbidden PLMN lists;

iii) the SNPN is not an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) the UE is not to perform initial registration for onboarding services in SNPN the SNPN identity of the new cell is in the "permanently forbidden SNPNs" list or the "temporarily forbidden SNPNs" list which are if the MS supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription;

iv) the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) the SNPN identity of the new cell is in the "permanently forbidden SNPNs for access for localized services in SNPN" list or the "temporarily forbidden SNPNs for access for localized services in SNPN" list associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription;

v) the UE is to perform initial registration for onboarding services in SNPN the SNPN identity of the new cell is in the "permanently forbidden SNPNs for onboarding services in SNPN" list or the "temporarily forbidden SNPNs for onboarding services in SNPN" list; or

vi) the current TAI is in one of the lists of 5GS forbidden tracking areas;

d) shall initiate an initial registration procedure when the current TAI has changed if timer T3346 is not running

1) the PLMN identity of the new cell is not in one of the forbidden PLMN lists;

2) the SNPN is not an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) the UE is not to perform initial registration for onboarding services in SNPN and the SNPN identity of the new cell is in neither the "permanently forbidden SNPNs" list nor the "temporarily forbidden SNPNs" list which are if the MS supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription;

3) the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) and the SNPN identity of the cell is in neither the "permanently forbidden SNPNs for access for localized services in SNPN" list nor the "temporarily forbidden SNPNs for access for localized services in SNPN" list associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription; or

4) the UE is to perform initial registration for onboarding services in SNPN and the SNPN identity of the cell is in neither the "permanently forbidden SNPNs for onboarding services in SNPN" list nor the "temporarily forbidden SNPNs for onboarding services in SNPN" list;

and the current TAI is not in one of the lists of 5GS forbidden tracking areas;

e) shall initiate an initial registration procedure if the 5GS update status is set to 5U2 NOT UPDATED and timers T3511 T3502 and T3346 are not running;

f) may initiate an initial registration procedure for UE in NB-N1 mode upon receiving a request from upper layers to transmit user data related to an exceptional event and the UE is allowed to use exception data reporting (see the ExceptionDataReportingAllowed leaf of the NAS configuration MO in 3GPP TS 24.368 [17]) or the USIM file EFNASCONFIG in 3GPP TS 31.102 [22]) if timer T3346 is not already running for "MO exception data" and even if timer T3502 or timer T3511 is running; and

g) may initiate an initial registration procedure with 5GS registration type IE set to "initial registration" for initiating of an emergency PDU session upon request of the upper layers to establish the emergency PDU session

the UE in non-3GPP access

a) shall initiate an initial registration procedure on the expiry of timers T3502 T3511 or T3346;

b) may initiate an initial registration procedure for emergency services even if timers T3502 T3511 or T3346 are running;

b1) may initiate an initial registration procedure even if timer T3502 or T3346 is running if the UE is a UE configured for high priority access in selected PLMN;

c) shall initiate an initial registration procedure when entering a new PLMN or SNPN except if timer T3346 is running and the new PLMN or SNPN is equivalent to the PLMN or SNPN where the UE started timer T3346;

d) shall initiate an initial registration procedure if the 5GS update status is set to 5U2 NOT UPDATED and timers T3511 T3502 and T3346 are not running; and

e) may initiate an initial registration procedure with 5GS registration type IE set to "initial registration" for initiating of an emergency PDU session upon request of the upper layers to establish the emergency PDU session

##### 5.2.2.3.4 PLMN-SEARCH

the UE shall perform PLMN selection or SNPN selection if a new PLMN or SNPN is selected the UE shall reset the registration attempt counter and initiate the registration procedure for initial registration (see subclause 5.5.1.2.2)

if the selected cell in the new PLMN is known not to be able to provide normal service the UE may initiate the registration procedure for initial registration for emergency services

##### 5.2.2.3.5 NO-SUPI

the UE may initiate the registration procedure for initial registration for emergency services

##### 5.2.2.3.6 NO-CELL-AVAILABLE

the UE shall perform cell selection and choose an appropriate substate when a cell is found

##### 5.2.2.3.7 eCALL-INACTIVE

the UE camps on a suitable cell or an acceptable cell in a PLMN selected as specified in 3GPP TS 23.122 [5] but initiates no 5GMM signalling with the network and ignores any paging requests

the UE shall leave substate 5GMM-DEREGISTERED.eCALL-INACTIVE state only when one of the following events occur

a) if the USIM is removed the UE enters substate 5GMM-DEREGISTERED.NO-SUPI;

b) if coverage is lost the UE enters substate 5GMM-DEREGISTERED.PLMN-SEARCH;

c) if the UE is deactivated (e.g powered off) by the user the UE enters state 5GMM-NULL;

d) if the UE receives a request from upper layers to establish an ecall over IMS or an IMS emergency session according to subclause H.6 in 3GPP TS 23.167 [6] the UE enters state 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION the UE then uses the relevant 5GMM and 5GSM procedures to establish the ecall over IMS or an IMS emergency session according to subclause H.6 in 3GPP TS 23.167 [6] at the earliest opportunity; or

e) if the UE receives a request from upper layers to establish a call to an HPLMN designated non-emergency MSISDN or URI for test or terminal reconfiguration service the UE enters state 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION once the registration procedure is completed the UE uses the relevant 5GMM and 5GSM procedures to establish the non-emergency call

##### 5.2.2.3.8 INITIAL-REGISTRATION-NEEDED

the UE shall initiate the initial registration procedure if still needed as soon as the access is allowed in the selected cell for the UE

the UE may initiate registration procedure for emergency services

#### 5.2.2.4 substate when back to state 5GMM-DEREGISTERED from another 5GMM state

when returning to state 5GMM-DEREGISTERED the UE shall select a cell as specified in 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C]

the substate depends on the result of the cell selection procedure the outcome of the previously performed 5GMM specific procedures on the 5GS update status of the UE on the tracking area data stored in the UE on the presence of the USIM on the UE configuration and on the reason for moving to 5GMM-DEREGISTERED

a) if no cell has been found the substate is NO-CELL-AVAILABLE until a cell is found;

b) if no USIM is present or if the inserted USIM is considered invalid by the UE the substate shall be NO-SUPI;

c) if a suitable cell has been found and the PLMN or tracking area is not in one of the forbidden lists the substate shall be NORMAL-SERVICE;

d) if an initial registration shall be performed (e.g network-requested re-registration) the substate shall be ATTEMPTING-REGISTRATION;

e) if a PLMN reselection or SNPN reselection (according to 3GPP TS 23.122 [5]) is needed the substate shall be PLMN-SEARCH;

f) if the selected cell is known not to be able to provide normal service the substate shall be LIMITED-SERVICE; and

g) if the UE is configured for ecall only mode as specified in 3GPP TS 31.102 [22] T3444 and T3445 have expired or are not running and substate PLMN-SEARCH is not required the substate shall be eCALL-INACTIVE

### 5.2.3 UE behaviour in state 5GMM-REGISTERED

#### 5.2.3.1 general

the state 5GMM-REGISTERED is entered at the UE when the initial registration procedure is performed by the UE (see subclause 5.5.1.2.2)

in state 5GMM-REGISTERED the UE shall behave according to the substate as explained in subclause 5.2.3.2

#### 5.2.3.2 detailed description of UE behaviour in state 5GMM-REGISTERED

##### 5.2.3.2.1 NORMAL-SERVICE

the UE

a) shall initiate the mobility or the registration procedure for periodic registration update (according to conditions given in subclause 5.5.1.3.2) except that the registration procedure for periodic registration update shall not be initiated over non-3GPP access;

b) shall initiate the service request procedure (according to conditions given in subclause 5.6.1);

c) shall respond to paging;

NOTE 1 paging is not supported over non-3GPP access

NOTE 2 as an implementation option the MUSIM UE is allowed to not respond to paging based on the information available in the paging message e.g voice service indication

d) if configured for ecall only mode as specified in 3GPP TS 31.102 [22] shall perform the ecall inactivity procedure at expiry of timer T3444 or timer T3445 (see subclause 5.5.3);

e) shall initiate a registration procedure for mobility and periodic registration update on the expiry of timer T3511; and

f) if acting as a 5G ProSe UE-to-network relay UE as specified in 3GPP 24.554 [19E] shall initiate the authentication and key agreement procedure (according to the conditions given in subclause 5.5.4)

##### 5.2.3.2.2 NON-ALLOWED-SERVICE

the UE shall behave as specified in subclause 5.3.5

the UE in 5GMM-REGISTERED.NON-ALLOWED-SERVICE substate if configured for ecall only mode as specified in 3GPP TS 31.102 [22] shall perform the ecall inactivity procedure at expiry of timer T3444 or timer T3445 (see subclause 5.5.3)

##### 5.2.3.2.3 ATTEMPTING-REGISTRATION-UPDATE

the UE in 3GPP access

a) shall not send any user data;

b) shall initiate a registration procedure for mobility and periodic registration update on the expiry of timers T3502 T3511 T3346 or discontinuous coverage maximum time offset timer;

c) shall initiate a registration procedure for mobility and periodic registration update when entering a new PLMN or SNPN if timer T3346 is running and the new PLMN or SNPN is not equivalent to the PLMN or SNPN where the UE started timer T3346 the PLMN identity of the new cell is not in the forbidden PLMN lists and the current TAI is not in one of the lists of 5GS forbidden tracking areas;

d) shall initiate a registration procedure for mobility and periodic registration update when the current TAI has changed if timer T3346 is not running and

1) the PLMN identity of the new cell is not in one of the forbidden PLMN lists;

2) the SNPN is not an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) the UE is not registered for onboarding services in SNPN and the SNPN identity of the new cell is in neither the "permanently forbidden SNPNs" list nor the "temporarily forbidden SNPNs" list which are if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription;

3) the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) and the SNPN identity of the new cell is in neither the "permanently forbidden SNPNs for access for localized services in SNPN" list nor the "temporarily forbidden SNPNs for access for localized services in SNPN" list associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription; or

4) the UE is registered for onboarding services in SNPN and the SNPN identity of the cell is in neither the "permanently forbidden SNPNs for onboarding services in SNPN" list nor the "temporarily forbidden SNPNs for onboarding services in SNPN" list;

and the current TAI is not in one of the lists of 5GS forbidden tracking areas;

e) may initiate a registration procedure for mobility and periodic registration update upon request of the upper layers to establish an emergency PDU session or perform emergency service fallback;

e1) may initiate a registration procedure for mobility and periodic registration update upon request of the upper layers to establish a PDU session even if timer T3502 T3346 or T3447 is running if the UE is a UE configured for high priority access in the selected PLMN;

e2) may initiate a registration procedure for mobility and periodic registration update upon request of the upper layers to establish a PDU session even if timer T3502 T3346 is running if the UE is a UE configured for high priority access in selected SNPN;

f) may perform de-registration locally and initiate a registration procedure for initial registration for emergency services even if timer T3346 is running;

g) shall initiate registration procedure for mobility and periodic registration update upon reception of paging or upon reception of NOTIFICATION message with access type indicating 3GPP access;

NOTE as an implementation option the MUSIM UE is allowed to not respond to paging based on the information available in the paging message e.g voice service indication

h) may initiate a registration procedure for mobility and periodic registration update upon request for an MMTEL voice call MMTEL video call or an MO IMS registration related signalling from the upper layers and none of the following conditions is met

1) timer T3346 is running;

2) the UE has stored a list of "non-allowed tracking areas" and the current TAI is in the list of "non-allowed tracking areas"; or

3) the UE has stored a list of "allowed tracking areas" the UE is camped on a cell which is in the registration area and the current TAI is not in the list of "allowed tracking areas";

i) shall initiate a registration procedure for mobility and periodic registration update if the 5GS update status is set to 5U2 NOT UPDATED and timers T3511 T3502 and T3346 are not running;

j) if configured for ecall only mode as specified in 3GPP TS 31.102 [22] shall perform the ecall inactivity procedure at expiry of timer T3444 or timer T3445 (see subclause 5.5.3);

k) may initiate a registration procedure for mobility and periodic registration update for UE in NB-N1 mode upon receiving a request from upper layers to transmit user data related to an exceptional event and the UE is allowed to use exception data reporting (see the ExceptionDataReportingAllowed leaf of the NAS configuration MO in 3GPP TS 24.368 [17]) or the USIM file EFNASCONFIG in 3GPP TS 31.102 [22]) if timer T3346 is not already running for "MO exception data" and even if timer T3502 or timer T3511 is running;

l) may initiate the signalling for the de-registration procedure with De-registration type IE indicating "normal de-registration" only if the current TAI is part of the TAI list;

m) shall initiate a registration procedure for mobility and periodic registration update if the UE supports the reconnection to the network due to RAN timing synchronization status change and receives an indication of a change in the RAN timing synchronization status even if timer T3502 is running

n) may initiate the signalling for the de-registration procedure with de-registration type "switch off"

the UE in non-3GPP access

a) shall not send any user data;

b) shall initiate the registration procedure for mobility and periodic registration update on the expiry of timers T3502 T3511 or T3346;

c) may initiate a registration procedure for mobility registration update upon request of the upper layers to establish an emergency PDU session;

c1) may initiate a registration procedure for mobility and periodic registration update upon request of the upper layers to establish a PDU session if the UE is a UE configured for high priority access in selected PLMN even if timer T3346 or T3502 is running;

d) may perform de-registration locally and initiate a registration procedure for initial registration for emergency services even if timer T3346 is running;

e) may initiate a registration procedure for mobility and periodic registration update upon request for an MMTEL voice call MMTEL video call or an MO IMS registration related signalling from the upper layers if timer T3346 is not running;

f) shall initiate a registration procedure for mobility and periodic registration update if the 5GS update status is set to 5U2 NOT UPDATED and timers T3511 T3502 and T3346 are not running; and

g) shall not initiate the signalling for the de-registration procedure unless timer T3346 is running

##### 5.2.3.2.4 LIMITED-SERVICE

the UE

a) shall perform cell selection/reselection;

b) may perform de-registration locally and initiate an initial registration for emergency services; and

c) if configured for ecall only mode as specified in 3GPP TS 31.102 [22] shall perform the ecall inactivity procedure at expiry of timer T3444 or timer T3445 (see subclause 5.5.3)

##### 5.2.3.2.5 PLMN-SEARCH

the UE shall perform PLMN selection or SNPN selection if a new PLMN is selected the UE shall reset the registration attempt counter and initiate a registration procedure for mobility and periodic registration update (see subclause 5.5.1.3) if a new SNPN is selected the UE shall reset the registration attempt counter and initiate a mobility registration update if the UE supports access to an SNPN using credentials from a credentials holder or when the SNPNs are equivalent SNPNs or both (see subclause 4.14.2) and the last registered SNPN and the newly selected SNPN are both identified by globally-unique SNPN identities otherwise the UE may perform de-registration locally and shall initiate a registration procedure for initial registration (see subclause 5.5.1.2.2).If the selected cell in the new PLMN is known not to be able to provide normal service the UE may perform de-registration locally and initiate an initial registration for emergency services

##### 5.2.3.2.6 NO-CELL-AVAILABLE

the UE shall perform cell selection and choose an appropriate substate when a cell is found

##### 5.2.3.2.7 UPDATE-NEEDED

the UE

a) shall not send any user data;

b) shall not send signalling information unless it is a service request as a response to paging or to initiate signalling for emergency services or emergency services fallback;

c) shall perform cell selection/reselection;

d) shall enter the appropriate new substate as soon as the lower layers indicate that the barring is alleviated for the access category with which the access attempt for the registration procedure for mobility and periodic registration update was associated and if still needed start the registration procedure for mobility and periodic registration update or the signalling for the de-registration procedure (see subclauses 5.5.1.3.7 item l and 5.5.2.2.6 item b); and

e) if configured for ecall only mode as specified in 3GPP TS 31.102 [22] shall perform the ecall inactivity procedure at expiry of timer T3444 or T3445 (see subclause 5.5.3)

## 5.3 general on elementary 5GMM procedures

### 5.3.1 5GMM modes and N1 NAS signalling connection

#### 5.3.1.1 establishment of the N1 NAS signalling connection

when the UE is in 5GMM-IDLE mode over 3GPP access and needs to transmit an initial NAS message the UE shall request the lower layer to establish an RRC connection upon indication from the lower layers that the RRC connection has been established the UE shall consider that the N1 NAS signalling connection over 3GPP access is established and enter 5GMM-CONNECTED mode over 3GPP access

when the UE is in 5GMM-IDLE mode over non-3GPP access and the UE receives an indication from the lower layers of non-3GPP access that the access stratum connection is established between the UE and the network the UE shall send an initial NAS message consider the N1 NAS signalling connection is established and enter 5GMM-CONNECTED mode over non-3GPP access

initial NAS messages are

a) REGISTRATION REQUEST message;

b) DEREGISTRATION REQUEST message;

c) SERVICE REQUEST message; and

d) CONTROL PLANE SERVICE REQUEST

if the UE is capable of both N1 mode and S1 mode and lower layers provide an indication that the current E-UTRA cell is connected to both EPC and 5GCN for the routing of the REGISTRATION REQUEST message during the initial registration procedure to the appropriate core network (EPC or 5GCN) the UE NAS provides the lower layers with the selected core network type information

for the routing of the initial NAS message to the appropriate AMF if the UE holds a 5G-GUTI or 4G-GUTI the UE NAS provides the lower layers with the UE identity according to the following rules

a) if the registration procedure for mobility and periodic registration update was triggered due to the last CONFIGURATION UPDATE COMMAND message containing the configuration update indication IE with the registration bit set to "registration requested" and including

1) no other parameters;

2) one or both of the allowed NSSAI IE and the configured NSSAI IE; or

3) the network slicing indication IE with the network slicing subscription change indication set to "Network slicing subscription changed";

the UE NAS shall not provide the lower layers with the 5G-S-TMSI or the registered GUAMI;

b) if the service request procedure was initiated over non-3GPP access the UE NAS shall provide the lower layers with the registered GUAMI but shall not provide the lower layers with the 5G-S-TMSI;

c) if the initial NAS message other than the SERVICE REQUEST or CONTROL PLANE SERVICE REQUEST message was initiated over untrusted non-3GPP access the UE NAS shall provide the lower layers with the GUAMI of the 5G-GUTI that the UE NAS has selected as specified in the subclause 5.5.1.2.2 and 5.5.1.3.2 but shall not provide the lower layers with the 5G-S-TMSI;

if the initial NAS message other than the SERVICE REQUEST or CONTROL PLANE SERVICE REQUEST message was initiated over trusted non-3GPP access the UE NAS shall provide the lower layers with the 5G-GUTI if available otherwise shall provide the lower layers with the SUCI;

if the UE is the 5G-RG and the initial NAS message other than the SERVICE REQUEST or CONTROL PLANE SERVICE REQUEST message was initiated over wireline access the UE NAS shall provide the lower layers with the GUAMI of the 5G-GUTI that the UE NAS has selected as specified in the subclause 5.5.1.2.2 and 5.5.1.3.2 if available otherwise shall not provide the lower layers with any UE identity;

d) if the UE does not hold a 5G-GUTI that was previously assigned by the same PLMN with which the UE is performing the registration procedure and if

1) the UE operating in the single-registration mode performs a registration procedure for mobility and periodic registration update indicating "mobility registration updating" following an inter-system change from S1 mode to N1 mode; or

2) the UE which was previously registered in S1 mode before entering state EMM-DEREGISTERED performs an initial registration procedure the UE has received the interworking without N26 interface indicator set to "interworking without N26 interface not supported" from the network and the UE holds a 4G-GUTI;

then the UE NAS provides the lower layers with a GUAMI part of the 5G-GUTI mapped from 4G-GUTI as specified in 3GPP TS 23.003 [4] with an indication that the GUAMI is mapped from EPS; or

e) otherwise

1) if the tracking area of the current cell is in the registration area the UE NAS shall provide the lower layers with the 5G-S-TMSI but shall not provide the registered GUAMI to the lower layers; or

2) if the tracking area of the current cell is not in the registration area the UE NAS shall provide the lower layers with the GUAMI of the 5G-GUTI that the UE NAS has selected as specified in the subclauses 5.5.1.2.2 and 5.5.1.3.2 but shall not provide the lower layers with the 5G-S-TMSI

for 3GPP access if

a) the UE is operating in single-registration mode the UE does not hold a 5G-GUTI and the UE does not hold a 4G-GUTI; or

b) the UE is operating in dual-registration mode and the UE does not hold a 5G-GUTI;

the UE NAS does not provide the lower layers with the 5G-S-TMSI or the registered GUAMI

for untrusted non-3GPP access if the UE does not hold a 5G-GUTI and the UE does not hold a 4G-GUTI the UE NAS does not provide the lower layers with the 5G-S-TMSI or the registered GUAMI for trusted non-3GPP access if the UE does not hold a 5G-GUTI and the UE does not hold a 4G-GUTI the UE NAS provides the lower layers with the SUCI

for 3GPP access if a UE operating as an IAB-node performs a registration procedure or service request procedure (see 3GPP TS 23.501 [8]) the UE NAS shall indicate to the lower layers that the establishment of the NAS signalling connection is for a UE operating as an IAB-node

the UE NAS also provides the lower layers with the identity of the selected PLMN (see 3GPP TS 38.331 [30]) if the UE is not operating in SNPN access operation mode if the UE is operating in SNPN access operation mode the UE NAS provides the lower layers with the SNPN identity of the selected SNPN in a shared network the UE shall choose one of the PLMN identity(ies) or SNPN identity(ies) as specified in 3GPP TS 23.122 [5] and 3GPP TS 24.502 [18]

the UE NAS layer may provide the lower layers with an NSSAI as specified in subclause 4.6.2.3

if the UE performs initial registration for onboarding services in SNPN or is registered for onboarding services in SNPN the UE NAS layer shall provide the lower layers with an indication that the connection is for onboarding

#### 5.3.1.2 Re-establishment of the N1 NAS signalling connection

when the UE in 5GMM-CONNECTED mode over 3GPP access receives a fallback indication from lower layers and the UE has no pending NAS procedure and no pending uplink user data for PDU session(s) with user-plane resources already established the UE shall

a) enter 5GMM-IDLE mode; and

b) initiate the registration procedure for mobility and periodic registration update and include the uplink data status IE in the REGISTRATION REQUEST message indicating the PDU session(s) for which user-plane resources were active prior to receiving the fallback indication if any (see subclause 5.5.1.3 for further details)

when the UE in 5GMM-CONNECTED mode over 3GPP access receives a fallback indication from lower layers and the UE has pending uplink user data for PDU session(s) with user-plane resources already established but no pending NAS procedure the UE shall

a) enter 5GMM-IDLE mode; and

b) initiate the service request procedure and include the uplink data status IE in the SERVICE REQUEST message or the CONTROL PLANE SERVICE REQUEST message indicating the PDU session(s) for which user-plane resources were active prior to receiving the fallback indication (see subclause 5.6.1 for further details)

when the UE in 5GMM-CONNECTED mode over 3GPP access receives a fallback indication from lower layers and the UE has a pending registration procedure a service request procedure or a de-registration procedure the UE shall

a) enter 5GMM-IDLE mode;

b) proceed with the pending procedure; and

c) if the pending procedure is a service request or registration procedure and the SERVICE REQUEST message the CONTROL PLANE SERVICE REQUEST message or the REGISTRATION REQUEST message does not include UE request type IE with request type value set to "NAS signalling connection release" the UE shall include the uplink data status IE in the SERVICE REQUEST message the CONTROL PLANE SERVICE REQUEST message or in the REGISTRATION REQUEST message indicating the PDU session(s) for which user-plane resources were not active prior to receiving a fallback indication from the lower layers and the UE has pending user data to be sent over 3GPP access if any and the PDU session(s) for which user-plane resources were active prior to receiving the fallback indication if any (see subclauses 5.5.1.3 and 5.6.1 for further details)

when the UE in 5GMM-CONNECTED mode over 3GPP access receives a fallback indication from lower layers and the UE has a pending NAS procedure other than a registration procedure a service request procedure or a de-registration procedure the UE shall

a) enter 5GMM-IDLE mode;

b) initiate the service request procedure and include the uplink data status IE in the SERVICE REQUEST message or the CONTROL PLANE SERVICE REQUEST message indicating the PDU session(s) for which user-plane resources were active prior to receiving the fallback indication if any (see subclause 5.6.1 for further details); and

c) upon successful service request procedure completion proceed with any pending procedure

when the UE in 5GMM-CONNECTED mode over 3GPP access receives a fallback indication from lower layers and the UE has no pending NAS procedure and no pending uplink user data for PDU session(s) with user-plane resources already established and the UE was using network resources for 5G ProSe direct discovery over PC5 or 5G ProSe direct communication over PC5 (see 3GPP TS 23.304 [6E]) the UE shall

a) enter 5GMM-IDLE mode; and

b) initiate the service request procedure and include the uplink data status IE in the SERVICE REQUEST message or the CONTROL PLANE SERVICE REQUEST message indicating the PDU session(s) for which user-plane resources were active prior to receiving the fallback indication if any (see subclause 5.6.1 for further details)

the UE which supports S-NSSAI location validity information and which has received S-NSSAI location validity information from the AMF shall include the uplink data status IE in the REGISTRATION REQUEST message the SERVICE REQUEST message or the CONTROL PLANE SERVICE REQUEST message to indicate the PDU session(s) for which user-plane resources were active prior to receiving the fallback indication as described above only if the UE is inside the NS-AoS with respect to the S-NSSAI which is associated with a PDU session

the cases above apply when the UE is in an allowed area or when the UE is not in a non-allowed area

when the UE

a) is in a non-allowed area or is not in an allowed area;

b) is in 5GMM-CONNECTED mode over 3GPP access;

c) receives a fallback indication from lower layers; and

d) does not have signalling pending

the UE shall

a) enter 5GMM-IDLE mode; and

b) initiate the registration procedure for mobility and periodic registration update the UE shall not include the uplink data status IE in the REGISTRATION REQUEST message except if the PDU session for which user-plane resources were active is an emergency PDU session or if the UE is configured for high priority access in selected PLMN or SNPN

in the above cases when the UE receives a fallback indication from lower layers if the UE is in non-allowed area or not in allowed area the UE shall behave as specified in subclause 5.3.5

#### 5.3.1.3 release of the N1 NAS signalling connection

the signalling procedure for the release of the N1 NAS signalling connection is initiated by the network

in N1 mode upon indication from lower layers that the access stratum connection has been released the UE shall enter 5GMM-IDLE mode and consider the N1 NAS signalling connection released

if the UE in 3GPP access is configured for ecall only mode as specified in 3GPP TS 31.102 [22] then

- if the N1 NAS signalling connection that was released had been established for ecall over IMS was released the UE shall start timer T3444; and

- if the N1 NAS signalling connection that was released had been established for a call to an HPLMN designated non-emergency MSISDN or URI for test or terminal reconfiguration service was released the UE shall start timer T3445

the UE shall start the timer T3447 if not already running when the N1 NAS signalling connection is released as specified in subclause 5.3.17

to allow the network to release the N1 NAS signalling connection the UE

a) shall start the timer T3540 if the UE receives any of the 5GMM cause values #7 #11 #12 #13 #15 #27 #31 #62 #72 #73 #74 #75 #76 #78 #80 and the UE does not consider the received 5GMM cause value as abnormal case as specified in subclauses 5.5.1.2.7 5.5.1.3.7 and 5.5.2.3.4;

a1) shall start the timer T3540 if the UE receives a SERVICE REJECT message case i) in subclause 5.6.1.7 is applicable and the procedure was started from 5GMM-IDLE mode;

b) shall start the timer T3540 for a UE in 3GPP access if

1) the UE receives a REGISTRATION ACCEPT message which does not include a pending NSSAI IE or UE radio capability ID deletion indication IE;

2) the UE has set the Follow-on request indicator to "No follow-on request pending" in the REGISTRATION REQUEST message;

3) the UE has not included the uplink data status IE in the REGISTRATION REQUEST message or the UE has included the uplink data status IE in the REGISTRATION REQUEST message but the REGISTRATION ACCEPT message indicates that no user-plane resources of any PDU sessions are to be re-established;

4) the UE has not included the allowed PDU session status IE or has included the allowed PDU session status IE indicating there is no PDU session(s) for which the UE allowed the user-plane resource to be re-established over 3GPP access in the REGISTRATION REQUEST message or the UE has included the allowed PDU session status IE in the REGISTRATION REQUEST message but the REGISTRATION ACCEPT message does not indicate that any user-plane resources of any PDU sessions are to be re-established;

5) the registration procedure has been initiated in 5GMM-IDLE mode or the UE has set request type to "NAS signalling connection release" in the UE request type IE in the REGISTRATION REQUEST message and the N1 NAS signalling connection release bit is set to "N1 NAS signalling connection release supported" in the 5GS network feature support IE of the REGISTRATION ACCEPT message;

6) the user-plane resources for PDU sessions have not been set up except for the case the UE has set request type to "NAS signalling connection release" in the UE request type IE in the REGISTRATION REQUEST message and the N1 NAS signalling connection release bit is set to "N1 NAS signalling connection release supported" in the 5GS network feature support IE of the REGISTRATION ACCEPT message;

7) the UE need not request resources for V2X communication over PC5 reference point (see 3GPP TS 23.287 [6C]);

8) void;

9) the UE need not request resources for 5G ProSe direct discovery over PC5 or 5G ProSe direct communication over PC5 (see 3GPP TS 23.304 [6E]); and

10) the UE need not request resources for A2X communication over PC5 reference point (see 3GPP TS 23.256 [6AB]);

NOTE 1 the lower layers indicate when the user-plane resources for PDU sessions are successfully established or released

b1) may start the timer T3540 at completion of the registration procedure if the UE has included unavailability information and has not included a start of the unavailability period in the REGISTRATION REQUEST message;

c) shall start the timer T3540 if the UE receives a REGISTRATION REJECT message indicating

the 5GMM cause value #9 or #10;

d) shall start the timer T3540 if the UE receives a SERVICE REJECT message indicating

the 5GMM cause value #9 #10; or

the 5GMM cause value #28 and with no emergency PDU session has been established;

e) shall start the timer T3540 if

1) the UE receives a CONFIGURATION UPDATE COMMAND message containing the configuration update indication IE with the registration bit set to "registration requested" and with

i) either new allowed NSSAI information or new configured NSSAI information or both included;

ii) the network slicing subscription change indication; or

iii) no other parameters; and

2) the user-plane resources for PDU sessions have not been set up;

f) shall start the timer T3540 for a UE in 3GPP access if

1) the UE receives a SERVICE ACCEPT message;

2) for the case that the UE sent the

i) SERVICE REQUEST message the UE did not set the service type IE to "signalling" or "high priority access" the UE has not included the uplink data status IE in the SERVICE REQUEST message or the UE has included the uplink data status IE in the SERVICE REQUEST message but the SERVICE ACCEPT message indicates that no user-plane resources of any PDU sessions are to be re-established; or

ii) CONTROL PLANE SERVICE REQUEST message the UE did not set the control plane service type IE to "emergency services fallback" the UE has not included the uplink data status IE in the CONTROL PLANE SERVICE REQUEST message or the UE has included the uplink data status IE in the CONTROL PLANE SERVICE REQUEST message but the SERVICE ACCEPT message indicates that no user-plane resources of any PDU sessions are to be re-established;

3) the UE has not included the allowed PDU session status IE or has included the allowed PDU session status IE indicating there is no PDU session(s) for which the UE allowed the user-plane resource to be re-established over 3GPP access in the SERVICE REQUEST message or the CONTROL PLANE SERVICE REQUEST message or the UE has included the allowed PDU session status IE in the SERVICE REQUEST message or the CONTROL PLANE SERVICE REQUEST message but the SERVICE ACCEPT message does not indicate that any user-plane resources of any PDU sessions are to be re-established;

4) the service request procedure has been initiated in 5GMM-IDLE mode;

5) the user-plane resources for PDU sessions have not been set up;

6) the UE need not request resources for V2X communication over PC5 reference point (see 3GPP TS 23.287 [6C]);

7) the UE need not request resources for 5G ProSe direct discovery over PC5 or 5G ProSe direct communication over PC5 (see 3GPP TS 23.304 [6E]); and

8) the UE need not request resources for A2X communication over PC5 reference point (see 3GPP TS 23.256 [6AB]);

NOTE 2 the lower layers indicate when the user-plane resources for PDU sessions are successfully established or released

g) may start the timer T3540 if the UE receives any of the 5GMM cause values #3 or #6 or if it receives an AUTHENTICATION REJECT message;

h) shall start the timer T3540 for a UE in 3GPP access upon completion of the configuration update procedure or the registration procedure if the UE does not have an emergency PDU session and

1) the UE received a CONFIGURATION UPDATE COMMAND message or a REGISTRATION ACCEPT message while camping on a CAG cell and none of the CAG-ID(s) supported by the current CAG cell is authorized based on "Allowed CAG list" of the entry for the current PLMN in the received "CAG information list";

2) the UE received a CONFIGURATION UPDATE COMMAND message or a REGISTRATION ACCEPT message while camping on a non-CAG cell and the entry for the current PLMN in the received "CAG information list" includes an "indication that the UE is only allowed to access 5GS via CAG cells"; or

3) the UE received a CONFIGURATION UPDATE COMMAND message while camping on a CAG cell and the entry for the current PLMN in not included in the received "CAG information list"; or

i) shall start the timer T3540 for a UE in 3GPP access if

1) the UE receives a SERVICE ACCEPT message; and

2) the UE

- has set request type to "NAS signalling connection release" in the UE request type IE in the SERVICE REQUEST message or CONTROL PLANE SERVICE REQUEST message; or

- has set request type to "Rejection of paging" in the UE request type IE in the SERVICE REQUEST message or the CONTROL PLANE SERVICE REQUEST message and the UE receives a CONFIGURATION UPDATE COMMAND message;

j) shall start the timer T3540 if

1) the UE receives the 5GMM cause value #22 along with a T3346 value in the SERVICE REJECT message the value indicates that the timer T3346 is neither zero nor deactivated and the service request procedure has been initiated in 5GMM-IDLE mode; or

2) the UE receives the 5GMM cause value #22 along with a T3346 value in a message different from the SERVICE REJECT message and the value indicates that the timer T3346 is neither zero nor deactivated; or

k) shall start the timer T3540 if the UE receives a DEREGISTRATION ACCEPT message; or

l) shall start the timer T3540 after the completion of the de-registration procedure if the UE receives a DEREGISTRATION REQUEST message and the De-registration type IE indicates "re-registration required"

upon expiry of T3540

- in cases a) a1) b) b1) f) g) h) i) j) and k) the UE shall locally release the established N1 NAS signalling connection;

- in cases c) and d) the UE shall locally release the established N1 NAS signalling connection and the UE shall initiate the registration procedure as described in subclause 5.5.1.3 or 5.6.1.5;

- in case e) the UE shall locally release the established N1 NAS signalling connection and perform a new registration procedure as specified in subclause 5.5.1.3.2; or

- in case l) the UE shall locally release the established N1 NAS signalling connection and initiate the registration procedure as specified in subclause 5.5.1.2.2

in case a)

- upon receiving a request from the upper layers to perform emergency services fallback only for a UE in 3GPP access or establishing an emergency PDU session the UE shall stop timer T3540 and shall locally release the N1 NAS signalling connection before proceeding as specified in subclause 5.5.1

in case b) and f)

- upon an indication from the lower layers that the user-plane resources for PDU sessions are set up the UE shall stop timer T3540 and may send uplink signalling via the existing N1 NAS signalling connection or user data via user plane if the uplink signalling is associated with emergency services fallback only for a UE in 3GPP access or establishing an emergency PDU session the UE shall stop timer T3540 and send the uplink signalling via the existing N1 NAS signalling connection;

in case b) f) and i)

- upon receipt of a DEREGISTRATION REQUEST message the UE shall stop timer T3540 and respond to the network-initiated de-registration request via the existing N1 NAS signalling connection as specified in subclause 5.5.2.3;

- upon receipt of a message of a network-initiated 5GMM common procedure the UE shall stop timer T3540 and respond to the network-initiated 5GMM common procedure via the existing N1 NAS signalling connection as specified in subclause 5.4;

- if there is no user-plane resources established for PDU sessions upon receiving a request from the upper layers to perform emergency services fallback only for a UE in 3GPP access or establishing an emergency PDU session the UE shall stop timer T3540 and shall locally release the N1 NAS signalling connection before proceeding as specified in subclause 5.6.1;

- if there is no user-plane resources established for PDU sessions upon receiving a request from the upper layers to perform services other than emergency services fallback only for a UE in 3GPP access or establishing an emergency PDU session the UE shall wait for the local release of the established N1 NAS signalling connection upon expiry of timer T3540 or wait for timer T3540 being stopped before initiating NAS signalling;

- upon receipt of a DL NAS TRANSPORT message the UE shall stop timer T3540 and may send uplink signalling via the existing N1 NAS signalling connection;

- upon reception of NOTIFICATION message as specified in subclause 5.6.3.1 case a) the UE shall stop timer T3540 and send uplink signalling via the existing N1 NAS signalling connection; or

- upon initiation of registration procedure for mobility and periodic registration update as specified in subclause 5.5.1.2.7 for cases h) i) j) subclause 5.5.1.3.7 for cases j) k) or subclause 5.5.1.3.2 for case a) the UE shall stop timer T3540

in case c) and d)

- upon an indication from the lower layers that the access stratum connection has been released the UE shall stop timer T3540 and perform a new registration procedure as specified in subclause 5.5.1.3.5 or 5.6.1.5

- upon receiving a request from the upper layers to perform emergency services fallback only for a UE in 3GPP access or establishing an emergency PDU session the UE shall stop timer T3540 and shall locally release the N1 NAS signalling connection before proceeding as specified in subclause 5.5.1

in case e)

- upon an indication from the lower layers that the access stratum connection has been released the UE shall stop timer T3540 and perform a new registration procedure as specified in subclause 5.5.1.3.2

- upon an indication from the lower layers that the user-plane resources for PDU sessions are set up the UE shall stop timer T3540 and may send user data via user plane

NOTE 3 in this case the new registration procedure is performed when the UE moves to the 5GMM-IDLE mode

- upon receiving a request from the upper layers to perform emergency services fallback only for a UE in 3GPP access or establishing an emergency PDU session the UE shall stop timer T3540 and shall locally release the N1 NAS signalling connection before proceeding as specified in subclause 5.5.1

if the UE had set the Follow-on request indicator to "Follow-on request pending" in the REGISTRATION REQUEST message due to pending uplink signalling but cannot send the pending signalling due to new service area restrictions received or due to network not supporting the feature as indicated in the REGISTRATION ACCEPT message (for example UE set the "Follow-on request pending" to send SMS over NAS but the AMF notified "SMS over NAS not allowed") and if there is no further pending data or signalling and user plane resources have not been set up the UE may locally release the established N1 NAS signalling connection upon completion of the registration procedure

NOTE 4 the UE is allowed to inform the lower layers that there is no 5GMM or 5GSM messages need to be sent over non-3GPP access if the UE receives a REGISTRATION REJECT message over non-3GPP access or a SERVICE REJECT message over non-3GPP access

if the timer T3540 is not running when the UE enters state 5GMM-DEREGISTERED.PLMN-SEARCH or 5GMM-REGISTERED.PLMN-SEARCH the UE may locally release the N1 NAS signalling connection

if the timer T3540 is not running and the UE has included unavailability information and has not included the start of unavailability period

- in the DEREGISTRATION REQUEST message then at completion of the de-registration procedure the UE shall locally release the N1 NAS signalling connection and enter 5GMM-DEREGISTERED.NO-CELL-AVAILABLE state; or

- in the REGISTRATION REQUEST message then at completion of the registration procedure the UE shall locally release the N1 NAS signalling connection and enter 5GMM-REGISTERED.NO-CELL-AVAILABLE state

#### 5.3.1.4 5GMM-CONNECTED mode with RRC inactive indication

this subclause is only applicable for UE's 5GMM mode over 3GPP access the 5GMM-CONNECTED mode with RRC inactive indication is not supported when the UE is in NB-N1 mode

the UE is in 5GMM-CONNECTED mode with RRC inactive indication when the UE is in

a) 5GMM-CONNECTED mode over 3GPP access at the NAS layer; and

b) RRC\_INACTIVE state at the AS layer (see 3GPP TS 38.300 [27])

unless stated otherwise the UE behaviour in 5GMM-CONNECTED mode with RRC inactive indication follows the UE behaviour in 5GMM-CONNECTED over 3GPP access except that

a) the UE shall apply the mobility restrictions; and

b) the UE shall perform the PLMN selection procedures

as in 5GMM-IDLE mode over 3GPP access

the UE shall transition from 5GMM-CONNECTED mode over 3GPP access to 5GMM-CONNECTED mode with RRC inactive indication upon receiving an indication from the lower layers that the RRC connection has been suspended

NOTE 1 any pending procedure or uplink data packet when receiving an indication from the lower layers that the RRC connection has been suspended triggers a request to the lower layers to transition to RRC\_CONNECTED state this is also the case when the pending procedure or uplink data packet triggered a previous request to the lower layers to transition to RRC\_CONNECTED state

if the UE in 3GPP access is configured for ecall only mode as specified in 3GPP TS 31.102 [22] then

- if the UE with the N1 NAS signalling connection established for ecall over IMS moved to 5GMM-CONNECTED mode with RRC inactive indication the UE shall start timer T3444; and

- if the UE with the N1 NAS signalling connection established for a call to an HPLMN designated non-emergency MSISDN or URI for test or terminal reconfiguration service moved to 5GMM-CONNECTED mode with RRC inactive indication the UE shall start timer T3445

upon

a) a trigger of a procedure which requires sending of a NAS message different from a REGISTRATION REQUEST message with the NG-RAN-RCU bit of the 5GS update type IE set to "UE radio capability update needed";

b) an uplink user data packet to be sent for a PDU session with suspended user-plane resources;

c) a trigger to request resources for 5G ProSe direct discovery over PC5 or 5G ProSe direct communication over PC5;

d) a trigger to request resources for V2X communication over PC5 (see 3GPP TS 23.287 [6C]); or

e) a trigger to request resources for A2X communication over PC5 (see 3GPP TS 23.256 [6AB]);

the UE in 5GMM-CONNECTED mode with RRC inactive indication over 3GPP access shall request the lower layers to transition to RRC\_CONNECTED state (see 3GPP TS 38.300 [27])

for case a) above if the trigger of the procedure is to request the establishment of a PDU session associated with an S-NSSAI included in the partially allowed NSSAI the UE shall request the lower layers to transition to RRC\_CONNECTED state only if the current TA is in the list of TAs where the S-NSSAI is allowed

for case a) above if the trigger of the procedure is to request the establishment of a PDU session associated with an S-NSSAI which has S-NSSAI location validity information the UE shall request the lower layers to transition to RRC\_CONNECTED state only if the current cell is in the NS-AoS of the S-NSSAI

for case b) above the UE which supports S-NSSAI location validity information and which has received S-NSSAI location validity information from the AMF shall request the lower layers to transition to RRC\_CONNECTED state only if the UE is inside the NS-AoS with respect to the S-NSSAI which is associated with the PDU session with suspended user-plane resources

for case b) above if the PDU session is associated with an S-NSSAI included in the partially allowed NSSAI the UE shall request the lower layers to transition to RRC\_CONNECTED state only if the current TA is in the list of TAs where the S-NSSAI is allowed

NOTE 2 if the UE supports small data transmission (SDT) (see 3GPP TS 38.300 [27]) the following applies

a) if the UE due to pending uplink NAS messages or user data packets is requesting the lower layers to transition to RRC\_CONNECTED state but has not received a response from the lower layers the UE can send the pending NAS messages or user data packets to the lower layers and can receive multiple downlink NAS messages or multiple downlink user data packets from the lower layers while the UE remains in 5GMM-CONNECTED mode with RRC inactive indication over 3GPP access (i.e. without transitioning to 5GMM-CONNECTED mode) when the NAS layer triggers the transmission of pending uplink NAS messages or user data packets and if the SDT is ongoing the NAS layer will receive the response from the lower layers only after the SDT session has completed or failed;

b) the NAS layer is not aware of the classification of NAS messages or the user data packets as belonging to the SDT session at the lower layers; and

c) the setting of access category and the RRC establishment cause indicated to the lower layers when sending the pending uplink user data packets while the UE remains in 5GMM-CONNECTED mode with RRC inactive indication is left to implementation

upon a trigger to send a REGISTRATION REQUEST message with the NG-RAN-RCU bit of the 5GS update type IE set to "UE radio capability update needed" the UE in 5GMM-CONNECTED mode with RRC inactive indication shall move to 5GMM-IDLE mode over 3GPP access and proceed with the registration procedure for mobility and periodic registration update as specified in subclause 5.5.1.3.2

the UE shall transition from 5GMM-CONNECTED mode with RRC inactive indication to 5GMM-CONNECTED mode over 3GPP access upon receiving an indication from the lower layers that the UE has transitioned to RRC\_CONNECTED state (see 3GPP TS 38.300 [27])

NOTE 3 the AMF can be aware of the transition between 5GMM-CONNECTED mode and 5GMM-CONNECTED mode with RRC inactive indication for a UE (see 3GPP TS 23.502 [9])

the UE shall trigger a transition from 5GMM-CONNECTED mode with RRC inactive indication to 5GMM-IDLE mode upon selection of a PLMN or SNPN that is not an equivalent PLMN or SNPN to the registered PLMN or SNPN the UE shall not trigger a transition from 5GMM-CONNECTED mode with RRC inactive indication to 5GMM-IDLE mode upon entering a new PLMN or SNPN which is in the list of equivalent PLMNs or SNPNs

the UE shall trigger a transition from 5GMM-CONNECTED mode with RRC inactive indication to 5GMM-IDLE mode upon receiving REFRESH command from the UICC as specified in subclause 5.4.5.3.3

if the UE in 5GMM-CONNECTED mode with RRC inactive indication receives an indication from the lower layers that the RRC connection has been suspended the UE shall stay in 5GMM-CONNECTED mode with RRC inactive indication the UE shall re-initiate any pending procedure that had triggered the request to the lower layers to transition to RRC\_CONNECTED state if still needed

when the UE in 5GMM-CONNECTED mode with RRC inactive indication receives a fallback indication from lower layers and the UE has no pending NAS procedure and no pending uplink user data for PDU session(s) with user-plane resources already established the UE shall

a) enter 5GMM-IDLE mode; and

b) initiate the registration procedure for mobility and periodic registration update as specified for case o) in subclause 5.5.1.3.2

if the UE requests the lower layers to transition to RRC\_CONNECTED state at initiation of a registration procedure a service request procedure or a de-registration procedure upon fallback indication from lower layers the UE shall

- enter 5GMM-IDLE mode;

- proceed with the pending procedure; and

- if the pending procedure is a service request or registration request procedure and the SERVICE REQUEST message the CONTROL PLANE SERVICE REQUEST message or the REGISTRATION REQUEST message does not include UE request type IE with request type value set to "NAS signalling connection release" the UE shall include the uplink data status IE in the SERVICE REQUEST message the CONTROL PLANE SERVICE REQUEST message or in the REGISTRATION REQUEST message indicating the PDU session(s) without active user-plane resources for which the UE has pending user data to be sent if any and the PDU session(s) for which user-plane resources were active prior to receiving the fallback indication if any (see subclauses 5.5.1.3 and 5.6.1 for further details)

if the UE requests the lower layers to transition to RRC\_CONNECTED state for other reason than initiation of a registration procedure or for other reason than a service request procedure or for other reason than a de-registration procedure upon fallback indication from lower layers the UE shall

1) enter 5GMM-IDLE mode;

2) initiate the service request procedure and include the uplink data status IE in the SERVICE REQUEST message or the CONTROL PLANE SERVICE REQUEST message indicating the PDU session(s) for which user-plane resources were active prior to receiving the fallback indication if any (see subclause 5.6.1 for further details) if the procedure that triggered the request to the lower layers to transition to RRC\_CONNECTED state is the UE-initiated NAS transport procedure and the UE had SMS location services message or CIoT user data to send the UE shall also include the SMS location services message or CIoT user data in the CONTROL PLANE SERVICE REQUEST message as described in subclause 5.6.1.2.2; and

3) upon successful service request procedure completion proceed with any pending procedure

if the UE in 5GMM-CONNECTED mode with RRC inactive indication receives a fallback indication from lower layers and the UE has pending uplink user data for PDU session(s) with user-plane resources already established but no pending NAS procedure the UE shall

1) enter 5GMM-IDLE mode; and

2) initiate the service request procedure and include the uplink data status IE in the SERVICE REQUEST message or the CONTROL PLANE SERVICE REQUEST message indicating the PDU session(s) for which user-plane resources were active prior to receiving the fallback indication (see subclause 5.6.1 for further details)

in the above cases when the UE receives a fallback indication from lower layers if the UE is in non-allowed area or not in allowed area the UE shall behave as specified in subclause 5.3.5

if the UE in 5GMM-CONNECTED mode with RRC inactive indication receives an indication from the lower layers that the resumption of the RRC connection has failed and

a) if the lower layers indicate that access barring is applicable for all access categories except categories 0 and 2 or access barring is applicable for all access categories except category 0 the UE shall

1) stay in 5GMM-CONNECTED mode with RRC inactive indication;

b) else the UE shall

1) enter 5GMM-IDLE mode; and

2) if the UE

- does not have pending uplink user data for PDU session(s) with user-plane resources already established initiate the registration procedure for mobility and periodic registration update used for mobility (i.e the 5GS registration type IE set to "mobility registration updating" in the REGISTRATION REQUEST message) for N1 NAS signalling connection recovery as specified for case f) in subclause 5.5.1.3.2; or

- has pending uplink user data for PDU session(s) with user-plane resources already established or has pending NAS procedure other than a registration service request or de-registration procedure then initiate the service request procedure for N1 NAS signalling connection recovery as specified for case i) or j) in subclause 5.6.1.1

NOTE 4 an indication from the lower layer that the RRC connection has been released with cause "RRC resume failure" can be considered as an indication that the resumption of the RRC connection has failed

the UE shall transition from 5GMM-CONNECTED mode with RRC inactive indication to 5GMM-IDLE mode over 3GPP access upon receiving from the lower layers

a) indication of transition from RRC\_INACTIVE state to RRC\_IDLE state; or

b) indication of cell selection to E-UTRAN or another RAT that the UE supports

if the UE in 5GMM-CONNECTED mode with RRC inactive indication receives an indication from the lower layers about the cell (re-)selection to different RAT that the UE supports the UE shall initiate the registration procedure for mobility or periodic registration update used for mobility (i.e the 5GS registration type IE set to "mobility registration updating" in the REGISTRATION REQUEST message) as specified in subclause 5.5.1.3.2

if the UE in 5GMM-CONNECTED mode with RRC inactive indication receives an indication from the lower layers of a transition from RRC\_INACTIVE state to RRC\_IDLE state and 5GMM-REGISTERED.LIMITED-SERVICE is entered the UE shall subsequently upon entering state 5GMM-REGISTERED.NORMAL-SERVICE and if there is no uplink user data or signalling pending initiate the registration procedure for mobility and periodic registration update used for mobility (i.e the 5GS registration type IE set to "mobility registration updating" in the REGISTRATION REQUEST message) for N1 NAS signalling connection recovery as specified in subclause 5.5.1.3.2

if the UE in 5GMM-CONNECTED mode with RRC inactive indication receives an indication from the lower layers about RAN paging and the MUSIM UE decides not to initiate the service request procedure with service type set to "mobile terminated services" or control plane service type set to "mobile terminating request" to respond to the RAN paging the UE may initiate the service request procedure and set request type to "NAS signalling connection release" in the UE request type IE and service type to "signalling" in the SERVICE REQUEST message or set request type to "NAS signalling connection release" in the UE request type IE and control plane service type set to "mobile originating request" in the CONTROL PLANE SERVICE REQUEST message to reject the RAN paging as specified in subclause 5.6.1.2 for case o of subclause 5.6.1.1 the UE may include its paging restriction preferences in the paging restriction IE in the SERVICE REQUEST message or CONTROL PLANE SERVICE REQUEST message as specified in subclause 5.6.1.2 for case o of subclause 5.6.1.1

NOTE 5 the interworking between the NAS layer and the AS layer triggered by RAN paging is up to UE implementation

NOTE 6 as an implementation option the MUSIM UE is allowed to not respond to RAN paging based on the information available in the paging message e.g voice service indication

upon receiving AMF paging indication from the lower layers the UE shall transition from 5GMM-CONNECTED mode with RRC inactive indication to 5GMM-IDLE mode over 3GPP access and handle the AMF paging same as the paging request received in the 5GMM-IDLE mode over 3GPP access as specified in subclause 5.6.1

if the UE supporting the reconnection to the network due to RAN timing synchronization status change has been requested to reconnect to the network upon receiving an indication of a change in the RAN timing synchronization status (see subclauses 5.4.4.2 5.5.1.2.4 and 5.5.1.3.4) and the UE receives an indication of a change in the RAN timing synchronization status the UE in 5GMM-CONNECTED mode with RRC inactive indication shall request the lower layers to transition to RRC\_CONNECTED state

#### 5.3.1.5 suspend and resume of the N1 NAS signalling connection

suspend of the N1 NAS signalling connection can be initiated by the network in 5GMM-CONNECTED mode when user plane CIoT 5GS optimization is used resume of the suspended N1 NAS signalling connection is initiated by the UE

in the UE when user plane CIoT 5GS optimization is used

- upon idle suspend indication from the lower layers the UE shall enter 5GMM-IDLE mode with suspend indication shall not consider the N1 NAS signalling connection released and shall not consider the secure exchange of NAS messages terminated (see subclause 4.4.2.5 and 4.4.5)

- upon trigger of a procedure using an initial NAS message when in 5GMM-IDLE mode with suspend indication the UE shall

i) if the initial NAS message is a REGISTRATION REQUEST message with the NG-RAN-RCU bit of the 5GS update type IE set to "UE radio capability update needed" enter 5GMM-IDLE mode without suspend indication and proceed with the registration procedure; or

ii) otherwise request the lower layer to resume the RRC connection

NOTE 1 in NB-N1 mode in the request to the lower layer the data volume information of the initial NAS message is provided to the lower layers interactions between the NAS and the lower layers in order to obtain the data volume information of the initial NAS message (see 3GPP TS 36.321 [25E] 3GPP TS 36.331 [25A]) is left to implementations

- upon indication from the lower layers that the RRC connection has been resumed when in 5GMM-IDLE mode with suspend indication the UE shall enter 5GMM-CONNECTED mode if the pending NAS message is

i) a SERVICE REQUEST message the service type IE is not set to "emergency services fallback" and the UE did not include the NAS message container IE in the SERVICE REQUEST message; or

ii) a CONTROL PLANE SERVICE REQUEST message and the UE did not include the CIoT small data container IE or the NAS message container IE in the CONTROL PLANE SERVICE REQUEST message

the message shall not be sent otherwise the UE shall cipher the message as specified in subclause 4.4.5 and send the pending initial NAS message upon entering 5GMM-CONNECTED mode;

NOTE 2 if a NAS message is discarded and not sent to the network the uplink NAS COUNT value corresponding to that message is reused for the next uplink NAS message to be sent

- upon fallback indication from the lower layers at RRC connection resume when in 5GMM-IDLE mode with suspend indication the UE shall enter 5GMM-IDLE mode without suspend indication send any pending initial NAS message and proceed as if RRC connection establishment had been requested;

- upon indication from the lower layers that the RRC connection resume has failed and indication from the lower layers that the RRC connection is suspended the UE shall enter 5GMM-IDLE mode with suspend indication and restart the ongoing NAS procedure if required; and

- upon indication from the lower layers that the RRC connection resume has failed and indication from the lower layers that the RRC connection is not idle suspended the UE shall enter 5GMM-IDLE mode without suspend indication and restart the ongoing NAS procedure if required

in the network when user plane CIoT 5GS optimization is used

- upon idle suspend indication from the lower layers the network shall enter 5GMM-IDLE mode with suspend indication shall not consider the N1 NAS signalling connection released and shall not consider the secure exchange of NAS messages terminated; and

- upon indication from the lower layers that it has received the NGAP UE context resume request message as specified in 3GPP TS 38.413 [31] when in 5GMM-IDLE mode with suspend indication the network shall enter 5GMM-CONNECTED mode

### 5.3.2 permanent identifiers

a globally unique permanent identity the 5G subscription permanent identifier (SUPI) is allocated to each subscriber for 5GS-based services the IMSI the network specific identifier the GCI and the GLI are valid SUPI types when the SUPI contains a network specific identifier a GCI or a GLI it shall take the form of a network access identifier (NAI) when the UE performs initial registration for onboarding services in SNPN or is registered for onboarding services in SNPN the SUPI contains the onboarding SUPI derived from the default UE credentials for primary authentication the UE derives the onboarding SUPI before or during the initial registration for onboarding services in SNPN and uses the derived onboarding SUPI in the initial registration for onboarding services in SNPN and while registered for onboarding services in SNPN

the structure of the SUPI and its derivatives are specified in 3GPP TS 23.003 [4]

the UE provides the SUPI to the network in concealed form the SUCI is a privacy preserving identifier containing the concealed SUPI when the SUPI contains a network specific identifier a GCI or a GLI the SUCI shall take the form of an NAI as specified in 3GPP TS 23.003 [4]

a UE supporting N1 mode includes a SUCI

a) in the REGISTRATION REQUEST message when the UE is attempting initial registration procedure and a valid 5G-GUTI is not available;

b) in the IDENTITY RESPONSE message if the SUCI is requested by the network during the identification procedure; and

c) in the DEREGISTRATION REQUEST message when the UE initiates a de-registration procedure and a valid 5G-GUTI is not available

if the UE uses the "null-scheme" as specified in 3GPP TS 33.501 [24] to generate a SUCI the SUCI contains the unconcealed SUPI

when

- not operating in SNPN access operation mode; or

- operating in SNPN access operation mode but not performing initial registration for onboarding services and not registered for onboarding services;

the UE shall use the "null-scheme" if

a) the home network has not provisioned the public key needed to generate a SUCI;

b) the home network has configured "null-scheme" to be used for the UE;

c) the UE needs to perform a registration procedure for emergency services and the USIM is still considered as valid after the failure of authentication procedure or after reception of a REGISTRATION REJECT message with the 5GMM cause #3 "Illegal UE" #6 "Illegal ME" or #7 "5GS services not allowed" or to initiate a de-registration procedure before the registration procedure for emergency services was completed successfully and the UE does not have a valid 5G-GUTI for the selected PLMN; or

d) the UE receives an identity request for SUCI during a registration procedure for emergency services or during a de-registration procedure that was initiated before the registration procedure for emergency services was completed successfully

when operating in SNPN access operation mode and

- performing initial registration for onboarding services; or

- registered for onboarding services;

the UE shall use the "null-scheme" if

a) the public key needed to generate a SUCI is not configured as part of the default UE credentials for primary authentication; or

b) "null-scheme" usage is configured as part of the default UE credentials for primary authentication

if

a) the UE uses the "null-scheme" as specified in 3GPP TS 33.501 [24] to generate a SUCI;

b) the UE operates in SNPN access operation mode and

1) an indication to use anonymous SUCI which is associated with the selected entry of the "list of subscriber data" is configured in the ME if the UE is not registering or registered for onboarding services in SNPN; or

2) an indication to use anonymous SUCI which is associated with the default UE credentials for primary authentication is configured in the ME if the UE is registering or registered for onboarding services in SNPN;

NOTE 1 the ME can be configured with an indication to use anonymous SUCI associated with an entry of "list of subscriber data" when the EAP method associated with the credentials of the entry supports SUPI privacy at the EAP layer or can be configured with an indication to use anonymous SUCI associated with the default UE credentials for primary authentication when the EAP method associated with the default UE credentials for primary authentication supports SUPI privacy at the EAP layer or both

c) the UE does not need to perform a registration procedure for emergency services or to initiate a de-registration procedure before the registration procedure for emergency services was completed successfully; and

d) the UE does not receive an identity request for SUCI during a registration procedure for emergency services or during a de-registration procedure that was initiated before the registration procedure for emergency services was completed successfully;

then the UE shall use anonymous SUCI as specified in 3GPP TS 23.003 [4]

a W-AGF acting on behalf of an FN-RG shall use the "null-scheme" as specified in 3GPP TS 33.501 [24] to generate a SUCI

a W-AGF acting on behalf of an N5GC device shall use the "null-scheme" as specified in 3GPP TS 33.501 [24] to generate a SUCI

if the 5G-RG acting on behalf of the AUN3 device has not obtained a SUCI from the AUN3 device the 5G-RG acting on behalf of the AUN3 device shall use the "null-scheme" as specified in 3GPP TS 33.501 [24] to generate a SUCI for the AUN3 device

if a UE is a MUSIM UE the UE shall use a separate permanent equipment identifier (PEI) for each USIM if any and each entry of "list of subscriber data" if any the UE operates for accessing 5GS-based services; otherwise a UE contains and uses a permanent equipment identifier (PEI) for accessing 5GS-based services when the UE is registered with a network by using a USIM or an entry of "list of subscriber data" and has provided a PEI then until the UE is de-registered from the network using the USIM or the entry of "list of subscriber data" the UE shall keep using that PEI in the registration using the USIM or the entry of "list of subscriber data" and shall not provide that PEI in registration using another USIM or another entry of "list of subscriber data"

in this release of the specification the IMEI the IMEISV the MAC address together with the MAC address usage restriction indication and the EUI-64 are the only PEI formats supported by 5GS the structure of the PEI and its formats are specified in 3GPP TS 23.003 [4]

each UE supporting at least one 3GPP access technology (i.e satellite NG-RAN NG-RAN satellite E-UTRAN E-UTRAN UTRAN or GERAN) contains a PEI in the IMEI format and shall be able to provide an IMEI and an IMEISV upon request from the network

each UE not supporting any 3GPP access technologies and supporting NAS over untrusted or trusted non-3GPP access shall have a PEI in the form of the extended unique identifier EUI-64 [48] of the access technology the UE uses to connect to the 5GC

a UE supporting N1 mode includes a PEI

a) when neither SUPI nor valid 5G-GUTI is available to use for emergency services in the REGISTRATION REQUEST message with 5GS registration type IE set to "emergency registration";

b) when the network requests the PEI by using the identification procedure in the IDENTITY RESPONSE message; and

c) when the network requests the IMEISV by using the security mode control procedure in the SECURITY MODE COMPLETE message

each 5G-RG supporting only wireline access and each FN-RG shall have a permanent MAC address configured by the manufacturer for 5G-CRG the permanent MAC address configured by the manufacturer shall be a cable modem MAC address

when the 5G-RG contains neither an IMEI nor an IMEISV the 5G-RG shall use as a PEI the 5G-RG's permanent MAC address configured by the manufacturer and the MAC address usage restriction indication set to "no restrictions"

the W-AGF acting on behalf of the FN-RG shall use as a PEI the MAC address provided by the FN-RG and if the MAC address provided by the FN-RG is not unique or does not correspond to the FN-RG's permanent MAC address according to W-AGF's configuration the MAC address usage restriction indication set to "MAC address is not usable as an equipment identifier" otherwise the MAC address usage restriction indication set to "no restrictions"

the 5G-RG when acting on behalf of an AUN3 device shall use the MAC address provided by the AUN3 device as a PEI

the 5G-RG containing neither an IMEI nor an IMEISV or the 5G-RG acting on behalf of the AUN3 device shall include the PEI containing the MAC address together with the MAC address usage restriction indication

a) when neither SUPI nor valid 5G-GUTI is available to use for emergency services in the REGISTRATION REQUEST message with 5GS registration type IE set to "emergency registration";

b) when the network requests the PEI by using the identification procedure in the IDENTIFICATION RESPONSE message; and

c) when the network requests the IMEISV by using the security mode control procedure in the SECURITY MODE COMPLETE message

NOTE 2 in case c) above the MAC address is provided even though AMF requests the IMEISV

the W-AGF acting on behalf of the FN-RG shall include the PEI containing the MAC address together with the MAC address usage restriction indication

a) when the network requests the PEI by using the identification procedure in the IDENTIFICATION RESPONSE message; and

b) when the network requests the IMEISV by using the security mode control procedure in the SECURITY MODE COMPLETE message

NOTE 3 in case b) above the MAC address is provided even though AMF requests the IMEISV

the W-AGF acting on behalf of the N5GC device shall use as a PEI the MAC address provided by the N5GC device and the MAC address usage restriction indication set to "no restrictions" based on operator policy the W-AGF acting on behalf of the N5GC device may encode the MAC address of the N5GC device using the EUI-64 format as specified in [48] and use as a PEI the derived EUI-64

NOTE 4 the MAC address of an N5GC device is universally/globally unique

the AMF can request the PEI at any time by using the identification procedure

if the TWIF acting on behalf of the N5CW device receives the decorated NAI for N5CW device as defined in subclause 28.7.7.1 or 28.7.7.2 of 3GPP TS 23.003 [4] from the N5CW device the TWIF shall first convert the decorated NAI into an NAI as specified in TS 23.502 [9] i.e. for decorated NAI taking the form "homerealm!username@otherrealm"

a) replace the 'otherrealm' part with the 'homerealm' part; and

b) remove 'homerealm!'

as a result of specified above the converted NAI takes the form "username@homerealm" the TWIF shall include the converted NAI as a SUPI with SUPI format "network specific identifier" in the REGISTRATION REQUEST message

### 5.3.3 temporary identities

a temporary user identity for 5GS-based services the 5G globally unique temporary identity (5G-GUTI) is used for identification within the signalling procedures in case of PLMN the 5G-GUTI is globally unique and in case of SNPN the 5G-GUTI is unique within an SNPN when the UE is registered to the same PLMN or SNPN over 3GPP and non-3GPP access the UE and the AMF maintain one 5G-GUTI that is common to both 3GPP and non-3GPP access when the UE is required to delete the 5G-GUTI according to a NAS procedure the UE shall delete the 5G-GUTI only if it is not registered to the same PLMN or SNPN through other access when the UE is registered to different PLMNs or SNPNs over 3GPP access and non-3GPP access the UE maintains two 5G-GUTIs a 5G-GUTI for the registration with a PLMN or SNPN over the 3GPP access and another 5G-GUTI for the registration with another PLMN or SNPN over the non-3GPP access in the paging and service request procedures a shortened form of the 5G-GUTI the 5G S-temporary mobile subscriber identity (5G-S-TMSI) is used to enable more efficient radio signalling the purpose of the 5G-GUTI and 5G-S-TMSI is to provide identity confidentiality i.e. to protect a user from being identified and located by an intruder the structure of the 5G-GUTI and its derivatives are specified in 3GPP TS 23.003 [4] the 5G-GUTI has two main components (see 3GPP TS 23.501 [8])

a) the GUAMI; and

b) the 5G-TMSI that provides an unambiguous identity of the UE within the AMF(s) identified by the GUAMI

the 5G-S-TMSI has three main components

a) the AMF set ID that uniquely identifies the AMF set within the AMF region;

b) the AMF pointer that identifies one or more AMFs within the AMF set; and

c) the 5G-TMSI

a UE supporting N1 mode includes a valid 5G-GUTI if any is available in the REGISTRATION REQUEST and DEREGISTRATION REQUEST messages in the SERVICE REQUEST message the UE includes a valid 5G-S-TMSI as user identity the AMF shall assign a new 5G-GUTI for a particular UE

a) during a successful initial registration procedure;

b) during a successful registration procedure for mobility registration update;

c) after a successful service request procedure invoked as a response to a paging request from the network and before the

1) release of the N1 NAS signalling connection; or

2) suspension of the N1 NAS signalling connection due to user plane CIoT 5GS optimization i.e before the UE and the AMF enter 5GMM-IDLE mode with suspend indication;

as specified in subclause 5.4.4.1; and

d) after the AMF receives an indication from the lower layers that it has received the NGAP UE context resume request message as specified in 3GPP TS 38.413 [31] for a UE in 5GMM-IDLE mode with suspend indication and this resumption is a response to a paging request from the network and before the

1) release of the N1 NAS signalling connection; or

2) suspension of the N1 NAS signalling connection due to user plane CIoT 5GS optimization i.e before the UE and the AMF enter 5GMM-IDLE mode with suspend indication;

as specified in subclause 5.4.4.1

the AMF should assign a new 5G-GUTI for a particular UE during a successful registration procedure for periodic registration update the AMF may assign a new 5G-GUTI at any time for a particular UE by performing the generic UE configuration update procedure

if a new 5G-GUTI is assigned by the AMF the UE and the AMF handle the 5G-GUTI as follows

a) upon receipt of a 5GMM message containing a new 5G-GUTI the UE considers the new 5G-GUTI as valid and the old 5G-GUTI as invalid stops timer T3519 if running and deletes any stored SUCI the new 5G-GUTI is stored in a non-volatile memory in the USIM if the corresponding file is present in the USIM else in the non-volatile memory in the ME as described in annex c

b) the AMF considers the old 5G-GUTI as invalid as soon as an acknowledgement for a registration or generic UE configuration update procedure is received

### 5.3.4 registration areas

within the 5GS the registration area is managed independently per access type i.e. 3GPP access or non-3GPP access the AMF assigns a registration area to the UE during the registration procedure a registration area is defined as a set of tracking areas and each of these tracking areas consists of one or more cells that cover a geographical area within the 5GS the concept of "registration to multiple tracking areas" applies

a) a tracking area is identified by a TAI which is broadcast in the cells of the tracking area the TAI is constructed from a TAC and a PLMN identity in case of a shared network

1) one or more TACs; and

2) any of the following

i) multiple PLMN identities;

ii) multiple SNPN identities; or

iii) one or more PLMN identities and one or more SNPN identities;

are broadcast

b) in order to reduce the tracking area update signalling within the 5GS the AMF can assign several tracking areas to the UE these tracking areas construct a list of tracking areas which is identified by a TAI list when generating the TAI list the AMF shall include only TAIs that are applicable on the access where the TAI list is sent the AMF shall be able to allocate a TAI list over different NG-RAN access technologies the AMF shall not allocate a TAI list containing both tracking areas in NB-N1 mode and tracking areas not in NB-N1 mode

c) the UE considers itself registered to a list of tracking areas and does not need to trigger the registration procedure for mobility and periodic registration update used for mobility (i.e the 5GS registration type IE set to "mobility registration updating" in the REGISTRATION REQUEST message) as long as the UE stays in one of the tracking areas of the list of tracking areas received from the AMF

d) the UE will consider the TAI list stored in the UE as valid until it receives a new TAI list in the next registration procedure for mobility and periodic registration update or generic UE configuration update procedure or the UE is commanded by the network to delete the TAI list by a reject message or it is deregistered from the 5GS if the registration request is accepted or the TAI list is reallocated by the AMF the AMF shall provide at least one entry in the TAI list if the new and the old TAI list are identical the AMF does not need to provide the new TAI list to the UE during mobility registration update or periodic registration update

e) the TAI list can be reallocated by the AMF

f)- when the UE is deregistered from the 5GS the UE shall delete the TAI list stored in the UE

g) the UE includes the last visited registered TAI if available to the AMF the last visited registered TAI is stored in a non-volatile memory in the USIM if the corresponding file is present in the USIM else in the non-volatile memory in the ME as described in annex c

### 5.3.5 service area restrictions

#### 5.3.5.1 general

service area restrictions are applicable only to 3GPP access and to wireline access

subclause 5.3.5.2 applies when the UE accesses 5GCN over 3GPP access

subclause 5.3.5.3 applies when the 5G-RG or the W-AGF acting on behalf of an FN-CRG (or on behalf of the N5GC device) access 5GCN over wireline access

NOTE service area restrictions are not applicable for the W-AGF acting on behalf of the FN-BRG

#### 5.3.5.2 3GPP access service area restrictions

the service area restrictions consist of tracking areas forming either an allowed area or a non-allowed area the tracking areas belong to the registered PLMN its equivalent PLMNs in the registration area or the registered SNPN the allowed area can contain up to 16 tracking areas or include all tracking areas in the registered PLMN and its equivalent PLMN(s) in the registration area or in the registered SNPN the non-allowed area can contain up to 16 tracking areas the network conveys the service area restrictions to the UE by including either an allowed area or a non-allowed area but not both in the service area list IE of a REGISTRATION ACCEPT message or a CONFIGURATION UPDATE COMMAND message

if the network does not convey the service area restrictions to the UE in the service area list IE of a REGISTRATION ACCEPT message the UE shall treat all tracking areas in the registered PLMN its equivalent PLMN(s) in the registration area or in the registered SNPN as allowed area and delete the stored list of "allowed tracking areas" or the stored list of "non-allowed tracking areas"

when the UE receives a service area list IE with an allowed area indication during a registration procedure or a generic UE configuration update procedure

a) if the "Type of list" included in the service area list IE does not indicate "all TAIs belonging to the PLMNs in the registration area are allowed area" the UE shall delete the old list of "allowed tracking areas" and store the tracking areas in the allowed area as the list of "allowed tracking areas" if the UE has a stored list of "non-allowed tracking areas" the UE shall delete that list; or

b) if the "Type of list" included in the service area list IE indicates "all TAIs belonging to the PLMNs in the registration area are allowed area" the UE shall treat all tracking areas in the registered PLMN and its equivalent PLMN(s) or in the registered SNPN as allowed area and delete the stored list of "allowed tracking areas" or the stored list of "non-allowed tracking areas"

when the UE receives a service area list IE with a non-allowed area indication during a registration procedure or a generic UE configuration update procedure the UE shall delete the old list of "non-allowed tracking areas" and store the tracking areas in the non-allowed area as the list of "non-allowed tracking areas" if the UE has a stored list of "allowed tracking areas" the UE shall delete that list

if the UE is successfully registered to a PLMN or SNPN and has a stored list of "allowed tracking areas"

a) while the current TAI is in the list of "allowed tracking areas" the UE shall stay in or enter the state 5GMM-REGISTERED.NORMAL-SERVICE and is allowed to initiate any 5GMM and 5GSM procedures; and

b) while the UE is camped on a cell which is in the registration area and the current TAI is not in the list of "allowed tracking areas" the UE shall enter the state 5GMM-REGISTERED.NON-ALLOWED-SERVICE and

1) if the UE is in 5GMM-IDLE mode or 5GMM-IDLE mode with suspend indication over 3GPP access the UE

i) shall not include the uplink data status IE in the registration procedure for mobility and periodic registration update except for emergency services or for high priority access;

ii) shall not perform the registration procedure for mobility and periodic registration update with Follow-on request indicator set to "Follow-on request pending" except for

- emergency services;

- high priority access;

- indicating a change of 3GPP PS data off UE status;

- sending an SOR transparent container;

- sending a UE policy container; or

- sending a UE parameters update transparent container;

iii) shall not initiate a service request procedure or request the lower layers to resume a suspended connection except for

- emergency services;

- emergency services fallback;

- high priority access;

- responding to paging;

- responding to notification received over non-3GPP access;

- indicating a change of 3GPP PS data off UE status;

- sending an SOR transparent container;

- sending a UE policy container; or

- sending a UE parameters update transparent container

the UE shall not include the uplink data status IE in the SERVICE REQUEST message or CONTROL PLANE SERVICE REQUEST message except for emergency services or for high priority access in case of emergency services the UE shall indicate that uplink data is pending only for the PDU session for emergency services;

iv) if the UE responds to a paging which includes an indication for non-3GPP access type the UE shall include the allowed PDU session status IE in the SERVICE REQUEST CONTROL PLANE SERVICE REQUEST or REGISTRATION REQUEST message for a UE with an emergency PDU session established or a UE configured for high priority access the UE shall indicate the PDU session(s) for which the UE allows the user-plane resources to be re-established over 3GPP access in the allowed PDU session status IE that re-establishment of the user-plane resources via 3GPP access is allowed; for all other cases the UE shall indicate for each PDU session in the allowed PDU session status IE that re-establishment of the user-plane resources via 3GPP access is not allowed; and

2) if the UE is in 5GMM-CONNECTED mode or 5GMM-CONNECTED mode with RRC inactive indication over 3GPP access the UE

i) shall not perform the registration procedure for mobility and periodic registration update with uplink data status IE except for emergency services or for high priority access;

ii) shall not initiate a service request procedure except for

- emergency services;

- emergency services fallback;

- high priority access;

- responding to paging or responding to a notification

the UE shall not include the uplink data status IE in the SERVICE REQUEST message or CONTROL PLANE SERVICE REQUEST message except for emergency services or for high priority access in case of emergency services the UE shall indicate that uplink data is pending only for the PDU session for emergency services;

iii) shall not initiate a 5GSM procedure except for

- emergency services;

- high priority access; or

- indicating a change of 3GPP PS data off UE status;

iv) shall not perform the NAS transport procedure except for the sending

- 5GSM messages for UE-requested 5GSM procedures allowed in iii) above;

- 5GSM messages for network-requested 5GSM procedures;

- SMS;

- an LPP message;

- a UPP-CMI container;

- an SLPP message;

- a location services message;

- an SOR transparent container;

- a UE policy container;

- a UE parameters update transparent container; or

- a CIoT user data container; and

NOTE 1 the contents of CIoT user data container can be data that is not for exception reports or data that is for exception reports if allowed for the UE (see subclause 6.2.13)

v) if the UE responds to a notification which includes an indication for non-3GPP access type the UE shall include the allowed PDU session status IE in the SERVICE REQUEST CONTROL PLANE SERVICE REQUEST or REGISTRATION REQUEST message for a UE with an emergency PDU session established or a UE configured for high priority access the UE shall indicate the PDU session(s) for which the UE allows the user-plane resources to be re-established over 3GPP access in the allowed PDU session status IE that re-establishment of the user-plane resources via 3GPP access is allowed; for all other cases the UE shall indicate for each PDU session in the allowed PDU session status IE that re-establishment of the user-plane resources via 3GPP access is not allowed

if the UE is successfully registered to a PLMN or an SNPN and has a stored list of "non-allowed tracking areas"

a) while the UE is camped on a cell which is in the registration area and the current TAI is not in the list of "non-allowed tracking areas" the UE shall stay in or enter the state 5GMM-REGISTERED.NORMAL-SERVICE and is allowed to initiate any 5GMM and 5GSM procedures; and

b) while the current TAI is in the list of "non-allowed tracking areas" the UE shall enter the state 5GMM-REGISTERED.NON-ALLOWED-SERVICE and

1) if the UE is in 5GMM-IDLE mode or 5GMM-IDLE mode with suspend indication over 3GPP access the UE

i) shall not include the uplink data status IE in the registration procedure for mobility and periodic registration update except for emergency services or for high priority access;

ii) shall not perform the registration procedure for mobility and periodic registration update with Follow-on request indicator set to "Follow-on request pending" except for

- emergency services;

- high priority access;

- indicating a change of 3GPP PS data off UE status;

- sending an SOR transparent container;

- sending a UE policy container; or

- sending a UE parameters update transparent container; and

iii) shall not initiate a service request procedure or request the lower layers to resume a suspended connection except for

- emergency services;

- emergency services fallback;

- high priority access;

- responding to paging;

- responding to notification received over non-3GPP access;

- indicating a change of 3GPP PS data off UE status;

- sending an SOR transparent container;

- sending a UE policy container; or

- sending a UE parameters update transparent container

the UE shall not include the uplink data status IE in the SERVICE REQUEST message or CONTROL PLANE SERVICE REQUEST message except for emergency services or for high priority access in case of emergency services the UE shall indicate that uplink data is pending only for the PDU session for emergency services;

iv) if the UE responds to a paging which includes an indication for non-3GPP access type the UE shall include the allowed PDU session status IE in the SERVICE REQUEST CONTROL PLANE SERVICE REQUEST or REGISTRATION REQUEST message for a UE with an emergency PDU session established or a UE configured for high priority access the UE shall indicate the PDU session(s) for which the UE allows the user-plane resources to be re-established over 3GPP access in the allowed PDU session status IE that re-establishment of the user-plane resources via 3GPP access is allowed; for all other cases the UE shall indicate for each PDU session in the allowed PDU session status IE that re-establishment of the user-plane resources via 3GPP access is not allowed; and

2) if the UE is in 5GMM-CONNECTED mode or 5GMM-CONNECTED mode with RRC inactive indication over 3GPP access the UE

i) shall not perform the registration procedure for mobility and periodic registration update with the uplink data status IE except for emergency services or for high priority access;

ii) shall not initiate a service request procedure or request the lower layers to resume a suspended connection except for

- emergency services;

- emergency services fallback;

- high priority access; or

- responding to paging or responding to a notification

the UE shall not include the uplink data status IE in the SERVICE REQUEST message or CONTROL PLANE SERVICE REQUEST message except for emergency services or for high priority access in case of emergency services the UE shall indicate that uplink data is pending only for the PDU session for emergency services;

iii) shall not initiate a 5GSM procedure except for

- emergency services;

- high priority access; or

- indicating a change of 3GPP PS data off UE status;

iv) shall not perform the NAS transport procedure except for the sending

- 5GSM messages for UE-requested 5GSM procedures allowed in iii) above;

- 5GSM messages for network-requested 5GSM procedures;

- SMS;

- an LPP message;

- a UPP-CMI container;

- an SLPP message;

- a location services message;

- an SOR transparent container;

- a UE policy container;

- a UE parameters update transparent container; or

- a CIoT user data container; and

NOTE 2 the contents of CIoT user data container can be data that is not for exception reports or data that is for exception reports if allowed for the UE (see subclause 6.2.13)

v) if the UE responds to a notification which includes an indication for non-3GPP access type the UE shall include the allowed PDU session status IE in the SERVICE REQUEST CONTROL PLANE SERVICE REQUEST or REGISTRATION REQUEST message for a UE with an emergency PDU session established or a UE configured for high priority access the UE shall indicate the PDU session(s) for which the UE allows the user-plane resources to be re-established over 3GPP access in the allowed PDU session status IE that re-establishment of the user-plane resources via 3GPP access is allowed; for all other cases the UE shall indicate for each PDU session in the allowed PDU session status IE that re-establishment of the user-plane resources via 3GPP access is not allowed

the list of "allowed tracking areas" as well as the list of "non-allowed tracking areas" shall be erased when

a) the UE is switched off; and

b) the UICC containing the USIM is removed or an entry of the "list of subscriber data" with the SNPN identity of the SNPN is updated

when a tracking area is added to the list of "5GS forbidden tracking areas for roaming" or to the list of "5GS forbidden tracking areas for regional provision of service" as specified in the subclauses 5.5.1.2.5 or 5.5.1.3.5 the tracking area shall be removed from the list of "allowed tracking areas" if the tracking area is already present in the list of "allowed tracking areas" and from the list of "non-allowed tracking areas" if the tracking area is already present in the list of "non-allowed tracking areas"

#### 5.3.5.3 wireline access service area restrictions

if

a) a SERVICE REJECT message with the 5GMM cause #28 "Restricted service area";

b) a DL NAS TRANSPORT message with the payload container type IE set to "N1 SM information" and the 5GMM cause #28 "Restricted service area"; or

c) a REGISTRATION ACCEPT message includes the PDU session reactivation result error cause IE with the 5GMM cause #28 "Restricted service area";

is received over wireline access then the 5G-RG or the W-AGF acting on behalf of the FN-CRG (or on behalf of the N5GC device) shall start enforcing the wireline access service area restrictions and shall enter the state 5GMM-REGISTERED.NON-ALLOWED-SERVICE

while in the state 5GMM-REGISTERED.NON-ALLOWED-SERVICE the 5G-RG or the W-AGF acting on behalf of the FN-CRG (or on behalf of the N5GC device) shall

a) if in 5GMM-IDLE mode over wireline access

1) shall not perform the registration procedure for mobility and periodic registration update with uplink data status IE except for emergency services or for high priority access; and

2) shall not initiate a service request procedure except for

- emergency services

- emergency services fallback; or

- high priority access; and

b) if in 5GMM-CONNECTED mode over wireline access

1) shall not perform the registration procedure for mobility and periodic registration update with uplink data status IE except for

- emergency services;

- emergency services fallback; or

- high priority access;

2) shall not initiate a service request procedure except for emergency services or high priority access; and

3) shall not initiate a 5GSM procedure except for emergency services or high priority access;

over the wireline access

when the 5G-RG is switched off the UICC containing the USIM is removed or the 5G-RG starts using another wireline access network the 5G-RG shall stop enforcing the wireline access service area restrictions if enforced

NOTE when the 5G-RG acting on behalf of the AUN3 device determines that the AUN3 device is switched off or the UICC containing the USIM of AUN3 device is removed the 5G-RG acting on behalf of the AUN3 device stops enforcing the wireline access service area restrictions if enforced

when the W-AGF acting on behalf of the FN-CRG determines that the FN-CRG is switched off the W-AGF acting on behalf of the FN-CRG stops enforcing the wireline access service area restrictions if enforced

when the W-AGF acting on behalf of the N5GC device determines that the FN-CRG serving the N5GC device is switched off the W-AGF acting on behalf of the N5GC device stops enforcing the wireline access service area restrictions if enforced

### 5.3.6 mobile initiated connection only mode

the UE can request the use of mobile initiated connection only (MICO) mode during the registration procedure (see 3GPP TS 23.501 [8] and 3GPP TS 23.502 [9]) the UE shall not request use of MICO mode over non-3GPP access furthermore the UE in 3GPP access shall not request the use of MICO mode during

a) a registration procedure for initial registration for emergency services (see subclause 5.5.1.2);

b) a registration procedure for initial registration for initiating an emergency PDU session (see subclause 5.5.1.2);

c) a registration procedure for mobility and periodic registration update (see subclause 5.5.1.3) for initiating an emergency PDU session if the UE is in the state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE; or

d) a registration procedure for mobility and periodic registration update (see subclause 5.5.1.3) when the UE has an emergency PDU session established

if the UE requests the use of MICO mode the network can accept the use of MICO mode by providing a MICO indication when accepting the registration procedure the UE may use MICO mode only if the network has provided the MICO indication IE during the last registration procedure the UE may also request an active time value together with the MICO mode indication during the registration procedure if the UE requests an active time by including an active time value the UE may also include the requested T3512 value IE to request a particular T3512 value to be allocated

if the network accepts the use of MICO mode and does not include an active time value in T3324 IE to the UE the AMF may include an "all PLMN registration area allocated" indication in the MICO indication IE to the UE if the UE indicated the support for strictly periodic registration timer in the MICO indication IE to the network the network may include a "strictly periodic registration timer supported" indication in the MICO indication IE to the UE

if the UE requested the use of active time by including an active time value and the network accepts the use of MICO mode and the use of active time the AMF shall include an active time value in the T3324 IE to the UE if the AMF indicates active time value to the UE AMF should not indicate "all PLMN registration area allocated" indication in the MICO indication IE to the UE upon entering 5GMM-IDLE mode AMF shall start the active timer with the active time value indicated to the UE and shall consider the UE is reachable for paging as long as the timer is running if the UE enters 5GMM-CONNECTED mode over 3GPP access when the active timer is running the AMF shall stop the active timer

NOTE 1 the active time value assigned by AMF can be different from the active time value requested by the UE AMF assigns the active time value based on several factors e.g local configuration expected UE behaviour UE requested active time value UE subscription information network policies etc

if the UE requested an active time and a requested T3512 value and the network accepts the use of MICO mode the AMF shall take the UE requested T3512 value into consideration when assigning a value of timer T3512 to the UE

if the network accepts the use of MICO mode the UE may deactivate the AS layer and activate MICO mode by entering the state 5GMM-REGISTERED.NO-CELL-AVAILABLE if

a) the UE is in 5GMM-IDLE mode over 3GPP access;

b) the UE is in the 5GMM-REGISTERED.NORMAL-SERVICE or 5GMM-REGISTERED.NON-ALLOWED-SERVICE (as described in subclause 5.3.5.2) state for 3GPP access; and

c) no T3324 value is received from the network

if the network accepts the use of MICO mode and indicates an active time value to the UE in a successful registration procedure the UE shall start the timer T3324 with the value received from the network after entering 5GMM-IDLE mode over 3GPP access at the expiry of the timer T3324 the UE may deactivate the AS layer and activate MICO mode by entering the state 5GMM-REGISTERED.NO-CELL-AVAILABLE if the UE is in the 5GMM-REGISTERED.NORMAL-SERVICE or 5GMM-REGISTERED.NON-ALLOWED-SERVICE (as described in subclause 5.3.5.2) state for 3GPP access if the UE enters 5GMM-CONNECTED mode over 3GPP access when the timer T3324 is running the UE shall stop the timer T3324

when MICO mode is activated all NAS timers are stopped and associated procedures aborted except for timers T3512 T3346 T3447 T3448 T3396 T3526 T3584 T3585 T3587 any back-off timers T3245 T3247 any slice deregistration inactivity timers the timer t controlling the periodic search for HPLMN or EHPLMN or higher prioritized PLMNs the timer TF the timer TG the timer TS (see 3GPP TS 23.122 [5]) and the timer TSENSE controlling the periodic search for PLMNs satisfying the operator controlled signal level threshold (see 3GPP TS 23.122 [5]) the timer TNSU and the timer instance associated with the entry in the list of "PLMNs not allowed to operate at the present UE location" the UE shall reset the registration attempt counter and service request attempt counter

NOTE 2 when MICO mode is activated and if the UE is also registered over the non-3GPP access the AMF will not send a NOTIFICATION message with access type indicating 3GPP access over the non-3GPP access for PDU sessions associated with 3GPP access

the UE may deactivate MICO mode and activate the AS layer at any time upon deactivating MICO mode the UE may initiate 5GMM procedures (e.g. for the transfer of mobile originated signalling or user data)

when an emergency PDU session is successfully established after the MICO mode was enabled the UE and the AMF shall locally disable MICO mode the UE and the AMF shall not enable MICO mode until the AMF accepts the use of MICO mode in the next registration procedure to enable an emergency call back the UE should wait for a UE implementation-specific duration of time before requesting the use of MICO mode after the completion of the emergency services

if the AMF accepts the use of MICO mode and does not indicate "strictly periodic registration timer supported" in the MICO indication IE to the UE the AMF starts the implicit de-registration timer for 3GPP access when entering 5GMM-IDLE mode for 3GPP access if AMF accepts the use of MICO mode and indicates "strictly periodic registration timer supported" in the MICO indication IE to the UE AMF shall start the strictly periodic monitoring timer with T3512 value indicated in the T3512 value IE after the registration procedure is completed the AMF shall neither stop nor reset the strictly periodic monitoring timer when the NAS signalling connection is established or released for the UE if the strictly periodic monitoring timer expires when NAS signalling connection is established for the UE AMF shall restart the strictly periodic monitoring timer with the T3512 value otherwise AMF shall start the implicit de-registration timer

when an emergency PDU session is successfully established and the MICO mode is disabled the UE shall stop timer T3512 if running and the AMF shall stop strictly periodic monitoring timer if running the UE and the AMF shall behave as if no "strictly periodic registration timer supported" indication was given to the UE in the last registration attempt

upon successful completion of an attach procedure or tracking area updating procedure after inter-system change from N1 mode to S1 mode (see 3GPP TS 24.301 [15]) the UE operating in single-registration mode shall locally disable MICO mode after inter-system change from S1 mode to N1 mode the UE operating in single-registration mode may re-negotiate MICO mode with the network during the registration procedure for mobility and periodic registration update

when MICO mode is activated for a UE that has joined one or more multicast MBS sessions the UE may deactivate MICO mode and activate the AS layer at the MBS start time and at any of the scheduled activation times of a multicast MBS session if any of those times are available as specified in 3GPP TS 23.247 [53]

when MICO mode is activated for a UE the UE may deactivate MICO mode and activate the AS layer at the broadcast start time and at any of the scheduled broadcast activation times of a broadcast MBS session if any of those times are available as specified in 3GPP TS 23.247 [53]

NOTE 3 the UE can obtain via the service announcement an MBS start time a sequence of scheduled activation times (e.g a first time and a periodicity) or both of a multicast MBS session as described in 3GPP TS 23.247 [53] or both which is out of scope of this specification similarly the UE can obtain via the service announcement a broadcast start time a sequence of scheduled broadcast activation times (e.g a first time and a periodicity) or both of a broadcast MBS session as described in 3GPP TS 23.247 [53] which is out of scope of this specification

NOTE 4 deactivating MICO mode and activating the AS layer at the MBS start time and the scheduled multicast activation times of a multicast MBS session allows the UE to listen to paging for a multicast MBS session which the has UE joined and to respond to it if received how long the UE needs to listen to paging is up to UE implementation similarly deactivating MICO mode and activating the AS layer at the broadcast start time and the scheduled broadcast activation times of a broadcast MBS session allows the UE to acquire the traffic of the broadcast MBS session if the UE fails to receive paging or data for a multicast MBS session which the UE has joined or data for a broadast MBS session the UE can as an implementation option initiate 5GMM procedures (e.g for the transfer of mobile originated signalling or user data) to enter 5GMM-CONNECTED mode over 3GPP access and obtain via the service announcement a new start time a sequence of scheduled activation times or both

when MICO mode is activated the UE is allowed to join one or more multicast MBS sessions in that case the UE can deactivate MICO mode and activate the AS layer at the MBS start time and at any of the scheduled activation times of a multicast MBS session if any of those times are available as specified in 3GPP TS 23.247 [53] and the UE joins one or more multicast MBS sessions by using the UE-requested PDU session establishment procedure or the UE-requested PDU session modification procedure (see subclauses 6.4.1.2 and 6.4.2.2)

NOTE 5 it is up to UE implementation whether to leave one or more multicast MBS sessions after each deactivation of each multicast MBS session and to re-join again at the next activation time or to keep a multicast MBS session that the UE has joined for the whole period of the session as described in 3GPP TS 23.247 [53]

### 5.3.7 handling of the periodic registration update timer and mobile reachable timer

the registration procedure for periodic registration update is used over 3GPP access to periodically notify the availability of the UE to the network the procedure is controlled in the UE by the periodic registration update timer T3512

if the UE is registered over the 3GPP access the AMF maintains an implicit de-registration timer to control when the UE is considered implicitly de-registered over the 3GPP access if the UE is registered over the non-3GPP access the AMF also maintains a non-3GPP implicit de-registration timer to control when the UE is considered implicitly de-registered over the non-3GPP access the UE registered over the non-3GPP access maintains a non-3GPP de-registration timer to control when the UE is considered implicitly de-registered for the non-3GPP access

the AMF shall start a non-3GPP implicit de-registration timer for the UE registered over non-3GPP access when the N1 NAS signalling connection over non-3GPP access is released

the UE registered over non-3GPP access shall reset and start a non-3GPP de-registration timer when the N1 NAS signalling connection over non-3GPP access is released the non-3GPP de-registration timer is stopped when the UE enters 5GMM-CONNECTED mode over non-3GPP access or the 5GMM-DEREGISTERED state over non-3GPP access

the non-3GPP implicit de-registration timer shall be longer than the non-3GPP de-registration timer

the value of timer T3512 is sent by the network to the UE in the REGISTRATION ACCEPT message the UE shall apply this value in all tracking areas of the list of tracking areas assigned to the UE until a new value is received the periodic registration update timer only applies to the UE registered to the 5GS services over 3GPP access

if timer T3512 received by the UE in a REGISTRATION ACCEPT message contains an indication that the timer is deactivated or the timer value is zero then timer T3512 is deactivated and the UE shall not perform the periodic registration update procedure

NOTE 1 the UE does not perform the registration procedure for periodic registration update for non-3GPP access

if during the registration procedure the AMF does not indicate "strictly periodic registration timer supported" in the MICO indication IE to the UE timer T3512 is reset and started with its initial value when the UE changes from 5GMM-CONNECTED over 3GPP access or 5GMM-IDLE mode with suspend indication over 3GPP access to 5GMM-IDLE mode over 3GPP access timer T3512 is stopped when the UE enters 5GMM-CONNECTED mode over 3GPP access or the 5GMM-DEREGISTERED state over 3GPP access

if during the registration procedure the AMF indicates "strictly periodic registration timer supported" in the MICO indication IE to the UE timer T3512 is started with its initial value after the completion of the registration procedure the UE shall neither stop nor reset the timer T3512 when the UE enters 5GMM-CONNECTED or when changing from 5GMM-CONNECTED mode to 5GMM-IDLE mode if the timer T3512 expires

a) the UE in 5GMM-CONNECTED mode over 3GPP access shall reset and start the timer T3512 with its initial value; or

b) the UE in 5GMM-IDLE mode over 3GPP access shall perform the periodic registration procedure

if the UE is registered for emergency services and timer T3512 expires the UE shall not initiate a periodic registration update procedure but shall locally de-register from the network when the UE is camping on a suitable cell it may re-register to regain normal service

when a UE is not registered for emergency services and timer T3512 expires when the UE is in 5GMM-IDLE mode the registration procedure for periodic registration update shall be started

if the UE is not registered for emergency services and is in a state other than 5GMM-REGISTERED.NORMAL-SERVICE or 5GMM-REGISTERED.NON-ALLOWED-SERVICE over 3GPP access when timer T3512 expires the registration procedure for periodic registration update is delayed until the UE returns to 5GMM-REGISTERED.NORMAL-SERVICE or 5GMM-REGISTERED.NON-ALLOWED-SERVICE over 3GPP access

NOTE 2 when the UE returns to 5GMM-REGISTERED.NORMAL-SERVICE or 5GMM-REGISTERED.NON-ALLOWED-SERVICE and it needs to initiate other 5GMM procedure than the registration procedure for periodic registration update then based on UE implementation the 5GMM procedure can take precedence

the network supervises the registration procedure for periodic registration update of the UE by means of the mobile reachable timer

if the UE is not registered for emergency services the mobile reachable timer shall be longer than the value of timer T3512 in this case by default the mobile reachable timer is 4 minutes greater than the value of timer T3512

the network behaviour upon expiry of the mobile reachable timer is network dependent but typically the network stops sending paging messages to the UE on the first expiry and may take other appropriate actions

if the UE is registered for emergency services the AMF shall set the mobile reachable timer with a value equal to timer T3512 when the mobile reachable timer expires the AMF shall locally de-register the UE

the mobile reachable timer shall be reset and started with the value as indicated above when the AMF releases the NAS signalling connection for the UE the mobile reachable timer shall be stopped when a NAS signalling connection is established for the UE

upon expiry of the mobile reachable timer the network shall start the implicit de-registration timer over 3GPP access the value of the implicit de-registration timer over 3GPP access is network dependent if MICO mode is activated the network shall start the implicit de-registration timer over 3GPP access when the UE enters 5GMM-IDLE mode at the AMF over 3GPP access the default value of the implicit de-registration timer over 3GPP access is 4 minutes greater than the value of timer T3512

if the implicit de-registration timer expires before the UE contacts the network the network shall implicitly de-register the UE the implicit de-registration timer shall be stopped when a NAS signalling connection is established for the UE

if the non-3GPP implicit de-registration timer expires before the UE contacts the network over the non-3GPP access the network shall implicitly de-register the UE and enter the state 5GMM-DEREGISTERED over non-3GPP access for the UE the non-3GPP implicit de-registration timer shall be stopped when a NAS signalling connection over non-3GPP access is established for the UE

if the non-3GPP de-registration timer expires before the UE contacts the network over the non-3GPP access the UE shall enter the state 5GMM-DEREGISTERED over non-3GPP access the non-3GPP de-registration timer shall be stopped when a NAS signalling connection over non-3GPP access is established for the UE

if the AMF provides T3346 value IE in the DEREGISTRATION REQUEST message with access type set to "Non-3GPP access" in deregistration type IE REGISTRATION REJECT message during a registration procedure for mobility and periodic registration update or SERVICE REJECT message and the value of timer T3346 is greater than the value of timer T3512 the AMF sets the mobile reachable timer and the implicit de-registration timer such that the sum of the timer values is greater than the value of timer T3346

if the AMF provides T3346 value IE in the DEREGISTRATION REQUEST message with access type set to "3GPP access" in deregistration type IE REGISTRATION REJECT message during a registration procedure for mobility and periodic registration update or SERVICE REJECT message and the value of timer T3346 is greater than the value of the non-3GPP de-registration timer the AMF sets the non-3GPP implicit de-registration timer value to be 8 minutes greater than the value of timer T3346

if the UE receives T3346 value IE in the DEREGISTRATION REQUEST message with access type set to "3GPP access" in deregistration type IE REGISTRATION REJECT message during a registration procedure for mobility and periodic registration update or SERVICE REJECT message and the value of timer T3346 is greater than the value of the non-3GPP de-registration timer the UE sets the non-3GPP de-registration timer value to be 4 minutes greater than the value of timer T3346

### 5.3.8 handling of timer T3502

the value of timer T3502 can be sent by the network to the UE in the REGISTRATION ACCEPT message the UE shall apply this value in all tracking areas of the registration area assigned to the UE until a new value is received

the value of timer T3502 can be sent by the network to the UE in the REGISTRATION REJECT message during the initial registration if a REGISTRATION REJECT message including timer T3502 value was received integrity protected the UE shall apply this value until a new value is received with integrity protection or a new PLMN or SNPN is selected otherwise the default value of this timer is used

the default value of this timer is also used by the UE in the following cases

a) REGISTRATION ACCEPT message is received without a value specified and the 5GS registration type IE in the REGISTRATION REQUEST message is not set to "periodic registration updating”;

b) the UE does not have a stored value for this timer;

c) a new PLMN which is not in the list of equivalent PLMNs or a new SNPN has been entered the initial registration procedure fails the registration attempt counter is equal to 5 and no REGISTRATION REJECT message was received from the new PLMN or SNPN;

d) the network indicates that the timer is "deactivated"; or

e) a new PLMN which is not in the list of equivalent PLMNs or a new SNPN has been entered the registration procedure for mobility and periodic registration update fails and the registration attempt counter is equal to 5

### 5.3.9 handling of NAS level mobility management congestion control

the AMF may detect 5GMM signalling congestion and perform general NAS level congestion control under the 5GMM signalling congestion conditions the AMF may reject 5GMM signalling requests from UEs as specified in 3GPP TS 23.501 [8] the AMF should not reject the following

a) requests for emergency services;

b) requests for emergency services fallback;

c) requests from UEs configured for high priority access in selected PLMN or SNPN;

d) DEREGISTRATION REQUEST message;

e) requests for mobile terminated services triggered by paging or a notification procedure;

f) requests for initial registration or mobility and periodic registration update when emergency is indicated by lower layers; and

g) requests for mobility registration update when the UE is reporting unavailability information due to discontinuous coverage

when general NAS level congestion control is active the AMF may include a value for the mobility management back-off timer T3346 in the reject messages the UE starts the timer T3346 with the value received in the 5GMM reject messages to avoid that large numbers of UEs simultaneously initiate deferred requests the AMF should select the value for the timer T3346 for the rejected UEs so that timeouts are not synchronised

when general NAS level congestion control is active for an SNPN providing access for localized services in SNPN the AMF may include an appropriate cause value other than 5GMM cause #22 "congestion" (e.g. #74 "Temporarily not authorized for this SNPN") in the reject messages without including timer T3346 value to allow the UE to enter state 5GMM-REGISTERED.PLMN-SEARCH or 5GMM-DEREGISTERED.PLMN-SEARCH and perform SNPN selection according to 3GPP TS 23.122 [5]

NOTE 0 if the AMF of an SNPN provides both localized services in SNPN and services which are not localized services in SNPN at the same location for a UE then the AMF can apply the congestion control handling for an SNPN providing access for localized services in SNPN

if the UE is registered in the same PLMN over the 3GPP access and non-3GPP access and the UE receives the timer T3346 from the AMF the timer T3346 shall apply to both 3GPP access and non-3GPP access

if the UE receives the paging message or NOTIFICATION message when timer T3346 is running and the UE is registered to the same PLMN over 3GPP access and non-3GPP access the UE shall stop the timer T3346 for both accesses and respond to the paging message or NOTIFICATION message as specified in subclause 5.6.2 and subclause 5.6.3

NOTE 1 as an implementation option MUSIM UE is allowed to not respond to paging based on the information available in the paging message e.g voice service indication

if the timer T3346 is running when the UE enters state 5GMM-DEREGISTERED the UE remains switched on and the USIM in the UE remains the same then the timer T3346 is kept running until it expires or it is stopped

if the UE is switched off when the timer T3346 is running the UE shall behave as follows when the UE is switched on and the USIM in the UE remains the same

let t1 be the time remaining for T3346 timeout at switch off and let t be the time elapsed between switch off and switch on if t1 is greater than t then the timer shall be restarted with the value t1 – t if t1 is equal to or less than t then the timer need not be restarted if the UE is not capable of determining t then the UE shall restart the timer with the value t1

if the UE enters a new PLMN or SNPN while timer T3346 is running and the new PLMN or SNPN is not equivalent to the PLMN or SNPN where the UE started timer T3346 the UE shall stop timer T3346 when initiating 5GMM procedures in the new PLMN or SNPN

after a change in registration area if the timer T3346 is running and 5GS update status is 5U1 UPDATED then the UE shall set the 5GS update status to 5U2 NOT UPDATED and enter state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE

if timer T3346 is running or is deactivated and

a) the UE is a UE configured for high priority access in selected PLMN or SNPN;

b) the UE needs to initiate signalling for emergency services or emergency services fallback; or

c) the UE needs to report unavailability information due to discontinuous coverage

then the UE is allowed to initiate 5GMM procedures

NOTE 2 UE can based on implementation restrict lower layers of non-3GPP access from establishing access stratum connection on a registered PLMN when timer T3346 is running for the same PLMN

### 5.3.10 handling of DNN based congestion control

the AMF may detect and start performing DNN based congestion control when one or more DNN congestion criteria as specified in 3GPP TS 23.501 [8] are met if the UE does not provide a DNN for a non-emergency PDU session then the AMF uses the selected DNN or the DNN associated with the PDU session corresponding to the 5GSM procedure

when DNN based congestion control is activated at the AMF the AMF performs the congestion control as specified in subclause 5.4.5 and the UE performs the congestion control as specified in subclause 5.4.5 and subclause 6.2.7

### 5.3.11 handling of S-NSSAI based congestion control

the AMF may detect and start performing S-NSSAI based congestion control when one or more S-NSSAI congestion criteria as specified in 3GPP TS 23.501 [8] are met if the UE does not provide a DNN for a non-emergency PDU session then the AMF uses the selected DNN or the DNN associated with the PDU session corresponding to the 5GSM procedure if the UE does not provide an S-NSSAI for a non-emergency PDU session then the AMF uses the selected S-NSSAI or the S-NSSAI associated with the PDU session corresponding to the 5GSM procedure

the AMF may detect and start performing S-NSSAI based congestion control when the UE that does not support S-NSSAI location validity information requests a PDU session establishment for an S-NSSAI limited by NS-AoS and the UE is outside the NS-AoS of the S-NSSAI

when S-NSSAI based congestion control is activated at the AMF the AMF performs the congestion control as specified in subclause 5.4.5 and the UE performs the congestion control as specified in subclause 5.4.5 and subclause 6.2.8

### 5.3.12 handling of local emergency numbers

the additional requirements in subclause 5.3.12A apply to a UE supporting registration or attach procedures via 3GPP access and registration procedures via non-3GPP access

in case of PLMN the network may send a local emergency numbers list or an extended local emergency numbers list or both in the REGISTRATION ACCEPT message by including the emergency number list IE and the extended emergency number list IE respectively the local emergency numbers list can be updated as described in 3GPP TS 24.301 [15] subclause 5.3.7

in case of SNPN the network may send an extended local emergency numbers list in the REGISTRATION ACCEPT message by including the extended emergency number list IE the network shall set the extended emergency number list validity (EENLV) field within the extended emergency number list IE to "Extended local emergency numbers list is valid only in the PLMN from which this IE is received" the UE shall consider the emergency number(s) received in the extended emergency number list IE valid only in the SNPN from which this IE is received regardless of the received value of the EENLV field within the extended emergency number list IE

the UE shall store the local emergency numbers list and the extended local emergency numbers list as provided by the network the local emergency numbers list stored in the UE shall be replaced on each receipt of the emergency number list IE the extended local emergency numbers list stored in the UE shall be replaced on each receipt of the extended emergency number list IE the received local emergency numbers list or the received extended local emergency numbers list or both shall be provided to the upper layers

the emergency number(s) received in the emergency number list IE are valid only in PLMNs in the same country as the PLMN from which this IE is received if no emergency number list IE is contained in the REGISTRATION ACCEPT message then the stored local emergency numbers list in the UE shall be kept except if the UE has successfully registered to a PLMN in a country different from that of the PLMN that sent the list

the emergency number(s) received in the extended emergency number list IE are valid only in

a) PLMNs in the same country as the PLMN from which this IE is received if the extended emergency number list validity (EENLV) field within the extended emergency number list IE indicates "Extended local emergency numbers list is valid in the country of the PLMN from which this IE is received"; and

b) the PLMN from which this IE is received if the EENLV field within the extended emergency number list IE indicates "Extended local emergency numbers list is valid only in the PLMN from which this IE is received"; and

c) the SNPN from which this IE is received regardless of the value of the EENLV field within the extended emergency number list IE

if no extended local emergency numbers list is contained in the REGISTRATION ACCEPT message and the registered PLMN or the registered SNPN has not changed then the stored extended local emergency numbers list in the UE shall be kept if no extended local emergency numbers list is contained in the REGISTRATION ACCEPT message but the registered PLMN or the registered SNPN has changed then

a) if the last received indication in the EENLV field within the extended emergency number list IE indicates "Extended local emergency numbers list is valid only in the PLMN from which this IE is received" the stored extended local emergency numbers list in the UE shall be deleted; and

b) if the last received indication in the EENLV field within the extended emergency number list IE indicates "Extended local emergency numbers list is valid in the country of the PLMN from which this IE is received" the list shall be kept except if the UE has successfully registered to a PLMN in a country different from that of the PLMN that sent the stored list

NOTE to prevent the misrouting of emergency calls all operators within a country need to follow the regulation or agree on the setting of the extended emergency number list IE in accordance to national agreement – either to indicate validity within a country or to indicate validity only within the PLMN

the local emergency numbers list and the extended local emergency numbers list shall be deleted at switch off or removal of the USIM the UE shall be able to store up to ten entries in the local emergency numbers list and up to twenty entries in the extended local emergency numbers list received from the network

for the use of the local emergency numbers list and the extended local emergency numbers list by the UE see 3GPP TS 24.301 [15] subclause 5.3.7

### 5.3.12A handling of local emergency numbers received via 3GPP access and non-3GPP access

#### 5.3.12A.1 general

the requirements in subclause 5.3.12 with the clarifications and additional conditions in subclause 5.3.12A apply to a UE supporting

a) attach procedures (see 3GPP TS 24.301 [15]) or registration procedures via 3GPP access; and

b) registration procedures via non-3GPP access

the UE shall ignore the presence or absence of local emergency numbers list extended local emergency numbers list or both in a REGISTRATION ACCEPT message received via non-3GPP access and keep the stored local emergency numbers list and the extended local emergency numbers list if available unless conditions in subclause 5.3.12A.2 are met

for the purposes of subclause 5.3.12A the UE is considered neither registered nor attached over 3GPP access if

1) the UE supports 3GPP access to EPC the UE does not support 3GPP access to 5GC and

a) the EMM sublayer is in the EMM-NULL state EMM-DEREGISTERED state or EMM-DEREGISTERED-INITIATED state; or

2) the UE supports 3GPP access to 5GC the UE does not support 3GPP access to EPC and

a) the 5GMM sublayer is in the 5GMM-NULL state 5GMM-DEREGISTERED state or 5GMM-DEREGISTERED-INITIATED state; or

3) supports both 3GPP access to EPC and 3GPP access to 5GC and

a) the EMM sublayer is in the EMM-NULL state EMM-DEREGISTERED state or EMM-DEREGISTERED-INITIATED state; and

a) the 5GMM sublayer is in the 5GMM-NULL state 5GMM-DEREGISTERED state or 5GMM-DEREGISTERED-INITIATED state

#### 5.3.12A.2 receiving a REGISTRATION ACCEPT message via non-3GPP access

if the UE can determine the current country and after switch on or after removal of the USIM has not been registered or has not been attached via 3GPP access in the current country then the UE shall store the local emergency numbers list or the extended local emergency numbers list or both as provided by the network with an MCC matching the current country via non-3GPP access

NOTE the UE determines as the current country the country in which it is located in accordance with 3GPP TS 24.502 [18]

the UE shall replace a previously stored local emergency numbers list or a previously stored extended local emergency numbers list or both with a local emergency numbers list or an extended local emergency numbers list or both received in a REGISTRATION ACCEPT message via non-3GPP access if the previously stored local emergency numbers list was also received via non-3GPP access or the previously stored extended local emergency numbers list was also received via non-3GPP access

the UE shall replace a previously stored extended local emergency numbers list with an extended local emergency numbers list received in a REGISTRATION ACCEPT message via non-3GPP access if

a) the UE is neither registered nor attached over 3GPP access;

b) the REGISTRATION ACCEPT message is received from a PLMN different from which the stored list was received; and

c) the stored indication in the EENLV field within the extended emergency number list IE indicates "Extended local emergency numbers list is valid only in the PLMN from which this IE is received"

if no extended local emergency numbers list is contained in a REGISTRATION ACCEPT message received via non-3GPP access and the UE is neither registered nor attached over 3GPP access the stored extended local emergency numbers list in the UE shall be discarded if

a) the UE can determine the current country and the UE has successfully registered to a PLMN in the country and that country is different from that of the PLMN that sent the stored list; or

b) the REGISTRATION ACCEPT message is received from a PLMN different from which the stored list was received and the stored indication in the EENLV field within the extended emergency number list IE indicates "Extended local emergency numbers list is valid only in the PLMN from which this IE is received"

### 5.3.13 lists of 5GS forbidden tracking areas

if the UE is not operating in SNPN access operation mode the UE shall store a list of "5GS forbidden tracking areas for roaming" as well as a list of "5GS forbidden tracking areas for regional provision of service" otherwise the UE shall store a list of "5GS forbidden tracking areas for roaming"

a) per SNPN; and

b) if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both per entry of the "list of subscriber data" or if the UE supports access to an SNPN using credentials from a credentials holder PLMN subscription;

and store a list of "5GS forbidden tracking areas for regional provision of service"

a) per SNPN; and

b) if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both per entry of the "list of subscriber data" or if the UE supports access to an SNPN using credentials from a credentials holder PLMN subscription

within the 5GS these lists are managed independently per access type i.e. 3GPP access or wireline access these lists shall be erased when

a) the UE is switched off the UICC containing the USIM is removed an entry of the "list of subscriber data" with the subscribed SNPN identity identifying the current SNPN is updated or if the UE supports access to an SNPN using credentials from a credentials holder the entry of the "list of subscriber data" associated with the lists is updated; and

b) periodically (with a period in the range 12 to 24 hours)

over 3GPP access when the lists are erased the UE performs cell selection according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C] if the UE is not operating in SNPN access operation mode a tracking area shall be removed from the list of "5GS forbidden tracking areas for roaming" as well as the list of "5GS forbidden tracking areas for regional provision of service" if the UE receives the tracking area in the TAI list or the service area list of "allowed tracking areas" in REGISTRATION ACCEPT message or a CONFIGURATION UPDATE COMMAND message

the UE operating in SNPN access operation mode shall remove a tracking area from the list of "5GS forbidden tracking areas for roaming" as well as the list of "5GS forbidden tracking areas for regional provision of service" for

a) the selected SNPN; and

b) when the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both for the selected entry of the "list of subscriber data" or when the UE supports access to an SNPN using credentials from a credentials holder the selected PLMN subscription;

if the UE receives the tracking area in the TAI list or the service area list of "allowed tracking areas" in REGISTRATION ACCEPT message or a CONFIGURATION UPDATE COMMAND message

if the UE supports access to an SNPN providing access for localized services in SNPN the access for localized services in SNPN is enabled and the validity information of

a) any SNPN identified by the "credentials holder controlled prioritized list of preferred SNPNs for access for localized services in SNPN" changes from not met to met; or

b) any GIN (broadcasted by an SNPN) identified by "credentials holder controlled prioritized list of preferred GINs for access for localized services in SNPN" changes from not met to met

the UE shall remove the tracking area(s) which are included in the location validity information of the SNPN in a) or b) if any from the list of "5GS forbidden tracking areas for roaming" as well as the list of "5GS forbidden tracking areas for regional provision of service" for that SNPN and for the selected entry of the "list of subscriber data" or PLMN subscription

the UE shall not remove the tracking area from "5GS forbidden tracking areas for roaming" or "5GS forbidden tracking areas for regional provision of service" if the UE is registered for emergency services

in N1 mode over 3GPP access the UE shall update the suitable list whenever a REGISTRATION REJECT SERVICE REJECT or DEREGISTRATION REQUEST message is received with the 5GMM cause #12 "tracking area not allowed" #13 "roaming not allowed in this tracking area" #15 "no suitable cells in tracking area" or #62 "no network slices available"

in N1 mode over 3GPP access if the UE receives the "5GS forbidden tracking areas for roaming" IE or the "5GS forbidden tracking areas for regional provision of service" IE in the REGISTRATION REJECT SERVICE REJECT DEREGISTRATION REQUEST REGISTRATION ACCEPT or SERVICE ACCEPT message the UE update the suitable list with the received TAI(s) belonging to the serving PLMN or equivalent PLMN(s) and ignore the TAI(s) which do not belong to the serving PLMN or equivalent PLMN(s) included in the IE

if the UE receives ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message provided with S-NSSAI and the PLMN ID in the protocol configuration options IE or extended protocol configuration options IE (see subclause 6.5.1.3 of 3GPP TS 24.301 [15]) the UE may remove the corresponding tracking area from the "5GS forbidden tracking areas for roaming"

over wireline access the 5G-RG the W-AGF acting on behalf of an FN-RG or the W-AGF acting on behalf of an N5GC device shall update the suitable list whenever a REGISTRATION REJECT SERVICE REJECT or DEREGISTRATION REQUEST message is received with the 5GMM cause #12 "tracking area not allowed" or #13 "roaming not allowed in this tracking area"

NOTE in this release of the specification for untrusted non-3GPP access and trusted non-3GPP access neither the list of "5GS forbidden tracking areas for roaming" nor the list of "5GS forbidden tracking areas for regional provision of service" is maintained by the UE since the UE is not able to determine the corresponding TAI

each list shall accommodate 40 or more TAIs when the list is full and a new entry has to be inserted the oldest entry shall be deleted

### 5.3.13A forbidden PLMN lists

in N1 mode two lists of forbidden PLMN are managed independently per access type i.e. 3GPP access or non-3GPP access

a) the list of "forbidden PLMNs" as defined in 3GPP TS 23.122 [5] is applicable for 3GPP access in N1 mode the same list is used by 5GMM for 3GPP access EMM GMM and MM (see 3GPP TS 24.301 [15] and 3GPP TS 24.008 [12]) regardless whether the UE is operating in single-registration mode or dual-registration mode

b) the list of "forbidden PLMNs for non-3GPP access to 5GCN" as defined in 3GPP TS 24.502 [18] is applicable for 5GMM for non-3GPP access

the list of "forbidden PLMNs for GPRS service" as defined in 3GPP TS 23.122 [5] and 3GPP TS 24.008 [12] is applicable for 3GPP access in N1 mode the same list is used by 5GMM for 3GPP access EMM and GMM (see 3GPP TS 24.301 [15] and 3GPP TS 24.008 [12]) regardless whether the UE is operating in single-registration mode or dual-registration mode

the forbidden PLMN lists shall be maintained across activation and deactivation of SNPN access operation mode

NOTE on timer T3245 expiry when the UE supports access to an SNPN using credentials from a credentials holder using PLMN subscription and the UE is operating in SNPN access operation mode as an implementation option the UE can delete the list of "forbidden PLMNs" "forbidden PLMNs for non-3GPP access to 5GCN" and "forbidden PLMNs for GPRS service"

### 5.3.14 list of equivalent PLMNs

the UE shall store a list of equivalent PLMNs these PLMNs shall be regarded by the UE as equivalent to each other for PLMN selection and cell selection/re-selection the same list is used by 5GMM EMM GMM and MM (see 3GPP TS 24.301 [15] and 3GPP TS 24.008 [12]) except for the case when the UE operates in dual-registration mode (see subclause 4.8.3)

the UE shall update or delete this list at the end of each registration procedure the stored list consists of a list of equivalent PLMNs as downloaded by the network plus the PLMN code of the registered PLMN that downloaded the list when the UE is switched off the UE shall keep the stored list so that it can be used for PLMN selection after switch on the UE shall delete the stored list if the USIM is removed or when the UE registered for emergency services enters the state 5GMM-DEREGISTERED the maximum number of possible entries in the stored list is 16

if the UE registers to different PLMNs over 3GPP and non-3GPP accesses the UE shall store an additional list of equivalent PLMNs associated with non-3GPP access the UE manages the two lists of equivalent PLMNs per access type independently

### 5.3.14A list of equivalent SNPNs

the UE may support equivalent SNPNs

if the UE supports equivalent SNPNs the ME shall store a list of equivalent SNPNs

a) per entry of "list of subscriber data"; or

b) per the PLMN subscription if the UE supports access to an SNPN using credentials from a credentials holder

SNPNs in the list of equivalent SNPNs associated with the selected entry of "list of subscriber data" or the selected PLMN subscription shall be regarded by the UE as equivalent to each other for SNPN selection cell selection and cell re-selection

the list of equivalent SNPNs associated with the selected entry of "list of subscriber data" or the selected PLMN subscription is created replaced or deleted at the end of each registration procedure the stored list consists of a list of equivalent SNPNs as provided by the network plus the SNPN identity of the registered SNPN that provided the list

when the UE is switched off the UE shall keep the stored list(s) so that they can be used for SNPN selection after switch on

the UE shall delete the stored list associated with an entry of "list of subscriber data" or the PLMN subscription when the USIM is removed the associated entry of "list of subscriber data" is updated or the UE registered for emergency services enters the state 5GMM-DEREGISTERED

the maximum number of possible entries in each stored list is 16

NOTE 1 to enable UE mobility between the registered SNPN and an equivalent SNPN the SNPN identity of the registered SNPN providing a list of equivalent SNPNs and the SNPN identity(ies) in the list of equivalent SNPNs are assumed to be globally-unique SNPN identities

NOTE 2 the MS can provide the list of equivalent SNPNs associated with the selected entry of "list of subscriber data" or the selected PLMN subscription to the lower layers

if the UE supports equivalent SNPNs and registers to different SNPNs over 3GPP and non-3GPP accesses the UE shall store an additional list of equivalent SNPNs associated with non-3GPP access the UE manages the two lists of equivalent SNPNs per access type independently

### 5.3.15 transmission failure abnormal case in the UE

the abnormal case 5GMM uplink message transmission failure indication by lower layers can be identified for 5GMM procedures

when it is specified in the relevant procedure that it is up to the UE implementation to re-run the ongoing procedure that triggered that procedure the procedure can typically be re-initiated using a retransmission mechanism of the uplink message (i.e the one that has previously failed to be transmitted) with new sequence number and message authentication code information thus avoiding to re-start the whole procedure

NOTE the transmission failure can happen due to TAI change the lower layer might take some time to read the system information and determine if the current TAI is changed therefore the information of TAI change can be sent to the NAS layer a little after receiving the transmission failure indication from the lower layer how to handle the retransmission procedure caused by the possible delayed TAI change information is up to UE implementation

### 5.3.16 extended DRX cycle for UEs in 5GMM-IDLE and 5GMM-CONNECTED mode with RRC inactive indication

extended DRX (eDRX) cycle is supported for a UE in N1 mode when eDRX is requested by the UE and accepted by the network

a) if the UE is not in NB-N1 mode eDRX is used when the UE is in 5GMM-IDLE mode or in 5GMM-CONNECTED mode with RRC inactive indication; or

b) if the UE is in NB-N1 mode eDRX is used when the UE is in 5GMM-IDLE mode

the UE may request the use of eDRX cycle during a registration procedure by including the requested extended DRX parameters IE (see 3GPP TS 23.501 [8] and 3GPP TS 23.502 [9]) the UE shall not request the use of eDRX during a registration procedure for emergency services the UE may use the extended idle mode DRX cycle length stored in the USIM (see 3GPP TS 31.102 [22]) when requesting the use of eDRX

the UE and the network may negotiate eDRX parameters during a registration procedure when the UE has an emergency PDU session

the network accepts the request to use the eDRX by providing the negotiated extended DRX parameters IE when accepting the registration procedure the UE shall use eDRX only if it received the negotiated extended DRX parameters IE during the last registration procedure and the UE does not have an emergency PDU session

NOTE 1 if the UE wants to keep using eDRX the UE includes the extended DRX parameters IE in each registration procedure

if the UE received the negotiated extended DRX parameters IE during the last registration procedure upon successful completion of the PDU session release procedure of the emergency PDU session the UE shall resume eDRX

if the network has provided the negotiated extended DRX parameters IE during the last registration procedure upon successful completion of the PDU session release procedure of the emergency PDU session the network shall resume eDRX

if the UE or the network locally releases an emergency PDU session the UE or the network shall not use eDRX until the UE receives eDRX parameters during a registration procedure with PDU session context synchronization or upon successful completion of a service request procedure with PDU session context synchronization

if the UE did not receive the negotiated extended DRX parameters IE or if the UE has an emergency PDU session the UE shall use the stored UE specific DRX parameter if available

if the network did not accept the request to use eDRX or if the UE has an emergency PDU session the network shall use the stored UE specific DRX parameter if available

if the network provided the negotiated extended DRX parameters IE and also assigned a new 5G-GUTI for the UE as described in subclause 5.5.1.3.4 during the last registration procedure the network shall use the stored UE specific DRX parameter if available with the old 5G-GUTI and use the eDRX provided by the network with the new 5G-GUTI until the old 5G-GUTI can be considered as invalid by the network (see subclauses 5.4.4.4 and 5.5.1.3.4)

NOTE 2 if the UE using eDRX has joined one or more multicast MBS sessions or wants to receive the traffic of broadcast MBS sessions the upper layers of the UE provide the lower layers with the MBS start time and the scheduled activation times of the respective MBS session if any of those times are obtained via the service announcement as specified in 3GPP TS 23.247 [53] this interaction between the upper layers and the lower layers is out of scope of the present document if the UE fails to receive paging or data for a multicast MBS session which the UE has joined or data for a broadast MBS session the UE can as an implementation option initiate 5GMM procedures (e.g for the transfer of mobile originated signalling or user data) to enter 5GMM-CONNECTED mode over 3GPP access and obtain via the service announcement a new start time a sequence of scheduled activation times or both

### 5.3.17 service gap control

service gap control (SGC) only applies to 3GPP access

the network may control the frequency with which UEs can transition from 5GMM-IDLE mode to 5GMM-CONNECTED mode via the SGC as specified in 3GPP TS 23.501 [8] and 3GPP TS 23.502 [9] if the network supports SGC and the service gap time value i.e T3447 value is available in the 5GMM context of the UE the AMF shall consider SGC as active for the UE

the UE and the network negotiate usage of SGC during the registration procedure for initial registration and registration procedure for mobility and periodic registration update

a) the UE supporting SGC indicates its support in the REGISTRATION REQUEST message if the UE supports SGC and the SGC is active for the UE the AMF includes T3447 value IE in the REGISTRATION ACCEPT message (see subclause 5.5.1.2 and subclause 5.5.1.3) the UE stores the T3447 value; and

b) for UEs that do not support SGC when the network rejects mobility management signalling requests because SGC is active in the network the mechanism for general NAS level mobility management congestion control as specified in subclause 5.3.9 applies

the network can provide a new T3447 value to the UE to be used next time it is started or stop timer T3447 in the UE if running with the generic UE configuration update procedure as specified in subclause 5.4.4

the UE shall start timer T3447 when the N1 NAS signalling connection is released and if

a) the UE supports SGC and the T3447 value is available in the UE and does not indicate zero; and

b) the N1 NAS signalling connection released was not established for

1) paging;

2) registration procedure for initial registration with Follow-on request indicator set to "No follow-on request pending";

3) registration procedure for mobility and periodic registration update with Follow-on request indicator set to "No follow-on request pending" and without uplink data status IE included;

4) requests for emergency services; or

5) requests for exception data reporting

if the SGC is active in the network after the UE transitions from 5GMM-CONNECTED mode to 5GMM-IDLE mode except when the UE was in 5GMM-CONNECTED mode due to

a) paging;

b) registration procedure for initial registration with Follow-on request indicator set to "No follow-on request pending";

c) registration procedure for mobility and periodic registration update with Follow-on request indicator set to "No follow-on request pending" and without uplink data status IE included

d) requests for emergency services; or

e) requests for exception data reporting

the network shall start timer T3447 if not already running

- with the T3447 value available in the 5GMM context minus 4 minutes if the UE supports SGC and the T3447 value has been sent to the UE with a non-zero value; or

- with the T3447 value available in the 5GMM context if the UE does not support SGC

when timer T3447 is running the network allows

a) requests for emergency service;

b) requests for emergency services fallback;

c) requests for high priority access;

d) requests for exception data reporting;

e) registration procedure for initial registration with Follow-on request indicator set to "No follow-on request pending";

f) registration procedure for mobility and periodic registration update without uplink data status IE included and with Follow-on request indicator set to "No follow-on request pending"; or

g) service request procedure or registration procedure for mobility and periodic registration update triggered by paging and subsequent MO signalling or MO data if any until the UE enters 5GMM-IDLE mode

the UE or the network with a running T3447 timer keeps the timer running when the UE transits from 5GMM-IDLE mode to 5GMM-CONNECTED mode

NOTE if the UE transitions from 5GMM-IDLE mode to 5GMM-CONNECTED mode due to registration procedure for initial registration with Follow-on request indicator set to "No follow-on request pending" or mobility and periodic registration update request without uplink data status IE and with Follow-on request indicator set to "No follow-on request pending" the UE initiates no further MO signalling except for mobility and periodic registration update requests without uplink data status and with Follow-on request indicator set to "No follow-on request pending" until the UE receives mobile terminated signalling (e.g DL NAS TRANSPORT message for MT SMS) or MT data over user plane or after the UE has moved to 5GMM-IDLE state and the service gap timer is not running

if timer T3447 is running when the UE changes PLMN or enters state 5GMM-DEREGISTERED the UE remains switched on and the USIM in the UE remains the same then timer T3447 is kept running until it expires

if the AMF determines that the UE operating in single-registration mode has performed an inter-system change from N1 mode to S1 mode and the timer T3447 is running in the AMF the AMF stops the T3447

upon inter-system change from S1 mode to N1 mode if the UE supports service gap control T3447 is running in the UE and the T3447 value IE is included in the REGISTRATION ACCEPT message received from the AMF (see subclause 5.5.1.2 and subclause 5.5.1.3) the UE shall keep T3447 running additionally the UE shall store and replace the currently stored service gap time value with the received T3447 value upon expiry of the running T3447 timer the UE shall use the new value when starting T3447 again

if the UE is switched off when the timer T3447 is running the UE shall behave as follows when the UE is switched on and the USIM in the UE remains the same

- let t1 be the time remaining for timer T3447 timeout at switch off and let t be the time elapsed between switch off and switch on if t1 is greater than t then the timer shall be restarted with the value t1 – t if t1 is equal to or less than t then the timer need not be restarted if the UE is not capable of determining t then the UE shall restart the timer with the value t1

### 5.3.18 restriction on use of enhanced coverage

in order to deal with use of extensive resources from the network the operator may prevent specific subscribers from using enhanced coverage (see 3GPP TS 23.501 [8]) when in NB-N1 mode the UE shall indicate support for restriction on use of enhanced coverage when in WB-N1 mode the UE supporting either CE mode a or CE mode b shall indicate support for restriction on use of enhanced coverage the UE supporting restriction on use of enhanced coverage indicates its support for restriction on use of enhanced coverage in the REGISTRATION REQUEST message if the UE supports restriction on use of enhanced coverage the AMF indicates in the REGISTRATION ACCEPT message (see subclause 5.5.1.2 and subclause 5.5.1.3) that

a) when in WB-N1 mode whether CE mode b is restricted for the UE or both CE mode a and CE mode b are restricted for the UE or both CE mode a and CE mode b are not restricted for the UE; or

b) when in NB-N1 mode whether the use of enhanced coverage is restricted or not for the UE

if

a) the use of enhanced coverage is restricted;

b) the use of CE mode b is restricted; or

c) the use of CE mode a and CE mode b is restricted

the UE shall not use enhanced coverage in the registered PLMN and in any PLMN which is in the list of equivalent PLMNs

if the UE supports CE mode b and the network determines that

a) the use of enhanced coverage is not restricted for the UE; or

b) CE mode b is not restricted for the UE

the applicable NAS timer values shall be calculated by the network as described in subclause 4.19 and subclause 4.20

for a UE that supports restriction on use of enhanced coverage or CE mode b if

a) the AMF determines to enforce a change in restriction on the use of enhanced coverage or a change in the restriction on the use of CE mode b as described in 3GPP TS 23.501 [8]; and

b) the UE is in 5GMM-CONNECTED mode and there is no ongoing registration procedure

the AMF shall initiate the generic UE configuration update procedure to indicate registration requested and release of the N1 NAS signalling connection not requested as described in subclause 5.4.4 after the successful completion of the registration procedure for mobility registration update including change of the restriction on the use of enhanced coverage for any SMF with which the UE has an established PDU session the AMF updates the SMF with the indication on the use of extended NAS timer setting as described in 3GPP TS 23.501 [8] and 3GPP TS 23.502 [9]

### 5.3.19 handling of congestion control for transport of user data via the control plane

the network may activate congestion control for transport of user data via the control plane as specified in 3GPP TS 23.501 [8]

if the UE has indicated support for the control plane CIoT 5GS optimizations and the network decides to activate the congestion control for transport of user data via the control plane the network may include a value for the control plane data back-off timer T3448 in REGISTRATION ACCEPT SERVICE ACCEPT or SERVICE REJECT message and shall store a control plane data back-off time on a per UE basis the UE starts the timer T3448 with the value informed in the message to avoid that large numbers of UEs simultaneously initiate deferred requests the network should select the value for the timer T3448 for the informed UEs so that timeouts are not synchronised based on local policy the network need not include a value for the control plane data back-off timer T3448 in REGISTRATION ACCEPT SERVICE ACCEPT or SERVICE REJECT message to a UE configured for high priority access in selected PLMN

the network sends REGISTRATION ACCEPT message or SERVICE ACCEPT message without T3448 value IE to stop the timer T3448 running in the UE as specified in subclause 5.5.1.3.4 and subclause 5.6.1.4

based on the stored control plane data back-off time for the UE the network may reject the transfer of user data via the control plane initiated by the UE based on local policy the network shall not reject the transfer of user data via the control plane initiated by a UE configured for high priority access in selected PLMN

while the timer T3448 is running the UE in 5GMM-IDLE mode does not initiate the transport of user data via the control plane procedure except if the UE is allowed to use exception data reporting (see the ExceptionDataReportingAllowed leaf of the NAS configuration MO in 3GPP TS 24.368 [17] or the USIM file EFNASCONFIG in 3GPP TS 31.102 [22]) and the user data is related to an exceptional event

the UE is allowed

a) to respond to paging with CONTROL PLANE SERVICE REQUEST message without uplink data; or

b) to send a CONTROL PLANE SERVICE REQUEST message for emergency services or for emergency services fallback;

even if the timer T3448 is running

upon entering the state 5GMM-DEREGISTERED or a new PLMN which is not equivalent to the PLMN where the UE started the timer T3448 or upon being switched off while the timer T3448 is running the UE stops the timer T3448

### 5.3.19A specific requirements for UE configured to use timer T3245

#### 5.3.19A.1 UE not operating in SNPN access operation mode

the following requirements apply for a UE that is configured to use timer T3245 (see 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22])

when the UE adds a PLMN identity to the "forbidden PLMN list" or sets the USIM as invalid for 5GS services for 3GPP access or non-3GPP access and timer T3245 (see 3GPP TS 24.008 [12]) is not running the UE shall start timer T3245 as specified in 3GPP TS 24.008 [12] subclause 4.1.1.6

upon expiry of the timer T3245 the UE shall erase the "forbidden PLMN list" and "forbidden PLMNs for GPRS service" list and set the USIM to valid for 5GS services for 3GPP access and non-3GPP access when the lists are erased the UE performs cell selection according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C]

if the UE is switched off when the timer T3245 is running the UE shall behave as follows when the UE is switched on and the USIM in the UE remains the same

- let t1 be the time remaining for T3245 timeout at switch off and let t be the time elapsed between switch off and switch on if t1 is greater than t then the timer shall be restarted with the value t1 – t if t1 is equal to or less than t then the UE will follow the behaviour as defined in the paragraph above upon expiry of the timer T3245 if the UE is not capable of determining t then the UE shall restart the timer with the value t1

#### 5.3.19A.2 UE operating in SNPN access operation mode

the following requirements apply for a UE that is configured to use timer T3245 (see 3GPP TS 24.368 [17])

when the UE adds an SNPN to the "permanently forbidden SNPNs" list or "temporarily forbidden SNPNs" list which are if the MS supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription or sets the selected entry of the "list of subscriber data" or the selected PLMN subscription as invalid for 3GPP access or non-3GPP access and timer T3245 (see 3GPP TS 24.008 [12]) is not running the UE shall start timer T3245 with a random value uniformly drawn from the range between 12h and 24h

when the UE adds an SNPN to the "permanently forbidden SNPNs for access for localized services in SNPN" list or "temporarily forbidden SNPNs for access for localized services in SNPN" list which are associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription for 3GPP access or non-3GPP access and timer T3245 is not running

a) if there is no next valid time period for the SNPN the UE shall start timer T3245 with a random value uniformly drawn from the range between 12h and 24h; or

b) if there is next valid time period for the SNPN the UE shall start timer T3245 with a random value uniformly drawn from the range between the start time point and the end time point of the next valid time period for localized services in SNPN

NOTE 1 the random value to calculate the value of timer T3245 can be UE implementation-specific value for the UE to perform SNPN selection for localized services in SNPN and receive localized services in the SNPN before the valid time of localized services ends

upon expiry of the timer T3245 the UE shall erase the "permanently forbidden SNPNs" list(s) and "temporarily forbidden SNPNs" list(s) and set the selected entry of the "list of subscriber data" or the selected PLMN subscription to valid for 3GPP access and non-3GPP access when the lists are erased the UE performs cell selection according to 3GPP TS 38.304 [28]

if the UE is switched off when the timer T3245 is running the UE shall behave as follows when the UE is switched on and the selected entry of the "list of subscriber data" or the selected PLMN subscription remain the same

- let t1 be the time remaining for T3245 timeout at switch off and let t be the time elapsed between switch off and switch on if t1 is greater than t then the timer shall be restarted with the value t1 – t if t1 is equal to or less than t then the UE will follow the behaviour as defined in the paragraph above upon expiry of the timer T3245 if the UE is not capable of determining t then the UE shall restart the timer with the value t1

### 5.3.20 specific requirements for UE when receiving non-integrity protected reject messages

#### 5.3.20.1 general

this subclause specifies the requirements for a UE that is not configured to use timer T3245 (see 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22]) and receives a REGISTRATION REJECT or SERVICE REJECT message without integrity protection with specific 5GMM causes

NOTE additional UE requirements for this case requirements for other 5GMM causes and requirements for the case when the UE receives an integrity protected reject message are specified in subclauses 5.5.1 and 5.6.1

#### 5.3.20.2 requirements for UE in a PLMN

the UE shall maintain

a) a list of PLMN-specific attempt counters (see 3GPP TS 24.301 [15]) the maximum number of possible entries in the list is implementation dependent this list is applicable to access attempts via 3GPP access only;

b) a list of PLMN-specific attempt counters for non-3GPP access if the UE supports non-3GPP access the maximum number of possible entries in the list is implementation dependent this list is applicable to access attempts via non-3GPP access only;

c) a list of PLMN-specific N1 mode attempt counters for 3GPP access the maximum number of possible entries in the list is implementation dependent this list is applicable to access attempts via 3GPP access only;

d) a list of PLMN-specific N1 mode attempt counters for non-3GPP access if the UE supports non-3GPP access the maximum number of possible entries in the list is implementation dependent this list is applicable to access attempts via non-3GPP access only;

e) one counter for "SIM/USIM considered invalid for GPRS services" events (see 3GPP TS 24 008 [12]);

f) one counter for "USIM considered invalid for 5GS services over non-3GPP access" events if the UE supports non-3GPP access; and

g)- a list of PLMN-specific attempt counters for the UE determined PLMN with disaster condition if the UE supports MINT the maximum number of possible entries in the list is implementation dependent this list is applicable to access attempts via 3GPP access only

a UE supporting non-EPS services shall maintain one counter for "SIM/USIM considered invalid for non-GPRS services" events (see 3GPP TS 24.008 [12])

the UE shall store the above lists of attempt counters and the event counters in its non-volatile memory the UE shall erase the lists and reset the event counters to zero when the UICC containing the USIM is removed the counter values shall not be affected by the activation or deactivation of MICO mode or power saving mode (see 3GPP TS 24.301 [15])

the UE implementation-specific maximum value for any of the above counters shall not be greater than 10

NOTE 1 different counters can use different UE implementation-specific maximum values

if the UE receives a REGISTRATION REJECT or SERVICE REJECT message without integrity protection with 5GMM cause value #3 #6 #7 #11 #12 #13 #15 #27 #31 #36 #62 #72 #73 or #80 before the network has established secure exchange of NAS messages for the N1 NAS signalling connection the UE shall stop timer T3510 or T3517 if running and start timer T3247 (see 3GPP TS 24.008 [12]) with a random value uniformly drawn from the range between 30 minutes and 60 minutes if the timer is not running and take the following actions

1) if the 5GMM cause value received is #3 #6 or #7 and

a) if the 5GMM cause value is received over 3GPP access the UE shall

i) if the UE is already registered over another access

- store the current TAI in the list of "5GS forbidden tracking areas for roaming" memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for non-integrity protected NAS reject message and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE; and

- search for a suitable cell in another tracking area according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C]; or

ii) otherwise if the counter for "SIM/USIM considered invalid for GPRS services" events has a value less than a UE implementation-specific maximum value

- set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete 5G-GUTI last visited registered TAI TAI list and ngKSI for 3GPP access;

- if the 5GMM cause value received is #3 or #6 delete the list of equivalent PLMNs if any;

- increment the counter for "SIM/USIM considered invalid for GPRS services" events;

- if the 5GMM cause value received is #3 or #6 and if the counter for "SIM/USIM considered invalid for non-GPRS services" events has a value less than a UE implementation-specific maximum value increment the counter;

- if a registration procedure was performed reset the registration attempt counter and if a service request procedure was performed reset the service request attempt counter;

- if the UE is operating in single-registration mode handle the EMM parameters EMM state EPS update status EPS attach attempt counter tracking area updating attempt counter or service request attempt counter 4G-GUTI TAI list eKSI as specified in 3GPP TS 24.301 [15] for the case when the EPS attach tracking area updating procedure or service request procedure is rejected with the EMM cause of the same value in a NAS message without integrity protection;

- store the current TAI in the list of "5GS forbidden tracking areas for roaming" memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for non-integrity protected NAS reject message and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE; and

- search for a suitable cell in another tracking area according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C]; and as a UE implementation option the UE may perform registration attempt over the non-3GPP access if non-3GPP access is available and the USIM is not considered invalid for 5GS services over non-3GPP access; and

iii) otherwise proceed as specified in subclauses 5.5.1 and 5.6.1;

b) if the 5GMM cause value is received over non-3GPP access the UE shall

i) if the UE is already registered over another access

- enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE; and

- may perform registration attempt over the non-3GPP access if another access point for non-3GPP access is available; or

ii) otherwise if the counter for "USIM considered invalid for 5GS services over non-3GPP access" events has a value less than a UE implementation-specific maximum value

- set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete the 5G-GUTI last visited registered TAI TAI list and ngKSI for non-3GPP access;

- enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE;

- increment the counter for "USIM considered invalid for 5GS services over non-3GPP access" events; and as a UE implementation option the UE may either perform registration attempt over the non-3GPP access if another access point for non-3GPP access is available or if 3GPP access is available and the USIM is not considered invalid for 5GS services over 3GPP access perform registration attempt over the 3GPP access; and

NOTE 2 how to select another access point for non-3GPP access is implementation specific

iii) otherwise proceed as specified in subclauses 5.5.1 and 5.6.1;

2) if the 5GMM cause value received is #12 #13 or #15 the UE shall proceed as specified in subclauses 5.5.1 and 5.6.1 additionally the UE may

a) if the 5GMM cause value is received over 3GPP access non-3GPP access is available the UE is not registered over non-3GPP access yet and the USIM is not considered invalid for 5GS services over non-3GPP access perform registration attempt over the non-3GPP access; or

b) if the 5GMM cause value is received over non-3GPP access 3GPP access is available the UE is not registered over 3GPP access yet and the USIM is not considered invalid for 5GS services over 3GPP access perform registration attempt over the 3GPP access;

3) if the 5GMM cause value received is #11 #36 or #73 and the UE is in its HPLMN or EHPLMN

a) if the 5GMM cause value is received over 3GPP access the UE shall

- set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete the 5G-GUTI last visited registered TAI TAI list ngKSI for 3GPP access and the list of equivalent PLMNs additionally if a registration procedure was performed the UE shall reset the registration attempt counter and if a service request procedure was performed reset the service request attempt counter;

- if the 5GMM cause value received is #11 and the UE is operating in single-registration mode handle the EMM parameters EMM state EPS update status EPS attach attempt counter tracking area updating attempt counter or service request attempt counter 4G-GUTI TAI list eKSI as specified in 3GPP TS 24.301 [15] for the case when the EPS attach tracking area updating procedure or service request procedure is rejected with the EMM cause of the same value in a NAS message without integrity protection;

- if the 5GMM cause value received is #73 and the UE is operating in single-registration mode the UE shall in addition set the EPS update status to EU3 ROAMING NOT ALLOWED and shall delete any 4G-GUTI last visited registered TAI TAI list and eKSI additionally the UE shall reset the attach attempt counter or tracking area updating attempt counter and enter the state EMM-DEREGISTERED;

- store the current TAI in the list of "5GS forbidden tracking areas for roaming" memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for non-integrity protected NAS reject message and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE; and

- search for a suitable cell in another tracking area according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C]; and as a UE implementation option the UE may perform registration attempt over the non-3GPP access if non-3GPP access is available the UE is not registered over non-3GPP access yet and the USIM is not considered invalid for 5GS services over non-3GPP access;

b) if the 5GMM cause value is received over non-3GPP access the UE shall

- set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete the 5G-GUTI last visited registered TAI TAI list and ngKSI for non-3GPP access additionally if a registration procedure was performed the UE shall reset the registration attempt counter and if a service request procedure was performed reset the service request attempt counter; and

- enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE as a UE implementation option the UE may perform registration attempt over the non-3GPP access if another access point for non-3GPP access is available or if 3GPP access is available the UE is not registered over 3GPP access yet and the USIM is not considered invalid for 5GS services over 3GPP access perform registration attempt over the 3GPP access;

4) if the 5GMM cause value received is #11 #36 or #73 and the UE is not in its HPLMN or EHPLMN in addition to the UE requirements specified in subclause 5.5.1 and 5.6.1

- if the message was received via 3GPP access and if the PLMN-specific attempt counter for the PLMN sending the reject message has a value less than a UE implementation-specific maximum value the UE shall increment the PLMN-specific attempt counter for the PLMN; or

- if the message was received via non-3GPP access and if the PLMN-specific attempt counter for non-3GPP access for the PLMN sending the reject message has a value less than a UE implementation-specific maximum value the UE shall increment the PLMN-specific attempt counter for non-3GPP access for the PLMN;

5) if the 5GMM cause value received is #27 the UE shall proceed as specified in subclauses 5.5.1 and 5.6.1 additionally if the PLMN-specific N1 mode attempt counter for the respective access type and for the PLMN sending the reject message has a value less than a UE implementation-specific maximum value the UE shall increment this counter for the PLMN;

6) if the 5GMM cause value received is #72 the UE shall proceed as specified in subclauses 5.5.1 and 5.6.1 additionally if the PLMN-specific N1 mode attempt counter for non-3GPP access for the PLMN sending the reject message has a value less than a UE implementation-specific maximum value the UE shall increment this counter for the PLMN;

7) if the 5GMM cause value received is #31 for a UE that has indicated support for CIoT optimizations the UE may discard the message or alternatively the UE should

- set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2);

- store the current TAI in the list of "5GS forbidden tracking areas for roaming" memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for non-integrity protected NAS reject message; and

- search for a suitable cell in another tracking area according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C]; and

8) if the 5GMM cause value received is #62 the UE may discard the message or alternatively the UE should

- set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2);

- store the current TAI in the list of "5GS forbidden tracking areas for roaming" memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for non-integrity protected NAS reject message; and

- search for a suitable cell in another tracking area according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C]

9) if the 5GMM cause value received is #80 the UE shall proceed as specified in subclauses 5.5.1 if the PLMN-specific attempt counter of the PLMN which sent the reject message for the UE determined PLMN with disaster condition has a value less than a UE implementation-specific maximum value the UE shall increment the PLMN-specific attempt counter of the PLMN which sent the reject message for the UE determined PLMN with disaster condition

upon expiry of timer T3247 the UE shall

- remove all tracking areas from the list of "5GS forbidden tracking areas for regional provision of service" and the list of "5GS forbidden tracking areas for roaming" which were stored in these lists for non-integrity protected NAS reject message;

- set the USIM to valid for 5GS services for 3GPP access if

- the counter for "SIM/USIM considered invalid for GPRS services" events has a value less than a UE implementation-specific maximum value;

- set the USIM to valid for 5GS services for non-3GPP access if

- the counter for "USIM considered invalid for 5GS services over non-3GPP access" events has a value less than a UE implementation-specific maximum value;

- set the USIM to valid for non-EPS services if

- the counter for "SIM/USIM considered invalid for non-GPRS services" events has a value less than a UE implementation-specific maximum value;

- for each PLMN-specific attempt counter that has a value greater than zero and less than a UE implementation-specific maximum value remove the respective PLMN from the extension of the "forbidden PLMNs" list;

- for each PLMN-specific attempt counter for non-3GPP access that has a value greater than zero and less than a UE implementation-specific maximum value remove the respective PLMN from the list of "forbidden PLMNs for non-3GPP access to 5GCN";

- re-enable the N1 mode capability for 3GPP access and for each PLMN-specific N1 mode attempt counter for 3GPP access that has a value greater than zero and less than a UE implementation-specific maximum value remove the respective PLMN from the list of PLMNs where N1 mode is not allowed for 3GPP access (see 3GPP TS 23.122 [5]);

- re-enable the N1 mode capability for non-3GPP access and for each PLMN-specific N1 mode attempt counter for non-3GPP access that has a value greater than zero and less than a UE implementation-specific maximum value remove the respective PLMN from the list of PLMNs where N1 mode is not allowed for non-3GPP access;

- if the UE is supporting A/Gb mode or iu mode perform the actions as specified in 3GPP TS 24.008 [12] for the case when timer T3247 expires;

- if the UE is supporting S1 mode perform the actions as specified in 3GPP TS 24.301 [15] for the case when timer T3247 expires;

- initiate a registration procedure if still needed dependent on 5GMM state and 5GS update status or perform PLMN selection according to 3GPP TS 23.122 [5]; and

- for each PLMN-specific attempt counter of the PLMN which sent the reject message for the UE determined PLMN with disaster condition that has a value greater than zero and less than a UE implementation-specific maximum value consider the PLMN which sent the reject message is available for disaster roaming service for the respective UE determined PLMN with disaster condition

when the UE is switched off the UE shall for each PLMN-specific attempt counter that has a value greater than zero and less than the UE implementation-specific maximum value remove the respective PLMN from the list of "forbidden PLMNs" when the USIM is removed the UE should perform this action

when the UE is switched off the UE shall for each PLMN-specific attempt counter for non-3GPP access that has a value greater than zero and less than the UE implementation-specific maximum value remove the respective PLMN from the list of "forbidden PLMNs for non-3GPP access to 5GCN" when the USIM is removed the UE should perform this action

when the UE is switched off the UE shall for each PLMN-specific attempt counter of the PLMN which sent the reject message for the UE determined PLMN with disaster condition that has a value greater than zero and less than the UE implementation-specific maximum value consider the PLMN is available for disaster roaming service for the respective UE determined PLMN with disaster condition when the USIM is removed the UE should perform this action

when the PLMN is removed from the list of "forbidden PLMNs" including extension of the "forbidden PLMNs" list due to reasons specified in subclause 4.4.6 or annex c in 3GPP TS 23.122 [5] the UE shall reset the PLMN-specific attempt counter for that PLMN

NOTE 3 if the respective PLMN was stored in the extension of the "forbidden PLMNs" list then according to 3GPP TS 23.122 [5] the UE will delete the contents of this extension when the UE is switched off or the USIM is removed

#### 5.3.20.3 requirements for UE in an SNPN

if the UE is operating in SNPN access operation mode the UE shall maintain for each of the entries in the "list of subscriber data"

a) one SNPN-specific attempt counter for 3GPP access the counter is applicable to access attempts via 3GPP access only;

b) one SNPN-specific attempt counter for non-3GPP access if the UE supports access to SNPN over non-3GPP access the counter is applicable in case of access to SNPN over non-3GPP access only;

NOTE 1 if the UE accesses to SNPN service directly over non-3GPP access or if the UE accesses to SNPN services via a PLMN the SNPN-specific attempt counter for non-3GPP access is used

c)one counter for "the entry for the current SNPN considered invalid for 3GPP access" events; and

d) one counter for "the entry for the current SNPN considered invalid for non-3GPP access" events if the UE supports access to SNPN over non-3GPP access the counter is applicable in case of access to SNPN over non-3GPP access only

NOTE 2 if the UE accesses to SNPN service directly over non-3GPP access or if the UE accesses to SNPN services via a PLMN the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events is used.The UE shall store the above counters in its non-volatile memory the UE shall erase the attempt counters and reset the event counters to zero when the selected entry of the "list of subscriber data" is updated or USIM is removed for the selected PLMN subscription the counter values shall not be affected by the activation or deactivation of MICO mode or power saving mode (see 3GPP TS 24.301 [15])

the UE implementation-specific maximum value for any of the above counters shall not be greater than 10

NOTE 3 different counters can use different UE implementation-specific maximum values

if the UE receives a REGISTRATION REJECT or SERVICE REJECT message without integrity protection with 5GMM cause value #3 #6 #7 #12 #13 #15 #27 #36 #72 #74 or #75 before the network has established secure exchange of NAS messages for the N1 NAS signalling connection the UE shall stop timer T3510 or T3517 if running if the SNPN sending the message is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) and there is next valid time period(s) for the SNPN the UE shall start timer T3247 (see 3GPP TS 24.008 [12]) with a random value uniformly drawn from the range between the start time point of the next valid time period for localized services in SNPN and

a) for 5GMM cause value #36 or #74

1) 30 minutes after the start time point of the next valid time period for localized services in SNPN if the next valid time period is longer than 30 minutes; or

2) the end time point of the next valid time period for localized services in SNPN if the next valid time period is not longer than 30 minutes; or

b) for other 5GMM cause values

1) 60 minutes after the start time point of the next valid time period for localized services in SNPN if the next valid time period is longer than 60 minutes; or

2) the end time point of the next valid time period for localized services in SNPN if the next valid time period is not longer than 60 minutes;

otherwise between

a) 15 minutes and 30 minutes for 5GMM cause value #36 or #74; or

b) 30 minutes and 60 minutes for other 5GMM cause values;

if the timer is not running and take the following actions

a) if the 5GMM cause value received is #3 #6 or #7 and the UE is neither registered for onboarding services in SNPN nor performing initial registration for onboarding services in SNPN

1) if the 5GMM cause value is received over 3GPP access

i) if the UE is already registered over another access the UE shall

A) store the current TAI in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the selected entry of the "list of subscriber data" or the selected PLMN subscription memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the selected entry of the "list of subscriber data" or the selected PLMN subscription for non-integrity protected NAS reject message and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE; and

B) search for a suitable cell in another tracking area according to 3GPP TS 38.304 [28]; or

ii) otherwise if the counter for "the entry for the current SNPN considered invalid for 3GPP access" events has a value less than a UE implementation-specific maximum value the UE shall

A) set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete 5G-GUTI last visited registered TAI TAI list and ngKSI for 3GPP access;

A1) if the 5GMM cause value received is #3 or #6 delete the list of equivalent SNPNs if any;

B) increment the counter for "the entry for the current SNPN considered invalid for 3GPP access" events;

C) reset the registration attempt counter in case of a REGISTRATION REJECT message or reset the service request attempt counter in case of a SERVICE REJECT message;

D) store the current TAI in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the selected entry of the "list of subscriber data" or the selected PLMN subscription memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the selected entry of the "list of subscriber data" or the selected PLMN subscription for non-integrity protected NAS reject message and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE; and

E) search for a suitable cell in another tracking area according to 3GPP TS 38.304 [28] as a UE implementation option if access to SNPN over non-3GPP access is available and the selected entry of the "list of subscriber data" or the selected PLMN subscription is not considered invalid for non-3GPP access then the UE may perform registration attempt over non-3GPP access; or

iii) otherwise the UE shall proceed as specified in subclauses 5.5.1 and 5.6.1;

2) if the 5GMM cause value is received over non-3GPP access

i) if the UE is already registered over another access the UE shall enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE; or

ii) otherwise if the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events has a value less than a UE implementation-specific maximum value the UE shall

A) set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete the 5G-GUTI last visited registered TAI TAI list and ngKSI for non-3GPP access;

B) enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE; and

C) increment the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events as a UE implementation option if 3GPP access is available and the selected entry of the "list of subscriber data" or the selected PLMN subscription is not considered invalid for 3GPP access then the UE may make a registration attempt over 3GPP access; or

iii) otherwise the UE shall proceed as specified in subclauses 5.5.1 and 5.6.1;

b) if the 5GMM cause value received is #12 #13 or #15 the UE shall proceed as specified in subclauses 5.5.1 and 5.6.1 additionally

1) if the 5GMM cause value is received over 3GPP access access to SNPN over non-3GPP access is available the UE is not registered over non-3GPP access yet and the selected entry of the "list of subscriber data" or the selected PLMN subscription is not considered invalid for non-3GPP access the UE may perform registration attempt over non-3GPP access; or

2) if the 5GMM cause value is received over non-3GPP access 3GPP access is available the UE is not registered to the current SNPN over 3GPP access yet and the selected entry of the "list of subscriber data" or the selected PLMN subscription is not considered invalid for 3GPP access the UE may make a registration attempt over 3GPP access;

c) if the 5GMM cause value received is #27 the UE shall proceed as specified in subclauses 5.5.1 and 5.6.1 additionally if the SNPN-specific attempt counter for the respective access type and for the current SNPN has a value less than a UE implementation-specific maximum value the UE shall increment this counter for the SNPN;

c1) if the 5GMM cause value received is #72 the UE shall proceed as specified in subclauses 5.5.1 and 5.6.1 additionally if the SNPN-specific attempt counter for non-3GPP access for the current SNPN has a value less than a UE implementation-specific maximum value the UE shall increment this counter for the SNPN; and

d) if

1) the 5GMM cause value received is #36 #74 or #75; or

2) the 5GMM cause value received is #3 #6 or #7 and the UE is registered for onboarding services in SNPN or performing initial registration for onboarding services in SNPN;

in addition to the UE requirements specified in subclauses 5.5.1 and 5.6.1

1) if the message was received via 3GPP access and if the SNPN-specific attempt counter for 3GPP access for the SNPN sending the reject message has a value less than a UE implementation-specific maximum value the UE shall increment the SNPN-specific attempt counter for 3GPP access for the SNPN; or

2) if the message was received via non-3GPP access and if the SNPN-specific attempt counter for non-3GPP access for the SNPN sending the reject message has a value less than a UE implementation-specific maximum value the UE shall increment the SNPN-specific attempt counter for non-3GPP access for the SNPN

upon expiry of timer T3247 the UE shall

a) remove for each SNPN all tracking areas from the list of "5GS forbidden tracking areas for regional provision of service" and the list of "5GS forbidden tracking areas for roaming" for the SNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the selected entry of the "list of subscriber data" or the selected PLMN subscription which were stored in these lists for non-integrity protected NAS reject message;

b) set each entry of the "list of subscriber data" or the PLMN subscription to valid for 3GPP access if the corresponding counter for "the entry for the current SNPN considered invalid for 3GPP access" events has a value less than a UE implementation-specific maximum value;

c) set each entry of the "list of subscriber data" or the PLMN subscription to valid for non-3GPP access if the corresponding counter for "the entry for the current SNPN considered invalid for non-3GPP access" events has a value less than a UE implementation-specific maximum value;

d) remove each SNPN identity from

1) the "permanently forbidden SNPNs" list for 3GPP access or "temporarily forbidden SNPNs" list for 3GPP access which are if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription

2) "permanently forbidden SNPNs for access for localized services in SNPN" list for 3GPP access or "temporarily forbidden SNPNs for access for localized services in SNPN" list for 3GPP access associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription; or

3) "permanently forbidden SNPNs for onboarding services in SNPN" list for 3GPP access or "temporarily forbidden SNPNs for onboarding services in SNPN" list for 3GPP access;

if the corresponding SNPN-specific attempt counter for 3GPP access has a value greater than zero and less than a UE implementation-specific maximum value and the SNPN identity is included in any of the "permanently forbidden SNPNs" list for 3GPP access "temporarily forbidden SNPNs" list for 3GPP access "permanently forbidden SNPNs for access for localized services in SNPN" list for 3GPP access "temporarily forbidden SNPNs for access for localized services in SNPN" list for 3GPP access "permanently forbidden SNPNs for onboarding services in SNPN" list for 3GPP access or "temporarily forbidden SNPNs for onboarding services in SNPN" list for 3GPP access;

- remove each SNPN identity from

1) the "permanently forbidden SNPNs" list for non-3GPP access or "temporarily forbidden SNPNs" list for non-3GPP access which are if the MS supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription or

2) "permanently forbidden SNPNs for onboarding services in SNPN" list for non-3GPP access or "temporarily forbidden SNPNs for onboarding services in SNPN" list for non-3GPP access;

if the corresponding SNPN-specific attempt counter for non-3GPP access has a value greater than zero and less than a UE implementation-specific maximum value and the SNPN identity is included in any of the "permanently forbidden SNPNs" list for non-3GPP access "temporarily forbidden SNPNs" list for non-3GPP access "permanently forbidden SNPNs for onboarding services in SNPN" list for non-3GPP access or "temporarily forbidden SNPNs for onboarding services in SNPN" list for non-3GPP access;

- re-enable the N1 mode capability for 3GPP access and for each SNPN-specific attempt counter for 3GPP access that has a value greater than zero and less than a UE implementation-specific maximum value remove the respective SNPN from the list of SNPNs for which the N1 mode capability was disabled due to receipt of a reject from the network with 5GMM cause #27 "N1 mode not allowed" (see 3GPP TS 23.122 [5]);

- re-enable the N1 mode capability for non-3GPP access and for each SNPN-specific attempt counter for non-3GPP access that has a value greater than zero and less than a UE implementation-specific maximum value remove the respective SNPN from the list of SNPNs for which N1 mode capability was disabled for non-3GPP access due to receipt of a reject from the network with 5GMM cause #27 "N1 mode not allowed" or 5GMM cause #72 "non-3GPP access to 5GCN not allowed"; and

- initiate a registration procedure if still needed dependent on 5GMM state and 5GS update status or perform SNPN selection according to 3GPP TS 23.122 [5]

when the UE is switched off or a UICC containing the USIM is removed

a) for each SNPN-specific attempt counter for 3GPP access having a value greater than zero and less than the UE implementation-specific maximum value the UE shall remove the respective SNPN identity from the "permanently forbidden SNPNs" list(s) for 3GPP access "temporarily forbidden SNPNs" list(s) for 3GPP access "permanently forbidden SNPNs for access for localized services in SNPN" list(s) for 3GPP access "temporarily forbidden SNPNs for access for localized services in SNPN" list(s) for 3GPP access "permanently forbidden SNPNs for onboarding services in SNPN" list for 3GPP access or "temporarily forbidden SNPNs for onboarding services in SNPN" list for 3GPP access if available; and

b) for each SNPN-specific attempt counter for non-3GPP access having a value greater than zero and less than the UE implementation-specific maximum value the UE shall remove the respective SNPN identity from the "permanently forbidden SNPNs" list(s) for non-3GPP access "temporarily forbidden SNPNs" list(s) for non-3GPP access "permanently forbidden SNPNs for onboarding services in SNPN" list for non-3GPP access or "temporarily forbidden SNPNs for onboarding services in SNPN" list for non-3GPP access if available

when an entry of the "list of subscriber data" is updated

a) if the UE does not support access to an SNPN using credentials from a credentials holder and equivalent SNPNs and the SNPN-specific attempt counter for 3GPP access for the SNPN corresponding to the entry has a value greater than zero and less than the UE implementation-specific maximum value the UE shall remove the SNPN identity corresponding to the entry from the "permanently forbidden SNPNs" list for 3GPP access or "temporarily forbidden SNPNs" list for 3GPP access if available;

b) if the UE does not support access to an SNPN using credentials from a credentials holder and equivalent SNPNs and the SNPN-specific attempt counter for non-3GPP access for the SNPN corresponding to the entry has a value greater than zero and less than the UE implementation-specific maximum value the UE shall remove the SNPN identity corresponding to the entry from the "permanently forbidden SNPNs" list for non-3GPP access or "temporarily forbidden SNPNs" list for non-3GPP access if available;

c) if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both and the SNPN-specific attempt counter for 3GPP access for an SNPN in the "permanently forbidden SNPNs" list for 3GPP access or "temporarily forbidden SNPNs" list for 3GPP access associated with the entry has a value greater than zero and less than the UE implementation-specific maximum value the UE shall remove the SNPN identity corresponding to the SNPN from the "permanently forbidden SNPNs" list for 3GPP access or "temporarily forbidden SNPNs" list for 3GPP access associated with the entry;

d) if the UE supports access to an SNPN providing access for localized services in SNPN and the SNPN-specific attempt counter for 3GPP access for an SNPN in the "permanently forbidden SNPNs for access for localized services in SNPN" list or "temporarily forbidden SNPNs for access for localized services in SNPN" list associated with the entry has a value greater than zero and less than the UE implementation-specific maximum value the UE shall remove the SNPN identity corresponding to the SNPN from the "permanently forbidden SNPNs for access for localized services in SNPN" list or "temporarily forbidden SNPNs for access for localized services in SNPN" list for 3GPP access associated with the entry; and

e) if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both and the SNPN-specific attempt counter for non-3GPP access for an SNPN in the "permanently forbidden SNPNs" list for non-3GPP access or "temporarily forbidden SNPNs" list for non-3GPP access associated with the entry has a value greater than zero and less than the UE implementation-specific maximum value the UE shall remove the SNPN identity corresponding to the SNPN from the "permanently forbidden SNPNs" list for non-3GPP access or "temporarily forbidden SNPNs" list for non-3GPP access associated with the entry

### 5.3.21 CIoT 5GS optimizations

CIoT 5GS optimizations provide improved support of small data and SMS transfer a UE supporting CIoT 5GS optimizations can indicate the 5GS CIoT network behaviour the UE can support and prefers to use during the registration procedure (see 3GPP TS 23.502 [9]) the UE may indicate the support for control plane CIoT 5GS optimization user plane CIoT 5GS optimization N3 data transfer and header compression (see subclause 9.11.3.1) furthermore the UE may separately from the indication of support indicate preference for control plane CIoT 5GS optimization or user plane CIoT 5GS optimization (see subclause 9.11.3.9A) the indication of preference is also considered as the request to use a UE supporting CIoT EPS optimizations can also indicate the EPS CIoT network behaviour the UE can support during the registration procedure furthermore the UE may separately from the indication of support indicate preference for control plane CIoT EPS optimization or user plane CIoT EPS optimization

NOTE 1 CIoT 5GS optimizations are not supported by NR connected to 5GCN

NOTE 2 if the UE does not support user plane CIoT 5GS optimization it does not indicate preference for user plane CIoT 5GS optimization

the UE can be in NB-N1 mode or WB-N1 mode when requesting the use of CIoT 5GS optimizations during the registration procedure a UE in NB-N1 mode always indicates support for control plane CIoT 5GS optimization

in NB-N1 mode the UE when requesting the use of CIoT 5GS optimizations does not

a) request an initial registration for emergency services;

b) request a PDU session establishment for emergency PDU session; or

c) indicate UE's usage setting during the registration procedure

the network does not indicate to the UE support of emergency services when the UE is in NB-N1 mode (see subclause 5.5.1.2.4 and 5.5.1.3.4)

the control plane CIoT 5GS optimization enables support of efficient transport of user data (IP ethernet and Unstructured) or SMS messages over control plane via the AMF without triggering user-plane resources establishment the support of control plane CIoT 5GS optimization is mandatory for the network in NB-N1 mode and optional in WB-N1 mode optional header compression of IP data and ethernet data can be applied to PDU sessions with IP PDU session type and ethernet PDU session type that are configured to support header compression for IP header compression robust header compression (ROHC) protocol specified in IETF RFC 5795 [39B] is used for ethernet header compression ethernet header compression (EHC) protocol specified in 3GPP TS 38.323 [29] is used

for a UE that supports location services (LCS) notification mechanisms in N1 mode the control plane CIoT 5GS optimization also enables the transport of location services messages from 5GMM-IDLE mode using the CONTROL PLANE SERVICE REQUEST message when location services are requested (see subclause 6.7.1 in 3GPP TS 23.273 [6B])

the user plane CIoT 5GS optimization enables support for change from 5GMM-IDLE mode over 3GPP access to 5GMM-CONNECTED mode over 3GPP access without the need for using the service request procedure (see subclause 5.3.1.5)

if the UE supports user plane CIoT 5GS optimization it shall also support N3 data transfer

if the UE indicates support of one or more CIoT 5GS optimizations and the network supports one or more CIoT 5GS optimizations and decides to accept the registration request the network indicates the supported CIoT 5GS optimizations to the UE per registration area when accepting the UE request network indication of support is interpreted by the UE as the acceptance to use the respective feature after completion of the registration procedure the UE and the network can then use the accepted CIoT 5GS optimizations for the transfer of user data (IP ethernet unstructured and SMS)

a UE in NB-N1 mode or WB-N1 mode can request the use of SMS over NAS by setting the SMS requested bit of the 5GS update type IE in the REGISTRATION REQUEST message as specified in subclauses 5.5.1.2.2 and 5.5.1.3.2

the AMF indicates whether it allows the use of SMS over NAS for a UE in NB-N1 mode or WB-N1 mode by setting the SMS allowed bit of the 5GS registration result IE in the REGISTRATION ACCEPT message as specified in subclauses 5.5.1.2.4 and 5.5.1.3.4

if the UE and the network support both the control plane CIoT 5GS optimization and N3 data transfer then when receiving the UE's request for a PDU session establishment the AMF decides whether the PDU session should be NEF PDU session or N6 PDU session as specified in 3GPP TS 23.501 [8] and then

a) if NEF PDU session is to be established for unstructured data type the AMF includes control plane only indication for the requested PDU session to the SMF;

b) if N6 PDU session is to be established and the DNN or S-NSSAI of the newly requested N6 PDU session supports interworking with EPS as specified in 3GPP TS 23.502 [9]

1) if there are existing N6 PDU sessions supporting interworking with EPS for this UE that were established with the control plane only indication the AMF includes the control plane only indication for the newly requested N6 PDU session to the SMF; or

2) if there are existing N6 PDU sessions supporting interworking with EPS for this UE that were established without the control plane only indication the AMF does not include the control plane only indication for the newly requested N6 PDU session to the SMF;

3) if there is no existing N6 PDU session supporting interworking with EPS for this UE the AMF determines whether to include the control plane only indication for the newly requested N6 PDU session to the SMF based on local policies the UE's preferred CIoT network behaviour and the supported CIoT network behaviour; and

c) if N6 PDU session is to be established and the DNN or S-NSSAI of the N6 PDU session does not support interworking with EPS as specified in 3GPP TS 23.502 [9] the AMF determines whether to include the control plane only indication for the newly requested N6 PDU session to the SMF based on local policies the UE's preferred CIoT network behaviour and the supported CIoT network behaviour

in NB-N1 mode if the UE or the network does not support N3 data transfer then when receiving the UE's request for a PDU session establishment the AMF decides whether the PDU session should be NEF PDU session or N6 PDU session as specified in 3GPP TS 23.501 [8] and then includes the control plane only indication for the requested PDU session to the SMF

if the network supports user plane CIoT 5GS optimization it shall also support N3 data transfer

broadcast system information may provide information about support of CIoT 5GS optimizations (see 3GPP TS 36.331 [25A]) at reception of new broadcast system information the lower layers deliver it to the 5GMM layer in the UE the information provided by lower layers is per PLMN and used by the UE to determine whether certain CIoT 5GS optimizations are supported in the cell

the UE shall not attempt to use CIoT 5GS optimizations which are indicated as not supported

in NB-N1 mode at any given time there cannot be user-plane resources established for a number of PDU sessions that exceeds the UE' s maximum number of supported user-plane resources the UE in NB-N1 mode shall not

a) request the establishment of user-plane resources for a number of PDU sessions that exceeds the UE' s maximum number of supported user-plane resources; or

b) initiate the establishment of a new PDU session or request the transfer of a PDU session from the non-3GPP access to the 3GPP access if

1) the UE has indicated preference for user plane CIoT 5GS optimization;

2) the network accepted the use of user plane CIoT 5GS optimization; and

3) the UE currently has user-plane resources established fora number of PDU sessions that is equal to the UE' s maximum number of supported user-plane resources

the AMF enforces a limit on the number of PDU sessions with active user-plane resources for a UE in NB-N1 mode based on the UE's maximum number of supported user-plane resources as follows

a) there can be a maximum of one PDU session with active user-plane resources when the multiple user-plane resources support bit is set to "Multiple user-plane resources not supported" or

b) there can be a maximum of two PDU sessions with active user-plane resources when the multiple user-plane resources support bit is set to "Multiple user-plane resources supported"

a PDU session for a UE in NB-N1 mode shall only have one QoS rule and that is the default QoS rule reflective QoS is not supported in NB-N1 mode reflective QoS is not applicable for a PDU session with control plane only indication

in NB-N1 mode when the UE requests the lower layer to establish a RRC connection and the UE requests the use of user plane CIoT 5GS optimization the UE shall pass an indication of the requested CIoT 5GS optimizations to the lower layers if the UE requests the use of N3 data transfer without user plane CIoT 5GS optimization then the UE shall also pass an indication of user plane CIoT 5GS optimization to lower layers

in WB-N1 mode when the UE requests the lower layer to establish a RRC connection and the UE requests the use of control plane CIoT 5GS optimization or user plane CIoT 5GS optimization the UE shall pass an indication of the requested CIoT 5GS optimizations to the lower layers

### 5.3.22 interaction between MICO mode with active time and extended idle mode DRX cycle

the UE can request the use of both MICO mode with active time and eDRX during a registration procedure but it is up to the network to decide to enable none one of them or both (see 3GPP TS 23.501 [8])

if the network accepts the use of both MICO mode with active time (see subclause 5.3.6) and eDRX (see subclause 5.3.16) the extended DRX parameters provided to the UE should allow for multiple paging occasions before the active timer expires

### 5.3.23 forbidden wireline access area

the AMF shall send a REGISTRATION REJECT SERVICE REJECT or DEREGISTRATION REQUEST message over a wireline access network with the 5GMM cause #77 "wireline access area not allowed" if conditions specified in 3GPP TS 23.316 [6D] for AMF's enforcement of forbidden area are fulfilled

if a REGISTRATION REJECT SERVICE REJECT or DEREGISTRATION REQUEST message is received over a wireline access network with the 5GMM cause #77 "wireline access area not allowed"

a) the 5G-RG shall not access 5GCN over the wireline access network until the 5G-RG is switched off the UICC containing the USIM is removed or the 5G-RG starts using another wireline access network;

NOTE when the 5G-RG acting on behalf of the AUN3 device receives a REGISTRATION REJECT SERVICE REJECT or DEREGISTRATION REQUEST message over a wireline access network with the 5GMM cause #77 "wireline access area not allowed" the 5G-RG acting on behalf of the AUN3 device can prevent reattempt of the same procedure until the AUN3 device is switched off or the UICC containing the USIM of the AUN3 device is removed

b) the W-AGF acting on behalf of the FN-CRG shall not access 5GCN until the W-AGF acting on behalf of the FN-CRG determines that the FN-CRG is switched off; and

c) the W-AGF acting on behalf of the N5GC device shall not access 5GCN until the W-AGF acting on behalf of the FN-CRG determines that the FN-CRG serving the N5GC device is switched off

### 5.3.24 WUS assistance

a UE supporting reception of WUS assistance information indicates its capability for reception of WUS assistance information during registration procedure (see 3GPP TS 23.501 [8]) the UE supporting WUS assistance information may include its UE paging probability information in the requested WUS assistance information IE in the REGISTRATION REQUEST message (see 3GPP TS 23.501 [8]) the UE shall not include its UE paging probability information during

a) a registration procedure for initial registration for emergency services (see subclause 5.5.1.2);

b) a registration procedure for initial registration for initiating an emergency PDU session (see subclause 5.5.1.2);

c) a registration procedure for mobility and periodic registration update (see subclause 5.5.1.3) for initiating an emergency PDU session if the UE is in the state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE; or

d) a registration procedure for mobility and periodic registration update (see subclause 5.5.1.3) when the UE has an emergency PDU session established

the UE and the network may negotiate the UE paging probability information during a registration procedure when the UE does not have an emergency PDU session the UE paging probability information is an assistance information used to determine the WUS group for paging UE (see 3GPP TS 23.501 [8] 3GPP TS 36.300 [25B])

NOTE 1 the determination of UE paging probability information is up to UE implementation

if a UE supporting WUS assistance information did not receive the negotiated WUS assistance information IE during the last registration procedure due to an active emergency PDU session over 3GPP access the UE shall initiate a registration procedure for mobility and periodic registration update to request WUS assistance information after the emergency PDU session is released over 3GPP access

if the UE does not have an emergency PDU session and the network accepts the use of the WUS assistance information for the UE the network determines the negotiated UE paging probability information for the UE based on the requested UE paging probability information if any local configuration or previous statistical information for the UE and then indicates the negotiated UE paging probability information in the negotiated WUS assistance information IE to the UE in the REGISTRATION ACCEPT message the network shall store the negotiated UE paging probability information in the 5GMM context of the UE for paging

the UE shall use WUS assistance information only if the UE received the negotiated WUS assistance information IE during the last registration procedure if the UE did not receive the negotiated WUS assistance information IE during the last registration procedure the UE shall delete any existing WUS assistance information received from the network

if the network did not accept the request to use WUS assistance information the network shall delete the stored negotiated UE paging probability information for the UE if available

when an emergency PDU session is successfully established after the UE received the negotiated WUS assistance information IE during the last registration procedure the UE and the AMF shall not use WUS assistance information until

- the successful completion of the PDU session release procedure of the emergency PDU session;

- the UE receives WUS assistance information during a registration procedure with PDU session status IE or upon successful completion of a service request procedure if the UE or the network locally releases the emergency PDU session; or

- the successful completion of the handover of the emergency PDU session to non-3GPP access

NOTE 2 WUS assistance is not supported by NR connected to 5GCN

### 5.3.25 paging early indication with paging subgrouping assistance

a UE may indicate its capability to support NR paging subgrouping during registration procedure when the UE

- initiates a registration procedure with 5GS registration type IE not set to "emergency registration"; and

- does not have an active emergency PDU session

NOTE the requirements for UE-ID based PEI are specified in 3GPP TS 38.300 [27]

if a UE supporting NR paging subgrouping did not indicate its capability to support NR paging subgrouping during the last registration procedure due to an active emergency PDU session over 3GPP access the UE shall initiate a registration procedure for mobility and periodic registration update to indicate its capability to support NR paging subgrouping after the emergency PDU session is released over 3GPP access

if the UE indicates support of NR paging subgrouping the UE may include its paging probability information in the requested PEIPS assistance information IE in the REGISTRATION REQUEST message if the UE indicates support of NR paging subgrouping and the network supports and accepts the use of the PEIPS assistance information for the UE the network provides to the UE the negotiated PEIPS assistance information including the paging subgroup ID in the REGISTRATION ACCEPT message or the CONFIGURATION UPDATE COMMAND message the paging subgroup ID is used to determine the NR paging subgroup for paging the UE the UE NAS layer shall indicate the paging subgroup ID to the access stratum layer the network shall store the paging subgroup ID in the 5GMM context of the UE

the UE shall use PEIPS assistance information only if the UE received the negotiated PEIPS assistance information IE during the last registration procedure if the UE did not receive the negotiated PEIPS assistance information IE during the last registration procedure the UE shall delete any existing PEIPS assistance information received from the network

if the network did not accept the request to use PEIPS assistance information during the registration procedure the network shall delete the stored PEIPS assistance information for the UE if available

if the UE supports the use of the PEIPS assistance information and the network supports and accepts the use of the PEIPS assistance information the network may provide the PEIPS assistance information to the UE by including the updated PEIPS assistance information IE in the CONFIGURATION UPDATE COMMAND message

when an emergency PDU session is successfully established over 3GPP access after the UE received the negotiated PEIPS assistance information IE during the last registration procedure the UE and the AMF shall not use PEIPS assistance information until

- the successful completion of the PDU session release procedure of the emergency PDU;

- the UE receives PEIPS assistance information during a registration procedure with PDU session status IE or upon successful completion of a service request procedure if the UE or the network locally releases the emergency PDU session;

- the successful completion of handover of emergency PDU session to non-3GPP access; or

- the successful transfer of the emergency PDU session in 5GS to the EPS or ePDG connected to EPC

### 5.3.26 support for unavailability period

if the UE and network support unavailability period and an event is triggered in the UE making the UE unavailable for a certain period of time and the unavailability is not due to discontinuous coverage the UE may store its 5GMM and 5GSM context in USIM or non-volatile memory in the ME to be able to reuse it after the unavailability period

NOTE 1 how and where the UE stores its contexts depends upon the UE implementation the UE can store some or all of its contexts in the ME or USIM using existing ME or USIM functionality

to activate the unavailability period either the UE provides unavailability information including a type of unavailability an unavailability period duration if known and the start of the unavailability period if known during the registration procedure or the UE provides unavailability information including the type of unavailability and the unavailability period duration if known during the de-registration procedure (see 3GPP TS 23.501 [8] and 3GPP TS 23.502 [9]) the support for the unavailability period is negotiated in the registration procedure if the UE is registered to a PLMN via a satellite NG-RAN cell the AMF may for discontinuous coverage provide the unavailability period duration of the UE the start of the unavailability period or both to the UE during the registration procedure the AMF may consider the unavailability period duration provided by the UE if available and determine the unavailability period duration of the UE as described in subclause 5.5.1.2.4 and 5.5.1.3.4 the AMF may also consider the start of the unavailability period provided by the UE if available and determine the start of the unavailability period of the UE as described in subclause 5.5.1.3.4

if the UE provided unavailability information in the last registration procedure for mobility registration or the de-registration procedure the AMF considers the UE unreachable until the UE registers for a normal service if the UE did not include a start of the unavailability period the AMF shall consider the start of the unavailability period to be the time at which AMF received the REGISTRATION REQUEST message or the DEREGISTRATION REQUEST message from the UE during the registration procedure the AMF may determine the values of the negotiated extended DRX parameters the timer T3324 and the periodic registration update timer (T3512) to be provided to the UE based on the discontinuous coverage maximum time offset the unavailability period duration and the start of the unavailability period based on their availability the AMF should set the value of the mobile reachable timer and implicit de-registration timer based on the unavailability period duration and the start of the unavailability period the AMF releases the N1 signalling connection after the completion of the registration procedure in which the UE provided unavailability information without providing the start of the unavailability period

NOTE 2 if the UE supports MUSIM and the UE is registered with the support of unavailability period then the UE can indicate a different unavailability periods to each registered network

NOTE 3 the AMF sets the value of the mobile reachable timer longer than the unavailability period duration

if for discontinuous coverage the UE has stored a discontinuous coverage maximum time offset as described in subclause 5.4.4.3 5.5.1.2.4 and 5.5.1.3.4 the UE shall set the discontinuous coverage maximum time offset value to a random value up to the stored discontinuous coverage maximum time offset for this PLMN and satellite NG-RAN RAT type determine a time point equal to the time when the UE is about to lose satellite coverage minus the discontinuous coverage maximum time offset value and send the REGISTRATION REQUEST message for mobility and periodic registration update to the AMF indicating out of satellite coverage at the determined time point

if for discontinuous coverage the UE has stored a discontinuous coverage maximum time offset as described in subclause 5.4.4.3 5.5.1.2.4 and 5.5.1.3.4 upon returning in satellite coverage of a TA in the current registration area after being out of satellite coverage due to discontinuous coverage the UE starts the discontinuous coverage maximum time offset timer to a random value up to the stored discontinuous coverage maximum time offset value if available for this PLMN and NR satellite access and starts the discontinuous coverage maximum time offset timer the UE shall enter 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE state and shall not initiate any NAS signalling on that NR satellite access and PLMN while the discontinuous coverage maximum time offset timer is running the UE shall stop the discontinuous coverage maximum time offset timer and initiate NAS signalling if the UE

a) receives paging message receives a NOTIFICATION message over non-3GPP access as described in case b) subclause 5.6.3.1;

b) has pending emergency services;

c) is establishing an emergency PDU session;

d) is performing emergency services fallback procedure;

e) enters a TAI outside the registration area;

f) is a MUSIM UE and needs to request a new 5G-GUTI assignment as specified in subclause 5.5.1.3.2;

g) is allowed to use exception data reporting (see the ExceptionDataReportingAllowed leaf of the NAS configuration MO in 3GPP TS 24.368 [17] or the USIM file EFNASCONFIG in 3GPP TS 31.102 [22]) and the UE has to transmit user data related to an exceptional event; or

h) is a UE configured for high priority access in selected PLMN

at expiry of the discontinuous coverage maximum time offset timer if the EUPR bit of the unavailability configuration IE in the last REGISTRATION ACCEPT message was set to "UE needs to report end of unavailability period" the UE shall perform a registration procedure for mobility registration update

if the AMF sets the EUPR bit value in the unavailability configuration IE to "UE does not need to report end of unavailability period" then upon returning to a TA in the current registration area the UE shall choose an appropriate substate of 5GMM-REGISTERED and the UE is not required to trigger the registration procedure for mobility registration update when the unavailability period duration has ended if the AMF does not provide the unavailability configuration IE or the AMF sets the EUPR bit value in the unavailability configuration IE to "UE needs to report end of unavailability period" when the unavailability period duration has ended and the UE returns in satellite coverage of a TA in the current registration area after being out of satellite coverage due to discontinuous coverage the UE shall trigger registration procedure for mobility registration update and the discontinuous coverage maximum time offset timer has expired if any

when the unavailability period is activated all NAS timers are stopped and associated procedures aborted except for timers T3512 T3324 T3346 T3444 T3445 T3447 T3448 T3396 T3526 T3584 T3585 T3587 any back-off timers T3245 T3247 the timer t controlling the periodic search for HPLMN or EHPLMN or higher prioritized PLMNs the timer TSENSE controlling the periodic search for PLMNs satisfying the operator controlled signal level threshold the timer TF the timer TG the timer TS (see 3GPP TS 23.122 [5]) the timer TNSU and the timer instance associated with the entry in the list of "PLMNs not allowed to operate at the present UE location" slice deregistration inactivity timer when the UE activates the unavailability period using registration procedure the UE shall reset the registration attempt counter and service request attempt counter

when the UE activates the unavailability period using registration procedure without providing the start of the unavailability period then after successful completion of the procedure the UE shall enter the state 5GMM-REGISTERED.NO-CELL-AVAILABLE and may deactivate AS layer otherwise if the UE provided the start of unavailability period in the registration procedure the UE shall enter the state 5GMM-REGISTERED.NO-CELL-AVAILABLE and may deactivate AS layer only after the UE activates the unavailability period

when the UE activates the unavailability period using the de-registration procedure then after successful completion of the procedure the UE shall enter the state 5GMM-DEREGISTERED.NO-CELL-AVAILABLE and deactivate the AS layer

when the UE comes out of the unavailability period the UE shall activate the AS layer if deactivated and perform registration procedure as described in subclause 5.5.1.2.2 and 5.5.1.3.2

## 5.4 5GMM common procedures

### 5.4.1 primary authentication and key agreement procedure

#### 5.4.1.1 general

the purpose of the primary authentication and key agreement procedure is to enable mutual authentication between the UE and the network and to provide keying material that can be used between the UE and network in subsequent security procedures as specified in 3GPP TS 33.501 [24]

two methods are defined

a) EAP based primary authentication and key agreement procedure

b) 5G AKA based primary authentication and key agreement procedure

the UE and the AMF shall support the EAP based primary authentication and key agreement procedure and the 5G AKA based primary authentication and key agreement procedure

#### 5.4.1.2 EAP based primary authentication and key agreement procedure

##### 5.4.1.2.1 general

the purpose of the EAP based primary authentication and key agreement procedure is to provide mutual authentication between the UE and the network and to agree on the keys KAUSF KSEAF and KAMF (see 3GPP TS 33.501 [24])

extensible authentication protocol (EAP) as specified in IETF RFC 3748 [34] enables authentication using various EAP methods

EAP defines four types of EAP messages

a) an EAP-request message;

b) an EAP-response message;

c) an EAP-success message; and

d) an EAP-failure message

several rounds of exchanges of an EAP-request message and a related EAP-response message can be required to achieve the authentication (see example in figure 5.4.1.2.1.1)

the EAP based primary authentication and key agreement procedure is always initiated and controlled by the network

the EAP-request message the ngKSI and the ABBA are transported from the network to the UE using the AUTHENTICATION REQUEST message of the EAP message reliable transport procedure

the EAP-response message is transported from the UE to the network using the AUTHENTICATION RESPONSE message of the EAP message reliable transport procedure

if the authentication of the UE completes successfully the serving AMF intends to initiate a security mode control procedure after the EAP based primary authentication and key agreement procedure and the security mode control procedure intends to bring into use the partial native 5G NAS security context created by the EAP based primary authentication and key agreement procedure then the EAP-success message and the ngKSI are transported from the network to the UE using the SECURITY MODE COMMAND message of the security mode control procedure (see subclause 5.4.2)

if the authentication of the UE completes successfully and the serving AMF does not intend to initiate a security mode control procedure bringing into use the partial native 5G NAS security context created by the EAP based primary authentication and key agreement procedure then the EAP-success message and the ngKSI are transported from the network to the UE using the AUTHENTICATION RESULT message of the EAP result message transport procedure

NOTE 1 the serving AMF will not initiate a security mode control procedure after the EAP based primary authentication and key agreement procedure e.g in case of AMF relocation during registration procedure

if the authentication of the UE completes unsuccessfully the EAP-failure message is transported from the network to the UE using the AUTHENTICATION RESULT message or the AUTHENTICATION REJECT message of the EAP result message transport procedure or in a response of the initial 5GMM procedure as part of which the EAP based primary authentication and key agreement procedure is performed

the AMF shall set the authenticator retransmission timer specified in IETF RFC 3748 [34] subclause 4.3 to infinite value

NOTE 2 the EAP message reliable transport procedure provides a reliable transport of EAP messages and therefore retransmissions at the EAP layer do not occur

the AUSF and the AMF support exchange of EAP messages using N12

the UE shall detect and handle any duplication of EAP message as specified in IETF RFC 3748 [34]

figure 5.4.1.2.1.1 EAP based primary authentication and key agreement procedure

##### 5.4.1.2.2 EAP-AKA' related procedures

5.4.1.2.2.1 general

the UE shall support acting as EAP-AKA' peer as specified in IETF RFC 5448 [40] the AUSF may support acting as EAP-AKA' server as specified in IETF RFC 5448 [40] the AAA server of the credentials holder (CH) or the default credentials server (DCS) may support acting as EAP-AKA' server as specified in IETF RFC 5448 [40]

the EAP-AKA' enables mutual authentication of the UE and the network

the UE can reject the EAP-request/AKA'-challenge message sent by the network the UE shall proceed with an EAP-request/AKA'-challenge message only if a USIM is present

during a successful EAP based primary authentication and key agreement procedure the CK and IK are computed by the USIM CK and IK are then used by the ME as key material to generate an EMSK or MSK

5.4.1.2.2.2 initiation

in order to initiate the EAP based primary authentication and key agreement procedure using EAP-AKA' the AUSF or the AAA server of the CH or the DCS shall send an EAP-request/AKA'-challenge message as specified in IETF RFC 5448 [40] the AUSF or the AAA server of the CH or the DCS shall set the AT\_KDF\_INPUT attribute of the EAP-request/AKA'-challenge message to the SNN the SNN is in format described in subclause 9.12.1 the AUSF or the AAA server of the CH or the DCS may include AT\_RESULT\_IND attribute in the EAP-request/AKA'-challenge message

the network shall select an ngKSI value if an ngKSI is contained in an initial NAS message during a 5GMM procedure the network shall select a different ngKSI value the network shall send the selected ngKSI value to the UE along with each EAP message the network shall send the ABBA value as described in subclause 9.11.3.10 to the UE along with the EAP request message and EAP-success message

upon receiving an EAP-request/AKA'-challenge message the UE shall check whether the UE has a USIM shall check the key derivation function indicated in AT\_KDF attributes as specified in IETF RFC 5448 [40] and if the value of the key derivation function field within the received AT\_KDF attribute is of value 1 shall check

a) whether the network name field of the AT\_KDF\_INPUT attribute is the SNN constructed according to subclause 9.12.1; and

b) whether the network name field of the AT\_KDF\_INPUT attribute matches the PLMN identity or the SNPN identity of the selected SNPN saved in the UE

when not operating in SNPN access operation mode the PLMN identity the UE uses for the above network name check is as follows

a) when the UE moves from 5GMM-IDLE mode to 5GMM-CONNECTED mode until the first handover the UE shall use the PLMN identity of the selected PLMN; and

b) after handover or inter-system change to N1 mode in 5GMM-CONNECTED mode

1) if the target cell is not a shared network cell the UE shall use the PLMN identity received as part of the broadcast system information;

2) if the target cell is a shared network cell and the UE has a valid 5G-GUTI the UE shall use the PLMN identity that is part of the 5G-GUTI; and

3) if the target cell is a shared network cell and the UE has a valid 4G-GUTI but not a valid 5G-GUTI the UE shall use the PLMN identity that is part of the 4G-GUTI

when operating in SNPN access operation mode the SNPN identity the UE uses for the above network name check is the SNPN identity of the selected SNPN

5.4.1.2.2.3 UE successfully authenticates network

if a USIM is present and the SNN check is successful the UE shall handle the EAP-request/AKA'-challenge message as specified in IETF RFC 5448 [40] the USIM shall derive CK and IK and compute the authentication response (RES) using the 5G authentication challenge data received from the ME and pass RES to the ME the ME shall derive CK' and IK' from CK and IK and if the UE operates in SNPN access operation mode and the credentials in the USIM contain an indication to use MSK for derivation of KAUSF after success of primary authentication and key agreement procedure then derive MSK from CK' and IK' otherwise derive EMSK from CK' and IK'

NOTE 1 when the UE is registering or registered for onboarding services in SNPN credentials in the USIM do not contain an indication to use MSK for derivation of KAUSF after success of primary authentication and key agreement procedure

furthermore if the UE operates in SNPN access operation mode and the credentials in the USIM

contain an indication to use MSK for derivation of KAUSF after success of primary authentication and key agreement procedure then the ME may generate a new KAUSF from the MSK otherwise the ME may generate a new KAUSF from the EMSK

if the ME generates a new KAUSF the ME shall generate a new KSEAF from the new KAUSF and the KAMF from the ABBA received together with the EAP-request/AKA'-challenge message and the new KSEAF as described in 3GPP TS 33.501 [24] and create a partial native 5G NAS security context identified by the ngKSI value received together with the EAP-request/AKA'-challenge message in subclause 5.4.1.2.4.2 in the volatile memory of the ME if the KAMF and the partial native 5G NAS security context are created the ME shall store the KAMF in the created partial native 5G NAS security context and shall send an EAP-response/AKA'-challenge message as specified in IETF RFC 5448 [40]

NOTE 2 generation of the new KAUSF and the new KSEAF does not result into deletion of the valid KAUSF and the valid KSEAF if any

the ME shall not use the new KAUSF in the verification of SOR transparent container and UE parameters update transparent container if any are received until receipt of an EAP-success message

if the EAP-request/AKA'-challenge message contains AT\_RESULT\_IND attribute the UE may include AT\_RESULT\_IND attribute in the EAP-response/AKA'-challenge message as specified in IETF RFC 5448 [40]

5.4.1.2.2.4 errors when handling EAP-request/AKA'-challenge message

if a USIM is present the SNN check fails or the UE does not accept AUTN during handling of the EAP-request/AKA'-challenge message as specified in IETF RFC 5448 [40] the UE shall send an EAP-response/AKA'-authentication-reject message as specified in IETF RFC 5448 [40]

if a USIM is present the SNN check is successful but the UE detects that the sequence number in AUTN is not correct during handling of the EAP-request/AKA'-challenge message as specified in IETF RFC 5448 [40] the UE shall send an EAP-response/AKA'-synchronization-failure message as specified in IETF RFC 5448 [40]

if a USIM is present the SNN check is successful the sequence number in AUTN is correct and the UE detects another error during handling of the EAP-request/AKA'-challenge message as specified in IETF RFC 5448 [40] the UE shall send an EAP-response/AKA'-client-error message as specified in IETF RFC 5448 [40]

if a USIM is not present the UE shall send an EAP-response/AKA'-client-error message as specified in IETF RFC 5448 [40]

for any of the above the UE shall start timer T3520 when the AUTHENTICATION RESPONSE message containing the EAP-response message is sent furthermore the UE shall stop any of the timers T3510 T3517 or T3521 (if they were running) upon receiving an AUTHENTICATION REQUEST message with the EAP message IE containing an EAP-request/AKA'-challenge from the network the UE shall stop timer T3520 if running and then process the EAP-request/AKA'-challenge information as normal

5.4.1.2.2.5 network successfully authenticates UE

upon reception of the EAP-response/AKA'-challenge message if procedures for handling an EAP-response/AKA'-challenge message as specified in IETF RFC 5448 [40] are successful and

a) the AUSF acts as the EAP-AKA' server the AUSF shall generate EMSK the KAUSF from the EMSK and the KSEAF from the KAUSF as described in 3GPP TS 33.501 [24]; or

b) the AAA server of the CH or the DCS acts as the EAP-AKA' server the AAA server of the CH or the DCS shall generate MSK as described in 3GPP TS 33.501 [24];

and

a) if the AUSF or the AAA server of the CH or the DCS included the AT\_RESULT\_IND attribute in the EAP-request/AKA'-challenge message and the AT\_RESULT\_IND attribute is included in the corresponding EAP-response/AKA'-challenge message the AUSF or the AAA server of the CH or the DCS shall send an EAP-request/AKA'-notification message as specified in IETF RFC 5448 [40]; or

b) if the AUSF or the AAA server of the CH or the DCS

1) included the AT\_RESULT\_IND attribute in the EAP-request/AKA'-challenge message and the AT\_RESULT\_IND attribute is not included in the EAP-response/AKA'-challenge message; or

2) did not include the AT\_RESULT\_IND attribute in the EAP-request/AKA'-challenge message;

then the AUSF or the AAA server of the CH or the DCS shall send an EAP-success message as specified in IETF RFC 5448 [40] and shall consider the procedure complete

NOTE 1 when the AAA server of the CH or the DCS acts as the EAP-AKA' server the AAA server of the CH or the DCS provides (via the NSSAAF) the MSK and the SUPI to the AUSF upon reception of the MSK the AUSF generates the KAUSF from the MSK and the KSEAF from the KAUSF as described in 3GPP TS 33.501 [24]

NOTE 2 the AUSF provides the KSEAF and optionally the SUPI (unless the SEAF provided the AUSF with the SUPI before) to the SEAF as described in 3GPP TS 33.501 [24] upon reception of the KSEAF and optionally the SUPI the SEAF generates the KAMF based on the ABBA the KSEAF and the SUPI as described in 3GPP TS 33.501 [24] and provides ngKSI and the KAMF to the AMF upon reception of the ngKSI and the KAMF the AMF creates a partial native 5G NAS security context identified by the ngKSI and stores the KAMF in the created partial native 5G NAS security context

5.4.1.2.2.6 UE handling EAP-AKA' notification message

upon receiving an EAP-request/AKA'-notification message the UE shall send an EAP-response/AKA'-notification message as specified in IETF RFC 5448 [40]

5.4.1.2.2.6A EAP based identification initiation by the network

if the AUSF or the AAA server of the CH or the DCS decides to initiate the EAP based identification procedure the AUSF or the AAA server of the CH or the DCS shall send an EAP-Request/Identity or EAP-Request/AKA'-Identity message as specified in IETF RFC 5448 [40]

the AMF shall encapsulate the EAP-Request/Identity or EAP-Request/AKA'-Identity message in the AUTHENTICATION REQUEST message and send it to the UE

5.4.1.2.2.6B EAP based identification response by the UE

upon receipt of the AUTHENTICATION REQUEST message with EAP-Request/Identity message the UE shall send an AUTHENTICATION RESPONSE message with EAP-Response/Identity to the network in the EAP-Response/Identity message the UE shall provide the requested identity according to 3GPP TS 33.501 [24] subclause F.2 in the UE identity in the EAP-Response/Identity message as specified in IETF RFC 5448 [40]

upon receipt of the AUTHENTICATION REQUEST message with EAP-Request/AKA'-Identity message the UE shall send an AUTHENTICATION RESPONSE message with EAP-Response/AKA'-Identity to the network based on the attribute received in the EAP-Request/AKA'-Identity the UE shall provide the requested identity according to 3GPP TS 33.501 [24] subclause F.2 in the EAP-Response/AKA'-Identity message as specified in IETF RFC 5448 [40]

if the EAP-Request/AKA'-Identity carries the AT\_PERMANENT\_REQ the UE shall respond with EAP-Response/AKA'-Client-Error with the error code "unable to process packet"

5.4.1.2.2.7 network sending EAP-success message

upon reception of the EAP-response/AKA'-notification message if earlier procedures for handling an EAP-request/AKA'-challenge message as specified in IETF RFC 5448 [40] were successful the AUSF or the AAA server of the CH or the DCS shall send an EAP-success message as specified in IETF RFC 5448 [40] and shall consider the procedure complete

NOTE the AUSF provides the KSEAF to the SEAF upon reception of the KSEAF the SEAF generates the KAMF based on the ABBA and the KSEAF as described in 3GPP TS 33.501 [24] and provides ngKSI and the KAMF to the AMF upon reception of the ngKSI and the KAMF the AMF creates a partial native 5G NAS security context identified by the ngKSI and stores the KAMF in the created partial native 5G NAS security context

5.4.1.2.2.8 UE handling EAP-success message

upon receiving an EAP-success message the ME shall

a) delete the valid KAUSF and the valid KSEAF if any;

b) if the ME has not generated a new KAUSF and a new KSEAF and has not created a partial native 5G NAS security context as described in subclause 5.4.1.2.2.3

1) if the UE operates in SNPN access operation mode and the credentials in the USIM contain an indication to use MSK for derivation of KAUSF after success of primary authentication and key agreement procedure then generate a new KAUSF from the MSK otherwise generate a new KAUSF from the EMSK;

NOTE when the UE is registering or registered for onboarding services in SNPN credentials in the USIM do not contain an indication to use MSK for derivation of KAUSF after success of primary authentication and key agreement procedure

2) generate a new KSEAF from the new KAUSF and the KAMF from the ABBA that was received with the EAP-success message and the new KSEAF as described in 3GPP TS 33.501 [24];

3) create a partial native 5G NAS security context identified by the ngKSI value in the volatile memory of the ME; and

4) store the KAMF in the created partial native 5G NAS security context; and

c) consider the new KAUSF to be the valid KAUSF and the new KSEAF to be the valid KSEAF reset the SOR counter and the UE parameter update counter to zero and store the valid KAUSF the valid KSEAF the SOR counter and the UE parameter update counter as specified in annex c and use the valid KAUSF in the verification of SOR transparent container and UE parameters update transparent container if any are received

the UE shall consider the procedure complete

5.4.1.2.2.9 network not successfully authenticates UE

upon reception of the EAP-response/AKA'-challenge message if procedures for handling an EAP-response/AKA'-challenge message as specified in IETF RFC 5448 [40] are not successful the AUSF or the AAA server of the CH or the DCS shall send an EAP-request/AKA'-notification message that implies failure as specified in IETF RFC 5448 [40]

5.4.1.2.2.10 network sending EAP-failure message

upon reception of the EAP-response/AKA'-notification message if earlier procedures for handling an EAP-request/AKA'-challenge message as specified in IETF RFC 5448 [40] were not successful the AUSF or the AAA server of the CH or the DCS shall send an EAP-failure message as specified in IETF RFC 5448 [40] and shall consider the procedure complete

if the authentication response (RES) returned by the UE in the AT\_RES attribute of the EAP-response/AKA'-challenge message is not valid the network handling depends upon the type of identity used by the UE in the initial NAS message that is

a) if the 5G-GUTI was used; or

b)- if the SUCI was used

if the 5G-GUTI was used the network should transport the EAP-failure message in the AUTHENTICATION RESULT message of the EAP result message transport procedure initiate an identification procedure to retrieve SUCI from the UE and restart the EAP based primary authentication and key agreement procedure with the received SUCI

if the SUCI was used for identification in the initial NAS message or in a restarted EAP based primary authentication and key agreement procedure or the network decides not to initiate the identification procedure to retrieve SUCI from the UE after an unsuccessful EAP based primary authentication and key agreement procedure the network should transport the EAP-failure message in an AUTHENTICATION REJECT message of the EAP result message transport procedure

depending on local requirements or operator preference for emergency services if the UE initiates a registration procedure with 5GS registration type IE set to "emergency registration" and the AMF is configured to allow emergency registration without user identity the AMF needs not follow the procedures specified for transporting the EAP-failure message in the AUTHENTICATION REJECT message of the EAP result message transport procedure in the present subclause the AMF may include the EAP-failure message in a response of the current 5GMM specific procedure or in the AUTHENTICATION RESULT of the EAP result message transport procedure

5.4.1.2.2.11 UE handling EAP-failure message

upon receiving an EAP-failure message the UE shall delete the partial native 5G NAS security context and shall delete the new KAUSF and the new KSEAF if any were created as described in subclause 5.4.1.2.2.3

the UE shall consider the procedure complete

if the EAP-failure message is received in an AUTHENTICATION REJECT message

1) if the AUTHENTICATION REJECT message has been successfully integrity checked by the NAS

- the UE shall set the update status to 5U3 ROAMING NOT ALLOWED delete the stored 5G-GUTI TAI list last visited registered TAI and ngKSI;

in case of PLMN the USIM shall be considered invalid until switching off the UE or the UICC containing the USIM is removed

in case of SNPN if the UE is neither registered for onboarding services in SNPN nor performing initial registration for onboarding services in SNPN and the UE does not support access to an SNPN using credentials from a credentials holder and does not support equivalent SNPNs the selected entry of the "list of subscriber data" with the SNPN identity of the current SNPN shall be considered invalid until the UE is switched off or the entry is updated additionally the UE shall consider the USIM as invalid for the current SNPN until switching off or the UICC containing the USIM is removed

in case of SNPN if the UE is neither registered for onboarding services in SNPN nor performing initial registration for onboarding services in SNPN and the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the UE shall consider the selected entry of the "list of subscriber data" as invalid until the UE is switched off or the entry is updated additionally the UE shall consider the USIM as invalid for the entry until switching off or the UICC containing the USIM is removed

if the UE is registered for onboarding services in SNPN or is performing initial registration for onboarding services in SNPN the UE shall store the SNPN identity in the "permanently forbidden SNPNs" for onboarding services in SNPN" list enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection or an SNPN selection for onboarding services according to 3GPP TS 23.122 [5];

- if the UE is neither registered for onboarding services in SNPN nor performing initial registration for onboarding services in SNPN the UE shall set

i) the counter for "SIM/USIM considered invalid for GPRS services" events the counter for "USIM considered invalid for 5GS services over non-3GPP access" events and the counter for "SIM/USIM considered invalid for non-GPRS services" events if maintained by the UE in case of PLMN; or

ii) the counter for "the entry for the current SNPN considered invalid for 3GPP access" events and the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events in case of SNPN;

to UE implementation-specific maximum value

if the UE is registered for onboarding services in SNPN or performing initial registration for onboarding services in SNPN the UE shall set the SNPN-specific attempt counter for the current SNPN to the UE implementation-specific maximum value; and

- if the UE is operating in single-registration mode the UE shall handle EMM parameters 4G-GUTI last visited registered TAI TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the authentication procedure is not accepted by the network the USIM shall be considered as invalid also for non-EPS services until switching off or the UICC containing the USIM is removed; and

2) if the AUTHENTICATION REJECT message is received without integrity protection the UE shall start timer T3247 with a random value uniformly drawn from the range between 30 minutes and 60 minutes if the timer is not running (see subclause 5.3.20)

additionally if the UE is neither registered for onboarding services in SNPN nor performing initial registration for onboarding services in SNPN the UE shall

a) if the AUTHENTICATION REJECT message is received over 3GPP access and the counter for "SIM/USIM considered invalid for GPRS services" events in case of PLMN or the counter for "the entry for the current SNPN considered invalid for 3GPP access" events in case of SNPN has a value less than a UE implementation-specific maximum value proceed as specified in subclause 5.3.20 list item 1)-a) of subclause 5.3.20.2 (if the UE is not operating in SNPN access operation mode) or list item a)-1) of subclause 5.3.20.3 (if the UE is operating in SNPN access operation mode) for the case that the 5GMM cause value received is #3;

b) if the AUTHENTICATION REJECT message is received over non-3GPP access and the counter for "USIM considered invalid for 5GS services over non-3GPP access" events in case of PLMN or the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events in case of SNPN has a value less than a UE implementation-specific maximum value proceed as specified in subclause 5.3.20 list item 1)-b) of subclause 5.3.20.2 (if the UE is not operating in SNPN access operation mode) or list item a)-2) of subclause 5.3.20.3 (if the UE is operating in SNPN access operation mode) for the case that the 5GMM cause value received is #3;

c) otherwise

i) if the AUTHENTICATION REJECT message is received over 3GPP access

- the UE shall set the update status for 3GPP access to 5U3 ROAMING NOT ALLOWED delete for 3GPP access only the stored 5G-GUTI TAI list last visited registered TAI and ngKSI

- in case of PLMN the UE shall consider the USIM as invalid for 5GS services via 3GPP access and invalid for non-EPS service until switching off the UE or the UICC containing the USIM is removed

in case of SNPN if the UE does not support access to an SNPN using credentials from a credentials holder and does not support equivalent SNPNs the UE shall consider the selected entry of the "list of subscriber data" with the SNPN identity of the current SNPN as invalid for 3GPP access until the UE is switched off or the entry is updated additionally the UE shall consider the USIM as invalid for the current SNPN via 3GPP access until switching off or the UICC containing the USIM is removed

in case of SNPN if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the UE shall consider the selected entry of the "list of subscriber data" as invalid for 3GPP access until the UE is switched off or the entry is updated additionally the UE shall consider the USIM as invalid for the entry via 3GPP access until switching off or the UICC containing the USIM is removed

- the UE shall set

- the counter for "SIM/USIM considered invalid for GPRS services" events and the counter for "SIM/USIM considered invalid for non-GPRS services" events if maintained by the UE in case of PLMN; or

- the counter for "the entry for the current SNPN considered invalid for 3GPP access" events in case of SNPN;

to UE implementation-specific maximum value

- if the UE is operating in single-registration mode the UE shall handle 4G-GUTI TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the authentication procedure is not accepted by the network the USIM shall be considered as invalid also for non-EPS services until switching off or the UICC containing the USIM is removed; and

ii) if the AUTHENTICATION REJECT message is received over non-3GPP access

- the UE shall set the update status for non-3GPP access to 5U3 ROAMING NOT ALLOWED delete for non-3GPP access only the stored 5G-GUTI TAI list last visited registered TAI and ngKSI;

- in case of PLMN the UE shall consider the USIM as invalid for 5GS services via non-3GPP access until switching off the UE or the UICC containing the USIM is removed

in case of SNPN the UE shall consider the selected entry of the "list of subscriber data" with the SNPN identity of the current SNPN as invalid for non-3GPP access until the UE is switched off or the entry is updated additionally the UE shall consider the USIM as invalid for the current SNPN and for non-3GPP access until switching off or the UICC containing the USIM is removed; and

- the UE shall set

- the counter for "USIM considered invalid for 5GS services over non-3GPP access" events to UE implementation-specific maximum value in case of PLMN; or

- the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events to UE implementation-specific maximum value in case of SNPN

if the UE is registered for onboarding services in SNPN or performing initial registration for onboarding services in SNPN the UE shall

a) if the SNPN-specific attempt counter for the SNPN sending the AUTHENTICATION REJECT message has a value less than a UE implementation-specific maximum value increment the SNPN-specific attempt counter for the SNPN; or

b) otherwise the UE shall set the update status to 5U3.ROAMING NOT ALLOWED delete the stored 5G-GUTI TAI list last visited registered TAI and ngKSI store the SNPN identity in the "permanently forbidden SNPNs for onboarding services in SNPN" list enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection or an SNPN selection for onboarding services according to 3GPP TS 23.122 [5]

if the AUTHENTICATION REJECT message is received by the UE the UE shall abort any 5GMM signalling procedure stop any of the timers T3510 T3517 T3519 or T3521 (if they were running) enter state 5GMM-DEREGISTERED and delete any stored SUCI

5.4.1.2.2.12 abnormal cases in the UE

the following abnormal cases can be identified

a) EAP-request/AKA'-challenge message with the key derivation function indicated in AT\_KDF attributes set to a value other than 1

the UE shall act as specified in IETF RFC 5448 [40] subclause 3.2 for the case when the AUTN had been incorrect

##### 5.4.1.2.3 EAP-TLS related procedures

5.4.1.2.3.1 general

the UE may support acting as EAP-TLS peer as specified in 3GPP TS 33.501 [24] the AUSF may support acting as EAP-TLS server as specified in 3GPP TS 33.501 [24] the AAA server of the CH or the DCS may support acting as EAP server of such EAP method as specified in 3GPP TS 23.501 [8]

the EAP-TLS enables mutual authentication of the UE and the network

when initiating an EAP based primary authentication and key agreement procedure using EAP-TLS the network shall select an ngKSI value if an ngKSI is contained in an initial NAS message during a 5GMM procedure the network shall select a different ngKSI value the network shall send the selected ngKSI value to the UE along with each EAP message the network shall send the ABBA value as described in subclause 9.11.3.10 to the UE along with the EAP-request message and EAP-success message

when the EAP based primary authentication and key agreement procedure uses EAP-TLS

a) if the UE operates in SNPN access operation mode and

1) the default UE credentials for primary authentication if the UE is registering or registered for onboarding services in SNPN; or

2) credentials in the selected entry of the "list of subscriber data" if the UE is not registering or registered for onboarding services in SNPN;

contain an indication to use MSK for derivation of KAUSF after success of primary authentication and key agreement procedure then the ME shall generate MSK as described in 3GPP TS 33.501 [24] otherwise the ME shall generate EMSK as described in 3GPP TS 33.501 [24];

b) if the AUSF acts as the EAP-TLS server the AUSF shall generate EMSK as described in 3GPP TS 33.501 [24]; and

c) if the AAA server of the CH or the DCS acts as the EAP-TLS server the AAA server of the CH or the DCS shall generate MSK as described in 3GPP TS 33.501 [24]

when handling of an EAP-request message results into generation of MSK or EMSK if the UE operates in SNPN access operation mode and

a) the default UE credentials for primary authentication if the UE is registering or registered for onboarding services in SNPN; or

b) credentials in the selected entry of the "list of subscriber data" if the UE is not registering or registered for onboarding services in SNPN;

contain an indication to use MSK for derivation of KAUSF after success of primary authentication and key agreement procedure then the ME may generate a new KAUSF from the MSK otherwise the ME may generate a new KAUSF from the EMSK

if the ME generates a new KAUSF the ME shall generate a new KSEAF from the new KAUSF and the KAMF from the ABBA received together with the EAP-request message and the new KSEAF as described in 3GPP TS 33.501 [24] and create a partial native 5G NAS security context identified by the ngKSI value received together with the EAP-request message in subclause 5.4.1.2.4.2 in the volatile memory of the ME if the KAMF and the partial native 5G NAS security context are created the ME shall store the KAMF in the created partial native 5G NAS security context

NOTE 1 generation of the new KAUSF and the new KSEAF does not result into deletion of the valid KAUSF and the valid KSEAF if any

the ME shall not use the new KAUSF in the verification of SOR transparent container and UE parameters update transparent container if any are received until receipt of an EAP-success message

when the AUSF acts as the EAP-TLS server and handling of an EAP response message results into generation of EMSK the AUSF shall generate the KAUSF from the EMSK and the KSEAF from the KAUSF as described in 3GPP TS 33.501 [24]

NOTE 2 when the AAA server of the CH or the DCS acts as the EAP-TLS server the AAA server of the CH or the DCS provides (via the NSSAAF) the MSK and the SUPI to the AUSF upon reception of the MSK the AUSF generates the KAUSF from the MSK and the KSEAF from the KAUSF as described in 3GPP TS 33.501 [24]

NOTE 3 the AUSF provides the KSEAF and optionally the SUPI (unless the SEAF provided the AUSF with the SUPI before) to the SEAF as described in 3GPP TS 33.501 [24] upon reception of the KSEAF and optionally the SUPI the SEAF generates the KAMF based on the ABBA the KSEAF and the SUPI as described in 3GPP TS 33.501 [24] and provides ngKSI and the KAMF to the AMF upon reception of the ngKSI and the KAMF the AMF creates a partial native 5G NAS security context identified by the ngKSI and stores the KAMF in the created partial native 5G NAS security context

if the UE does not accept the server certificate of the network the UE shall start timer T3520 when the AUTHENTICATION RESPONSE message containing the EAP-response message is sent furthermore the UE shall stop any of the retransmission timers that are running (e.g T3510 T3517 or T3521) upon receiving an AUTHENTICATION REQUEST message with the EAP message IE containing an EAP-request message from the network the UE shall stop timer T3520 if running and then process the EAP-request message as normally

if the network does not accept the client certificate of the UE the network handling depends upon the type of identity used by the UE in the initial NAS message that is

- if the 5G-GUTI was used; or

- if the SUCI was used

if the 5G-GUTI was used the network should transport the EAP-failure message in the AUTHENTICATION RESULT message of the EAP result message transport procedure initiate an identification procedure to retrieve SUCI from the UE and restart the EAP based primary authentication and key agreement procedure with the received SUCI

if the SUCI was used for identification in the initial NAS message or in a restarted EAP based primary authentication and key agreement procedure or the network decides not to initiate the identification procedure to retrieve SUCI from the UE after an unsuccessful the EAP based primary authentication and key agreement procedure the network should transport the EAP-failure message in an AUTHENTICATION REJECT message of the EAP result message transport procedure

depending on local requirements or operator preference for emergency services if the UE initiates a registration procedure with 5GS registration type IE set to "emergency registration" and the AMF is configured to allow emergency registration without user identity the AMF needs not follow the procedures specified for transporting the EAP-failure message in the AUTHENTICATION REJECT message of the EAP result message transport procedure in the present subclause the AMF may include the EAP-failure message in a response of the current 5GMM specific procedure or in the AUTHENTICATION RESULT of the EAP result message transport procedure

if the EAP-failure message is received in an AUTHENTICATION REJECT message

a) if the AUTHENTICATION REJECT message has been successfully integrity checked by the NAS

1) the UE shall set the update status to 5U3 ROAMING NOT ALLOWED delete the stored 5G-GUTI TAI list last visited registered TAI and ngKSI

in case of PLMN the USIM shall be considered invalid until switching off the UE or the UICC containing the USIM is removed

in case of SNPN if the UE is neither registered for onboarding services in SNPN nor performing initial registration for onboarding services in SNPN and the UE does not support access to an SNPN using credentials from a credentials holder and does not support equivalent SNPNs the selected entry of the "list of subscriber data" with the SNPN identity of the current SNPN shall be considered invalid until the UE is switched off or the entry is updated;

in case of SNPN if the UE is neither registered for onboarding services in SNPN nor performing initial registration for onboarding services in SNPN and the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the UE shall consider the selected entry of the "list of subscriber data" as invalid until the UE is switched off or the entry is updated

if the UE is registered for onboarding services in SNPN or is performing initial registration for onboarding services in SNPN the UE shall store the SNPN identity in the "permanently forbidden SNPNs for onboarding services in SNPN" list enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection or an SNPN selection for onboarding services according to 3GPP TS 23.122 [5];

2) if the UE is neither registered for onboarding services in SNPN nor performing initial registration for onboarding services in SNPN the UE shall set

i) the counter for "SIM/USIM considered invalid for GPRS services" events the counter for "USIM considered invalid for 5GS services over non-3GPP access" events and the counter for "SIM/USIM considered invalid for non-GPRS services" events if maintained by the UE in case of PLMN; or

ii) the counter for "the entry for the current SNPN considered invalid for 3GPP access" events and the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events in case of SNPN;

to UE implementation-specific maximum value

if the UE is registered for onboarding services in SNPN or performing initial registration for onboarding services in SNPN the UE shall set the SNPN-specific attempt counter for the current SNPN to the UE implementation-specific maximum value; and

3) if the UE is operating in single-registration mode the UE shall handle EMM parameters 4G-GUTI last visited registered TAI TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the authentication procedure is not accepted by the network the USIM shall be considered as invalid also for non-EPS services until switching off or the UICC containing the USIM is removed; and

b) if the AUTHENTICATION REJECT message is received without integrity protection the UE shall start timer T3247 with a random value uniformly drawn from the range between 30 minutes and 60 minutes if the timer is not running (see subclause 5.3.20)

additionally if the UE is neither registered for onboarding services in SNPN nor performing initial registration for onboarding services in SNPN the UE shall

1) if the AUTHENTICATION REJECT message is received over 3GPP access and the counter for "SIM/USIM considered invalid for GPRS services" events in case of PLMN or the counter for "the entry for the current SNPN considered invalid for 3GPP access" events in case of SNPN has a value less than a UE implementation-specific maximum value proceed as specified in subclause 5.3.20 list item 1)-a) of subclause 5.3.20.2 (if the UE is not SNPN enabled or is not operating in SNPN access operation mode) or list item a) 1) of subclause 5.3.20.3 (if the UE is operating in SNPN access operation mode) for the case that the 5GMM cause value received is #3;

2) if the AUTHENTICATION REJECT message is received over non-3GPP access and the counter for "USIM considered invalid for 5GS services over non-3GPP access" events in case of PLMN or the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events in case of SNPN has a value less than a UE implementation-specific maximum value proceed as specified in subclause 5.3.20 list item 1)-b) of subclause 5.3.20.2 (if the UE is not operating in SNPN access operation mode) or list item a)-2) of subclause 5.3.20.3 (if the UE is operating in SNPN access operation mode) for the case that the 5GMM cause value received is #3; or

3) otherwise

i) if the AUTHENTICATION REJECT message is received over 3GPP access

A) the UE shall set the update status for 3GPP access to 5U3 ROAMING NOT ALLOWED delete for 3GPP access only the stored 5G-GUTI TAI list last visited registered TAI and ngKSI

in case of PLMN the UE shall consider the USIM as invalid for 5GS services via 3GPP access and invalid for non-EPS service until switching off the UE or the UICC containing the USIM is removed

in case of SNPN if the UE does not support access to an SNPN using credentials from a credentials holder and does not support equivalent SNPNs the UE shall consider the selected entry of the "list of subscriber data" with the SNPN identity of the current SNPN as invalid for 3GPP access until the UE is switched off or the entry is updated;

in case of SNPN if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the UE shall consider the selected entry of the "list of subscriber data" as invalid for 3GPP access until the UE is switched off or the entry is updated;

B) the UE shall set

- the counter for "SIM/USIM considered invalid for GPRS services" events and the counter for "SIM/USIM considered invalid for non-GPRS services" events if maintained by the UE in case of PLMN; or

- the counter for "the entry for the current SNPN considered invalid for 3GPP access" events in case of SNPN;

to UE implementation-specific maximum value; and

C) if the UE is operating in single-registration mode the UE shall handle 4G-GUTI TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the authentication procedure is not accepted by the network the USIM shall be considered as invalid also for non-EPS services until switching off or the UICC containing the USIM is removed; and

ii) if the AUTHENTICATION REJECT message is received over non-3GPP access

A) the UE shall set the update status for non-3GPP access to 5U3 ROAMING NOT ALLOWED delete for non-3GPP access only the stored 5G-GUTI TAI list last visited registered TAI and ngKSI in case of PLMN the USIM shall be considered invalid for 5GS services via non-3GPP access until switching off the UE or the UICC containing the USIM is removed in case of SNPN the UE shall consider the selected entry of the "list of subscriber data" with the SNPN identity of the current SNPN shall be considered invalid for non-3GPP access until the UE is switched off or the entry is updated; and

B) the UE shall set the counter for "USIM considered invalid for 5GS services over non-3GPP access" events in case of PLMN or the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events in case of SNPN to UE implementation-specific maximum value

if the UE is registered for onboarding services in SNPN or performing initial registration for onboarding services in SNPN the UE shall

1) if the SNPN-specific attempt counter for the SNPN sending the AUTHENTICATION REJECT message has a value less than a UE implementation-specific maximum value increment the SNPN-specific attempt counter for the SNPN; or

2) otherwise the UE shall set the update status to 5U3.ROAMING NOT ALLOWED delete the stored 5G-GUTI TAI list last visited registered TAI and ngKSI store the SNPN identity in the "permanently forbidden SNPNs for onboarding services in SNPN" list enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection or an SNPN selection for onboarding services according to 3GPP TS 23.122 [5]

if the AUTHENTICATION REJECT message is received by the UE the UE shall abort any 5GMM signalling procedure stop any of the timers T3510 T3517 T3519 or T3521 (if they were running) enter state 5GMM-DEREGISTERED and delete any stored SUCI

upon receiving an EAP-success message the ME shall

a) delete the valid KAUSF and the valid KSEAF if any;

b) if the ME has not generated a new KAUSF and a new KSEAF and has not created a partial native 5G NAS security context when handling the EAP-request message which resulted into generation of EMSK or MSK as described above

1) if the UE operates in SNPN access operation mode and

i) the default UE credentials for primary authentication if the UE is registering or registered for onboarding services in SNPN; or

ii) credentials in the selected entry of the "list of subscriber data" if the UE is not registering or registered for onboarding services in SNPN;

contain an indication to use MSK for derivation of KAUSF after success of primary authentication and key agreement procedure then generate a new KAUSF from the MSK otherwise generate a new KAUSF from the EMSK;

2) generate a new KSEAF from the new KAUSF and the KAMF from the ABBA that was received with the EAP-success message and the new KSEAF as described in 3GPP TS 33.501 [24];

3) create a partial native 5G NAS security context identified by the ngKSI value in the volatile memory of the ME; and

4) store the KAMF in the created partial native 5G NAS security context; and

c) consider the new KAUSF to be the valid KAUSF and the new KSEAF to be the valid KSEAF reset the SOR counter and the UE parameter update counter to zero store the valid KAUSF the valid KSEAF the SOR counter and the UE parameter update counter as specified in annex c and use the valid KAUSF in the verification of SOR transparent container and UE parameters update transparent container if any are received

the UE shall consider the procedure complete

upon receiving an EAP-failure message the UE shall delete the partial native 5G NAS security context and shall delete the new KAUSF and the new KSEAF if any were created when handling the EAP-request message which resulted into generation of EMSK or MSK as described above

the UE shall consider the procedure complete

##### 5.4.1.2.3A procedures related to EAP methods other than EAP-AKA' and EAP-TLS

5.4.1.2.3A.1 general

this subclause applies when an EAP method

a) supporting mutual authentication;

b) supporting EMSK or MSK generation; and

c) other than EAP-AKA' and EAP-TLS;

is used for primary authentication and key agreement in an SNPN

the UE may support acting as EAP peer of such EAP method as specified in 3GPP TS 33.501 [24] the AUSF may support acting as EAP server of such EAP method as specified in 3GPP TS 33.501 [24] the AAA server of the CH or the DCS may support acting as EAP server of such EAP method as specified in 3GPP TS 23.501 [8]

when initiating an EAP based primary authentication and key agreement procedure using such EAP method the network shall select an ngKSI value if an ngKSI is contained in an initial NAS message during a 5GMM procedure the network shall select a different ngKSI value the network shall send the selected ngKSI value to the UE along with each EAP message the network shall send the ABBA value as described in subclause 9.11.3.10 to the UE along with the EAP-request message and EAP-success message

when the EAP based primary authentication and key agreement procedure uses such EAP method

a) if

1) the default UE credentials for primary authentication if the UE is registering or registered for onboarding services in SNPN; or

2) credentials in the selected entry of the "list of subscriber data" if the UE is not registering or registered for onboarding services in SNPN;

contain an indication to use MSK for derivation of KAUSF after success of primary authentication and key agreement procedure then the ME shall generate MSK as described in 3GPP TS 33.501 [24] otherwise the ME shall generate EMSK as described in 3GPP TS 33.501 [24];

b) if the AUSF acts as the EAP server the AUSF shall generate EMSK as described in 3GPP TS 33.501 [24]; and

c) if the AAA server of the CH or the DCS acts as the EAP server the AAA server of the CH or the DCS shall generate MSK as described in 3GPP TS 33.501 [24]

when handling of an EAP-request message results into generation of MSK or EMSK if

a) the default UE credentials for primary authentication if the UE is registering or registered for onboarding services in SNPN; or

b) credentials in the selected entry of the "list of subscriber data" if the UE is not registering or registered for onboarding services in SNPN;

contain an indication to use MSK for derivation of KAUSF after success of primary authentication and key agreement procedure then the ME may generate a new KAUSF from the MSK otherwise the ME may generate a new KAUSF from the EMSK

if the ME generates a new KAUSF the ME shall generate a new KSEAF from the new KAUSF and the KAMF from the ABBA received together with the EAP-request message and the new KSEAF as described in 3GPP TS 33.501 [24] and create a partial native 5G NAS security context identified by the ngKSI value received together with the EAP-request message in subclause 5.4.1.2.4.2 in the volatile memory of the ME if the KAMF and the partial native 5G NAS security context are created the ME shall store the KAMF in the created partial native 5G NAS security context

NOTE 1 generation of the new KAUSF and the new KSEAF does not result into deletion of the valid KAUSF and the valid KSEAF if any

the ME shall not use the new KAUSF in the verification of SOR transparent container and UE parameters update transparent container if any are received until receipt of an EAP-success message

when the AUSF acts as the EAP server and handling of an EAP response message results into generation of EMSK the AUSF shall generate the KAUSF from the EMSK and the KSEAF from the KAUSF as described in 3GPP TS 33.501 [24]

NOTE 2 when the AAA server of the CH or the DCS acts as the EAP server and handling of an EAP response message results into generation of MSK the AAA server of the CH or the DCS provides (via the NSSAAF) the MSK and the SUPI to the AUSF upon reception of the MSK the AUSF generates the KAUSF from the MSK and the KSEAF from the KAUSF as described in 3GPP TS 33.501 [24]

NOTE 3 the AUSF provides the KSEAF and optionally the SUPI (unless the SEAF provided the AUSF with the SUPI before) to the SEAF as described in 3GPP TS 33.501 [24] upon reception of the KSEAF and optionally the SUPI the SEAF generates the KAMF based on the ABBA the KSEAF and the SUPI as described in 3GPP TS 33.501 [24] and provides ngKSI and the KAMF to the AMF upon reception of the ngKSI and the KAMF the AMF creates a partial native 5G NAS security context identified by the ngKSI and stores the KAMF in the created partial native 5G NAS security context

if the UE fails to authenticate the network the UE shall start timer T3520 when the AUTHENTICATION RESPONSE message containing the EAP-response message is sent furthermore the UE shall stop any of the retransmission timers that are running (e.g T3510 T3517 or T3521) upon receiving an AUTHENTICATION REQUEST message with the EAP message IE containing an EAP-request message from the network the UE shall stop timer T3520 if running and then process the EAP-request message as normally

if the network fails to authenticate the UE the network handling depends upon the type of identity used by the UE in the initial NAS message that is

- if the 5G-GUTI was used; or

- if the SUCI was used

if the 5G-GUTI was used the network should transport the EAP-failure message in the AUTHENTICATION RESULT message of the EAP result message transport procedure initiate an identification procedure to retrieve SUCI from the UE and restart the EAP based primary authentication and key agreement procedure with the received SUCI

if the SUCI was used for identification in the initial NAS message or in a restarted EAP based primary authentication and key agreement procedure or the network decides not to initiate the identification procedure to retrieve SUCI from the UE after an unsuccessful the EAP based primary authentication and key agreement procedure the network should transport the EAP-failure message in an AUTHENTICATION REJECT message of the EAP result message transport procedure

if the EAP-failure message is received in an AUTHENTICATION REJECT message

a) if the AUTHENTICATION REJECT message has been successfully integrity checked by the NAS

1) the UE shall set the update status to 5U3 ROAMING NOT ALLOWED delete the stored 5G-GUTI TAI list last visited registered TAI and ngKSI

in case of SNPN if the UE is neither registered for onboarding services in SNPN nor performing initial registration for onboarding services in SNPN and the UE does not support access to an SNPN using credentials from a credentials holder and does not support equivalent SNPNs the selected entry of the "list of subscriber data" with the SNPN identity of the current SNPN shall be considered invalid until the UE is switched off or the entry is updated;

in case of SNPN if the UE is neither registered for onboarding services in SNPN nor performing initial registration for onboarding services in SNPN and the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the UE shall consider the selected entry of the "list of subscriber data" as invalid until the UE is switched off or the entry is updated

in case of SNPN if the UE is registered for onboarding services in SNPN or is performing initial registration for onboarding services in SNPN the UE shall store the SNPN identity in the "permanently forbidden SNPNs for onboarding services in SNPN" list enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection or an SNPN selection for onboarding services according to 3GPP TS 23.122 [5]; and

2) if the UE is neither registered for onboarding services in SNPN nor performing initial registration for onboarding services in SNPN the UE shall set the counter for "the entry for the current SNPN considered invalid for 3GPP access" events and the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events in case of SNPN to UE implementation-specific maximum value

if the UE is registered for onboarding services in SNPN or performing initial registration for onboarding services in SNPN the UE shall set the SNPN-specific attempt counter for the current SNPN to the UE implementation-specific maximum value; and

b) if the AUTHENTICATION REJECT message is received without integrity protection the UE shall start timer T3247 with a random value uniformly drawn from the range between 30 minutes and 60 minutes if the timer is not running (see subclause 5.3.20)

additionally if the UE is neither registered for onboarding services in SNPN nor performing initial registration for onboarding services in SNPN the UE shall

1) if the AUTHENTICATION REJECT message is received over 3GPP access and the counter for "the entry for the current SNPN considered invalid for 3GPP access" events has a value less than a UE implementation-specific maximum value proceed as specified in list item a) 1) of subclause 5.3.20.3 for the case that the 5GMM cause value received is #3;

2) if the AUTHENTICATION REJECT message is received over non-3GPP access and the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events has a value less than a UE implementation-specific maximum value proceed as specified in list item a)-2) of subclause 5.3.20.3 for the case that the 5GMM cause value received is #3; or

3) otherwise

i) if the AUTHENTICATION REJECT message is received over 3GPP access

- the UE shall set the update status for 3GPP access to 5U3 ROAMING NOT ALLOWED delete for 3GPP access only the stored 5G-GUTI TAI list last visited registered TAI and ngKSI;

in case of SNPN if the UE does not support access to an SNPN using credentials from a credentials holder and does not support equivalent SNPNs the selected entry of the "list of subscriber data" with the SNPN identity of the current SNPN shall be considered invalid for 3GPP access until the UE is switched off or the entry is updated;

in case of SNPN if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the UE shall consider the selected entry of the "list of subscriber data" as invalid until the UE is switched off or the entry is updated; and

- the UE shall set the counter for "the entry for the current SNPN considered invalid for 3GPP access" events to UE implementation-specific maximum value; and

ii) if the AUTHENTICATION REJECT message is received over non-3GPP access

- the UE shall set the update status for non-3GPP access to 5U3 ROAMING NOT ALLOWED delete for non-3GPP access only the stored 5G-GUTI TAI list last visited registered TAI and ngKSI the selected entry of the "list of subscriber data" with the SNPN identity of the current SNPN shall be considered invalid for non-3GPP access until the UE is switched off or the entry is updated; and

- the UE shall set the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events to UE implementation-specific maximum value

if the UE is registered for onboarding services in SNPN or performing initial registration for onboarding services in SNPN the UE shall

1) if the SNPN-specific attempt counter for the SNPN sending the AUTHENTICATION REJECT message has a value less than a UE implementation-specific maximum value increment the SNPN-specific attempt counter for the SNPN; or

2) otherwise the UE shall set the update status to 5U3.ROAMING NOT ALLOWED delete the stored 5G-GUTI TAI list last visited registered TAI and ngKSI store the SNPN identity in the "permanently forbidden SNPNs for onboarding services in SNPN" list enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection or an SNPN selection for onboarding services according to 3GPP TS 23.122 [5]

if the AUTHENTICATION REJECT message is received by the UE the UE shall abort any 5GMM signalling procedure stop any of the timers T3510 T3517 T3519 or T3521 (if they were running) enter state 5GMM-DEREGISTERED and delete any stored SUCI

upon receiving an EAP-success message the ME shall

a) delete the valid KAUSF and the valid KSEAF if any;

b) if the ME has not generated a new KAUSF and a new KSEAF and has not created a partial native 5G NAS security context when handling the EAP-request message which resulted into generation of EMSK as described above

1) if

i) the default UE credentials for primary authentication if the UE is registering or registered for onboarding services in SNPN; or

ii) credentials in the selected entry of the "list of subscriber data" if the UE is not registering or registered for onboarding services in SNPN;

contain an indication to use MSK for derivation of KAUSF after success of primary authentication and key agreement procedure then generate a new KAUSF from the MSK otherwise generate a new KAUSF from the EMSK;

2) generate a new KSEAF from the new KAUSF and the KAMF from the ABBA that was received with the EAP-success message and the KSEAF as described in 3GPP TS 33.501 [24];

3) create a partial native 5G NAS security context identified by the ngKSI value in the volatile memory of the ME; and

4) store the KAMF in the created partial native 5G NAS security context; and

c) consider the new KAUSF to be the valid KAUSF and the new KSEAF to be the valid KSEAF reset the SOR counter and the UE parameter update counter to zero store the valid KAUSF the valid KSEAF the SOR counter and the UE parameter update counter as specified in annex c and use the valid KAUSF in the verification of SOR transparent container and UE parameters update transparent container if any are received

the UE shall consider the procedure complete

upon receiving an EAP-failure message the UE shall delete the partial native 5G NAS security context and shall delete the new KAUSF and the new KSEAF if any were created when handling the EAP-request message which resulted into generation of EMSK or MSK as described above

the UE shall consider the procedure complete

5.4.1.2.3A.2 EAP-TTLS with two phases of authentication

the UE may support acting as EAP peer of EAP-TTLS with two phases of authentication as specified in 3GPP TS 33.501 [24] and acting as peer of a legacy authentication protocol as specified in 3GPP TS 33.501 [24] the AUSF may support acting as EAP server of EAP-TTLS with two phases of authentication as specified in 3GPP TS 33.501 [24] the AAA server of the CH or the DCS may support acting a server of a legacy authentication protocol as specified in 3GPP TS 33.501 [24]

when EAP-TTLS with two phases of authentication as specified in 3GPP TS 33.501 [24] is used for primary authentication and key agreement in an SNPN

a) requirements in subclause 5.4.1.2.3A.1 shall apply in addition to requirements specified in 3GPP TS 33.501 [24] annex U;

b) indication to use MSK for derivation of KAUSF after success of primary authentication and key agreement procedure is not included in

1) the default UE credentials for primary authentication if the UE is registering or registered for onboarding services in SNPN; or

2) credentials in the selected entry of the "list of subscriber data" if the UE is not registering or registered for onboarding services in SNPN; and

c) the SUPI of the UE is in the form of a SUPI with the SUPI format "network specific identifier" containing a network-specific identifier

NOTE support of EAP-TTLS with two phases of authentication is based on the informative requirements as specified in 3GPP TS 33.501 [24]

##### 5.4.1.2.3B procedures related to EAP methods used for primary authentication of an N5GC device

5.4.1.2.3B.1 general

this subclause applies when an EAP method

a) supporting mutual authentication; and

b) other than EAP-AKA'

is used for primary authentication of an N5GC device when an W-AGF supports acting on behalf of the N5GC device the AMF supports serving the W-AGF acting on behalf of the N5GC device and the AUSF supports authentication of the N5GC device EAP-TLS is an example of such EAP method

NOTE 1 neither the N5GC device nor the AUSF derive any 5G related keys during or after the primary authentication

the AUSF supporting authentication of the N5GC device shall support acting as EAP server of at least one such EAP method as specified in annex o of 3GPP TS 33.501 [24]

NOTE 2 the N5GC device supports acting as EAP peer of at least one such EAP method as specified in annex o of 3GPP TS 33.501 [24] which is also supported by the AUSF

the W-AGF acting on behalf of the N5GC device provides to the N5GC device an EAP-request message an EAP-success message or an EAP-failure message received from the network according to subclause 5.4.1.2.1 and sends to the network according to subclause 5.4.1.2.1 an EAP-response provided by the N5GC device the N5GC device can inform the W-AGF acting on behalf of the N5GC device that the N5GC device fails to authenticate the network details of communication between the N5GC device and the W-AGF acting on behalf of the N5GC device are out of scope of this specification

when initiating an EAP based primary authentication and key agreement procedure using such EAP method the network shall select an ngKSI value the network shall send the selected ngKSI value to the W-AGF acting on behalf of the N5GC device along with each EAP message the network shall send the ABBA value as described in subclause 9.11.3.10 to the W-AGF acting on behalf of the N5GC device along with the EAP-request message and EAP-success message the W-AGF acting on behalf of the N5GC device shall not forward the ngKSI value or the ABBA value to the N5GC device

NOTE 3 the network provides the ngKSI value and the ABBA value since the ngKSI IE and the ABBA IE are mandatory IEs in AUTHENTICATION REQUEST message the W-AGF acting on behalf of the N5GC device does not use the ngKSI value or the ABBA value provided by the network

if the N5GC device fails to authenticate the network the W-AGF acting on behalf of the N5GC device shall start timer T3520 when the AUTHENTICATION RESPONSE message containing the EAP-response message is sent furthermore the W-AGF acting on behalf of the N5GC device shall stop any of the retransmission timers that are running (e.g T3510 T3517 or T3521) upon receiving an AUTHENTICATION REQUEST message with the EAP message IE containing an EAP-request message from the network the W-AGF acting on behalf of the N5GC device shall stop timer T3520 if running and then provides the EAP-request message to the N5GC device as normally

if the network fails to authenticate the N5GC device the network handling depends upon the type of identity used by the W-AGF acting on behalf of the N5GC device in the initial NAS message that is

a) if the 5G-GUTI was used; or

b) if the SUCI was used

if the 5G-GUTI was used the network should transport the EAP-failure message in the AUTHENTICATION RESULT message of the EAP result message transport procedure initiate an identification procedure to retrieve SUCI from the W-AGF acting on behalf of the N5GC device and restart the EAP based primary authentication and key agreement procedure with the received SUCI

if the SUCI was used for identification in the initial NAS message or in a restarted EAP based primary authentication and key agreement procedure or the network decides not to initiate the identification procedure to retrieve SUCI from the W-AGF acting on behalf of the N5GC device after an unsuccessful EAP based primary authentication and key agreement procedure the network should transport the EAP-failure message in an AUTHENTICATION REJECT message of the EAP result message transport procedure

if the EAP-failure message is received in an AUTHENTICATION REJECT message the W-AGF acting on behalf of the N5GC device shall start timer T3247 with a random value uniformly drawn from the range between 30 minutes and 60 minutes if the timer is not running (see subclause 5.3.20) additionally the W-AGF acting on behalf of the N5GC device shall

a) if the counter for "USIM considered invalid for 5GS services over non-3GPP access" events has a value less than a W-AGF implementation-specific maximum value proceed as specified in list item 1)-b) of subclause 5.3.20.2 for the case that the 5GMM cause value received is #3; or

b) otherwise set the update status to 5U3 ROAMING NOT ALLOWED delete the stored 5G-GUTI TAI list last visited registered TAI and ngKSI the USIM shall be considered invalid for 5GS services via non-3GPP access until switching off or the UICC containing the USIM is removed

if the AUTHENTICATION REJECT message is received by the W-AGF acting on behalf of the N5GC device the W-AGF acting on behalf of the N5GC device shall abort any 5GMM signalling procedure stop any of the timers T3510 T3517 T3519 or T3521 (if they were running) enter state 5GMM-DEREGISTERED and delete any stored SUCI

upon receiving an EAP-success message the W-AGF acting on behalf of the N5GC device shall consider the procedure complete

upon receiving an EAP-failure message the W-AGF acting on behalf of the N5GC device shall consider the procedure complete

##### 5.4.1.2.3C procedures related to EAP methods used for primary authentication of an AUN3 device

5.4.1.2.3C.1 general

this subclause applies when an EAP method is used for primary authentication of an AUN3 device when a 5G-RG supports acting on behalf of the AUN3 device the AMF supports serving the 5G-RG acting on behalf of the AUN3 device and the AUSF supports authentication of the AUN3 device EAP-AKA' and EAP-TLS are examples of such EAP method

the AUSF supporting authentication of the AUN3 device shall support acting as EAP server of at least one such EAP method as specified in annex z of 3GPP TS 33.501 [24]

the 5G-RG acting on behalf of the AUN3 device provides to the AUN3 device an EAP-request message an EAP-success message or an EAP-failure message received from the network according to subclause 5.4.1.2.1 and sends to the network according to subclause 5.4.1.2.1 an EAP-response provided by the AUN3 device details of communication between the AUN3 device and the 5G-RG acting on behalf of the AUN3 device are out of scope of this specification

when initiating an EAP based primary authentication and key agreement procedure using such EAP method the network shall select an ngKSI value the network shall send the selected ngKSI value to the 5G-RG acting on behalf of the AUN3 device along with each EAP message the network shall send the ABBA value as described in subclause 9.11.3.10 to the 5G-RG acting on behalf of the AUN3 device along with the EAP-request message and EAP-success message the 5G-RG acting on behalf of the AUN3 device shall not forward the ngKSI value or the ABBA value to the AUN3 device

NOTE 1 the network provides the ngKSI value and the ABBA value since the ngKSI IE and the ABBA IE are mandatory IEs in AUTHENTICATION REQUEST message the 5G-RG acting on behalf of the AUN3 device does not use the ngKSI value or the ABBA value provided by the network

if the 5G-RG acting on behalf of the AUN3 device is informed by AUN3 about failure to authenticate the network the 5G-RG acting on behalf of the AUN3 device shall start timer T3520 when the AUTHENTICATION RESPONSE message containing the EAP-response message is sent furthermore the 5G-RG acting on behalf of the AUN3 device shall stop any of the retransmission timers that are running (e.g T3510 T3517 or T3521) upon receiving an AUTHENTICATION REQUEST message with the EAP message IE containing an EAP-request message from the network the 5G-RG acting on behalf of the AUN3 device shall stop timer T3520 if running and then provides the EAP-request message to the AUN3 device as normally

if the network fails to authenticate the AUN3 device the network handling depends upon the type of identity used by the 5G-RG acting on behalf of the AUN3 device in the initial NAS message that is

a) if the 5G-GUTI was used; or

b) if the SUCI was used

if the 5G-GUTI was used the network should transport the EAP-failure message in the AUTHENTICATION RESULT message as specified in the EAP result message transport procedure initiate an identification procedure to retrieve SUCI from the 5G-RG acting on behalf of the AUN3 device and restart the EAP based primary authentication and key agreement procedure with the received SUCI

if the SUCI was used for identification in the initial NAS message or in a restarted EAP based primary authentication and key agreement procedure or the network decides not to initiate the identification procedure to retrieve SUCI from the 5G-RG acting on behalf of the AUN3 device after an unsuccessful EAP based primary authentication and key agreement procedure the network should transport the EAP-failure message in an AUTHENTICATION REJECT message as specified in the EAP result message transport procedure

if the EAP-failure message is received in an AUTHENTICATION REJECT message the 5G-RG acting on behalf of the AUN3 device shall start timer T3247 with a random value uniformly drawn from the range between 30 minutes and 60 minutes if the timer is not running (see subclause 5.3.20) additionally the 5G-RG acting on behalf of the AUN3 device shall

a) if the counter for "USIM considered invalid for 5GS services over non-3GPP access" events has a value less than a 5G-RG implementation-specific maximum value proceed as specified in list item 1)-b) of subclause 5.3.20.2 for the case that the 5GMM cause value received is #3; or

b) otherwise set the update status to 5U3 ROAMING NOT ALLOWED delete the stored 5G-GUTI TAI list last visited registered TAI and ngKSI the USIM shall be considered invalid for 5GS services via non-3GPP access until switching off or the UICC containing the USIM is removed

if the AUTHENTICATION REJECT message is received by the 5G-RG acting on behalf of the AUN3 device the 5G-RG acting on behalf of the AUN3 device shall abort any 5GMM signalling procedure stop any of the timers T3510 T3517 T3519 or T3521 (if they were running) enter state 5GMM-DEREGISTERED and delete any stored SUCI

upon receiving an EAP-success message from the network the 5G-RG acting on behalf of the AUN3 device shall consider the procedure complete the network shall provide

a) the master session key if the AUN3 device does not support 5G key hierarchy; or

b) the KWAGF key if the AUN3 device supports 5G key hierarchy;

to the 5G-RG along with the EAP-success message as specified in subclauses 5.4.1.2.5.2 and 5.4.2.2 the 5G-RG acting on behalf of the AUN3 device shall derive the pairwise master key from the master session key or the KWAGF key as specified in subclause 7B.7 of 3GPP TS 33.501 [24] the 5G-RG acting on behalf of the AUN3 device provides the EAP-success message to the AUN3 device

NOTE 2 the network is aware from the AUN3 device subscription data in UDM whether the AUN3 device supports 5G key hierarchy or not as specified in subclause 7B.7 of 3GPP TS 33.501 [24]

upon receiving an EAP-failure message from the network the 5G-RG acting on behalf of the AUN3 device shall consider the procedure complete

##### 5.4.1.2.4 EAP message reliable transport procedure

5.4.1.2.4.1 general

the purpose of the EAP message reliable transport procedure is to provide a reliable transport of an EAP-request message the ngKSI and the ABBA from the network to the UE and of an EAP-response message from the UE to the network

the EAP message reliable transport procedure is initiated by an AUTHENTICATION REQUEST message with the EAP message IE

5.4.1.2.4.2 EAP message reliable transport procedure initiation by the network

in order to initiate the EAP message reliable transport procedure the AMF shall create an AUTHENTICATION REQUEST message

the AMF shall set the EAP message IE of the AUTHENTICATION REQUEST message to the EAP-request message to be sent to the UE the AMF shall set the ngKSI IE of the AUTHENTICATION REQUEST message to the ngKSI value selected in subclause 5.4.1.2.2.2 subclause 5.4.1.2.3.1 or subclause 5.4.1.2.3A.1 in this release of specification the AMF shall set the ABBA IE of the AUTHENTICATION REQUEST message with the length of ABBA IE to 2 and the ABBA contents to be 2 octets in length with value 0000H as described in subclause 9.11.3.10

the AMF shall send the AUTHENTICATION REQUEST message to the UE and the AMF shall start timer T3560 (see example in figure 5.4.1.2.4.2.1)

figure 5.4.1.2.4.2.1 EAP message reliable transport procedure

upon receipt of an AUTHENTICATION REQUEST message with the EAP message IE the UE handles the EAP message received in the EAP message IE and the ABBA of the AUTHENTICATION REQUEST message

###### 5.4.1.2.4.3 EAP message reliable transport procedure accepted by the UE

the UE shall create an AUTHENTICATION RESPONSE message

if the received EAP message is an EAP-request message the UE shall set the EAP message IE of the AUTHENTICATION RESPONSE message to the EAP-response message responding to the received EAP-request message

the UE shall send the AUTHENTICATION RESPONSE message to the AMF

upon receipt of an AUTHENTICATION RESPONSE message the AMF shall stop timer T3560 if the EAP message IE is included in the AUTHENTICATION RESPONSE message the AMF handles the EAP message received in the EAP message IE of the AUTHENTICATION RESPONSE message

###### 5.4.1.2.4.4 abnormal cases on the network side

the following abnormal cases can be identified

a) expiry of timer T3560

the AMF shall on the first expiry of the timer T3560 retransmit the AUTHENTICATION REQUEST message and shall reset and start timer T3560 this retransmission is repeated four times i.e on the fifth expiry of timer T3560 the AMF shall abort the EAP based primary authentication and key agreement procedure and any ongoing 5GMM specific procedure and release the N1 NAS signalling connection

b) lower layers indication of non-delivered NAS PDU due to handover

if the AUTHENTICATION REQUEST message could not be delivered due to an intra AMF handover and the target TA is included in the TAI list then upon successful completion of the intra AMF handover the AMF shall retransmit the AUTHENTICATION REQUEST message if a failure of handover procedure is reported by the lower layer and the N1 NAS signalling connection exists the AMF shall retransmit the AUTHENTICATION REQUEST message

###### 5.4.1.2.4.5 abnormal cases in the UE

the following abnormal cases can be identified

a) authentication failure (5GMM cause #71 "ngKSI already in use")

the UE shall send an AUTHENTICATION FAILURE message with 5GMM cause #71 "ngKSI already in use" to the network and start the timer T3520 (see example in figure 5.4.1.3.7.1) furthermore the UE shall stop any of the retransmission timers that are running (e.g T3510 T3517 or T3521) upon the first receipt of an AUTHENTICATION FAILURE message from the UE with 5GMM cause #71 "ngKSI already in use" the network performs necessary actions to select a new ngKSI and send the same EAP-request message to the UE

NOTE 1 upon receipt of an AUTHENTICATION FAILURE message from the UE with 5GMM cause #71 "ngKSI already in use" the network can also re-initiate the EAP based primary authentication and key agreement procedure (see subclause 5.4.1.2.2.2)

upon receiving a new AUTHENTICATION REQUEST message with the EAP message IE containing an EAP-request message from the network the UE shall stop timer T3520 if running process the EAP-request message as normal

if the network is validated successfully (an AUTHENTICATION REQUEST message that contains a valid ngKSI and EAP-request message is received) the UE shall send the AUTHENTICATION RESPONSE message to the network and shall start any retransmission timers (e.g T3510 T3517 or T3521) if they were running and stopped when the UE received the first failed AUTHENTICATION REQUEST message

b) transmission failure of AUTHENTICATION RESPONSE message or AUTHENTICATION FAILURE message indication from lower layers (if the EAP based primary authentication and key agreement procedure is triggered by a registration procedure)

the UE shall stop the timer T3520 if running and re-initiate the registration procedure

c) transmission failure of AUTHENTICATION RESPONSE message or AUTHENTICATION FAILURE message indication with change in the current TAI (if the EAP based primary authentication and key agreement procedure is triggered by a service request procedure)

the UE shall stop the timer T3520 if running

if the current TAI is not in the TAI list the EAP based primary authentication and key agreement procedure shall be aborted and a registration procedure for mobility and periodic registration update shall be initiated

if the current TAI is still part of the TAI list it is up to the UE implementation how to re-run the ongoing procedure that triggered the EAP based primary authentication and key agreement procedure

d) transmission failure of AUTHENTICATION RESPONSE message or AUTHENTICATION FAILURE message indication without change in the current TAI (if the authentication procedure is triggered by a service request procedure)

the UE shall stop the timer T3520 if running it is up to the UE implementation how to re-run the ongoing procedure that triggered the EAP based primary authentication and key agreement procedure

e) network failing the authentication check

if the UE deems that the network has failed the authentication check then it shall request RRC to locally release the RRC connection and treat the active cell as barred (see 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C]) the UE shall start any retransmission timers (e.g T3510 T3517 or T3521) if they were running and stopped when the UE received the first AUTHENTICATION REQUEST message containing an ngKSI that was already in use

f) change in the current TAI

if that the current TAI is not in the TAI list before the AUTHENTICATION RESPONSE message is sent the UE may discard sending the AUTHENTICATION RESPONSE message to the network and continue with the initiation of the registration procedure for mobility and periodic registration update as described in subclause 5.5.1.3.2

for item e if no emergency service is started or is ongoing

the UE shall stop timer T3520 if the timer is running and the UE enters 5GMM-IDLE mode e.g upon detection of a lower layer failure release of the N1 NAS signalling connection or as the result of an inter-system change in 5GMM-CONNECTED mode from N1 mode to S1 mode

the UE shall deem that the network has failed the authentication check or assume that the authentication is not genuine and proceed as described in item e above if any of the following occurs

- the timer T3520 expires;

- the UE detects any combination of the EAP-based authentication failures transmission of AUTHENTICATION FAILURE message with 5GMM cause #71 "ngKSI already in use" transmission of AUTHENTICATION RESPONSE message with an EAP-response message after detecting an error as described in subclause 5.4.1.2.2.4 with an EAP-response message after not accepting of the server certificate as described in subclause 5.4.1.2.3.1 or with an EAP-response message after failing to authenticate the network as described in subclause 5.4.1.2.3A.1 during three consecutive authentication challenges the EAP-request/AKA'-challenge challenges shall be considered as consecutive only if the EAP-request/AKA'-challenge challenges causing the second and third EAP-based authentication failure are received by the UE while the timer T3520 started after the previous EAP-based authentication failure is running not accepting of the server certificate shall be considered as consecutive only if the EAP-request messages causing the second and third not accepting of the server certificate are received by the UE while the timer T3520 started after the previous EAP request message causing the previous not accepting of the server certificate is running

NOTE 2 reception of an EAP-failure message is not considered when determining the three consecutive authentication challenges or three consecutive not accepting of the server certificate

for item e if there is an emergency service started or is ongoin

the UE shall stop timer T3520 if the timer is running and the UE enters 5GMM-IDLE mode e.g upon detection of a lower layer failure release of the N1 NAS signalling connection or as the result of an inter-system change in 5GMM-CONNECTED mode from N1 mode to S1 mode

if a UE has an emergency PDU session established or is establishing an emergency PDU session and sends an AUTHENTICATION FAILURE message to the AMF with the 5GMM cause appropriate for this cases (i.e #71) or an AUTHENTICATION RESPONSE message containing an EAP-response message as described in subclause 5.4.1.2.2.4 containing an EAP-response message after not accepting of the server certificate as described in subclause 5.4.1.2.3.1 or containing an EAP-response message after failing to authenticate the network as described in subclause 5.4.1.2.3A.1 and receives the SECURITY MODE COMMAND message before the timeout of timer T3520 the UE shall deem that the network has passed the authentication check successfully stop timer T3520 respectively and execute the security mode control procedure

if a UE has an emergency PDU session established or is establishing an emergency PDU session when timer T3520 expires the UE shall not deem that the network has failed the authentication check and not behave as described in item e instead the UE shall continue using the current security context if any release all non-emergency PDU sessions if any by initiating UE-requested PDU session release procedure if there is an ongoing PDU session establishment procedure the UE shall release all non-emergency PDU sessions upon completion of the PDU session establishment procedure

the UE shall start any retransmission timers (e.g T3510 T3517 or T3521) if

- they were running and stopped when the UE received the AUTHENTICATION REQUEST message and detected an authentication failure; and

- the procedures associated with these timers have not yet been completed

the UE shall consider itself to be registered for emergency services

##### 5.4.1.2.5 EAP result message transport procedure

5.4.1.2.5.1 general

the purpose of the EAP result message transport procedure is to provide an EAP-success message or an EAP-failure message and ngKSI from the network to the UE when the EAP message cannot be piggybacked by another NAS message

the EAP result message transport procedure is initiated

a) by an AUTHENTICATION RESULT message with the EAP message IE carrying the EAP-success message or the EAP-failure message; or

b) by an AUTHENTICATION REJECT message with the EAP message IE carrying the EAP-failure message

5.4.1.2.5.2 EAP result message transport procedure initiation by the network

in order to initiate the EAP result message transport procedure the AMF shall create an AUTHENTICATION RESULT message or an AUTHENTICATION REJECT message

the AMF shall set the EAP message IE of the AUTHENTICATION RESULT message to an EAP-success message or an EAP-failure message to be sent to the UE if the AUTHENTICATION RESULT message is provided to a 5G-RG that is acting on behalf of an AUN3 device and the EAP message IE is set to an EAP-success message the AMF shall include the AUN3 device security key IE in the AUTHENTICATION RESULT message with its value set to

a) the master session key if the AUN3 device does not support 5G key hierarchy; or

b) the KWAGF key if the AUN3 device supports 5G key hierarchy

NOTE the network is aware from the AUN3 device subscription data in UDM whether the AUN3 device supports 5G key hierarchy or not as specified in subclause 7B.7 of 3GPP TS 33.501 [24]

the AMF shall set the EAP message IE of the AUTHENTICATION REJECT message to an EAP-failure message to be sent to the UE the AMF shall set the ngKSI IE of the AUTHENTICATION RESULT message or the AUTHENTICATION REJECT message to the ngKSI value selected in subclause 5.4.1.2.2.2 subclause 5.4.1.2.3.1 or subclause 5.4.1.2.3A.1

the AMF shall send the AUTHENTICATION RESULT message or the AUTHENTICATION REJECT message to the UE (see example in figure 5.4.1.2.5.2.1)

figure 5.4.1.2.5.2.1 EAP result message transport procedure

upon receipt of an AUTHENTICATION RESULT message or an AUTHENTICATION REJECT message with the EAP message IE the UE handles the EAP message received in the EAP message IE and the ABBA if received of the AUTHENTICATION RESULT message or in the AUTHENTICATION REJECT message and the 5G-RG that is acting on behalf of an AUN3 device handles the AUN3 device security key IE if received in the AUTHENTICATION RESULT message

#### 5.4.1.3 5G AKA based primary authentication and key agreement procedure

##### 5.4.1.3.1 general

the purpose of the 5G AKA based primary authentication and key agreement procedure is to provide mutual authentication between the UE and the network and to agree on the keys KAUSF KSEAF and KAMF (see 3GPP TS 33.501 [24]) the cases when the 5G AKA based primary authentication and key agreement procedure is used are defined in 3GPP TS 33.501 [24]

the network initiates the 5G AKA based primary authentication and key agreement procedure by sending an AUTHENTICATION REQUEST message to the UE without the EAP message IE the network shall include the ngKSI and the ABBA in AUTHENTICATION REQUEST message

the 5G AKA based primary authentication and key agreement procedure is always initiated and controlled by the network however the UE can reject the 5G authentication challenge sent by the network

the UE shall proceed with a 5G authentication challenge only if a USIM is present

a partial native 5G NAS security context is established in the UE and the network when a 5G authentication is successfully performed during a successful 5G AKA based primary authentication and key agreement procedure the CK and IK are computed by the USIM CK and IK are then used by the ME as key material to compute new keys KAUSF KSEAF and KAMF KAMF is stored in the 5G NAS security contexts (see 3GPP TS 33.501 [24]) of both the network and in the volatile memory of the ME while registered to the network and is the root for the 5GS integrity protection and ciphering key hierarchy

NOTE 1 generation of the new KAUSF and the new KSEAF does not result into deletion of the valid KAUSF and the valid KSEAF if any

upon successful completion of the 5G AKA based primary authentication the AMF shall initiate a security mode control procedure (see subclause 5.4.2) to take the new partial native 5G NAS security context into use

NOTE 2 the AMF immediately initiates a security mode control procedure (see subclause 5.4.2) after 5G AKA primary authentication is successful to avoid KAUSF key mismatch between the UE and the network

##### 5.4.1.3.2 authentication initiation by the network

the network may initiate a 5G AKA based primary authentication and key agreement procedure for a UE in 5GMM-CONNECTED mode at any time for restrictions applicable after handover or inter-system change to N1 mode in 5GMM-CONNECTED mode see subclause 5.5.1.3.3

the network initiates the 5G AKA based primary authentication and key agreement procedure by sending an AUTHENTICATION REQUEST message to the UE and starting the timer T3560 (see example in figure 5.4.1.3.2.1) the AUTHENTICATION REQUEST message shall contain the parameters necessary to calculate the authentication response (see 3GPP TS 33.501 [24]) this message shall include the ngKSI that will be used by the UE and AMF to identify the KAMF and the partial native security context that is created if the authentication is successful this message shall also include the ABBA parameter in this release of specification the network shall set the length of ABBA IE to 2 and the ABBA contents to be 2 octets in length with value 0000H as described in subclause 9.11.3.10

if an ngKSI is contained in an initial NAS message during a 5GMM procedure the network shall include a different ngKSI value in the AUTHENTICATION REQUEST message when it initiates a 5G AKA based primary authentication and key agreement procedure

figure 5.4.1.3.2.1 5G AKA based primary authentication and key agreement procedure

##### 5.4.1.3.3 authentication response by the UE

the UE shall respond to an AUTHENTICATION REQUEST message with the exception of the cases described in subclause 5.4.1.3.6 and 5.4.1.3.7 case l the UE shall process the 5G authentication challenge data and respond with an AUTHENTICATION RESPONSE message to the network

upon a successful 5G authentication challenge the UE shall determine the PLMN identity in case of PLMN or the SNPN identity in case of SNPN to be used for the calculation of the new KAMF from the 5G authentication challenge data according to the following rules

a) when the UE moves from 5GMM-IDLE mode to 5GMM-CONNECTED mode until the first handover the UE shall use the PLMN identity of the selected PLMN or the SNPN identity of the selected SNPN; and

b) after handover or inter-system change to N1 mode in 5GMM-CONNECTED mode

1) if the target cell is not a shared network cell the UE shall use the PLMN identity in case of PLMN or the SNPN identity in case of SNPN received as part of the broadcast system information;

2) if the target cell is a shared network cell and the UE has a valid 5G-GUTI the UE shall use the PLMN identity in case of PLMN or the SNPN identity in case of SNPN that is part of the 5G-GUTI; and

3) if the target cell is a shared network cell and the UE has a valid 4G-GUTI but not a valid 5G-GUTI the UE shall use the PLMN identity that is part of the 4G-GUTI

upon a successful 5G authentication challenge the new KAMF calculated from the 5G authentication challenge data shall be stored in a new 5G NAS security context in the volatile memory of the ME

the USIM will compute the authentication response (RES) using the 5G authentication challenge data received from the ME and pass RES to the ME from the RES RES\* is then generated according to annex a of 3GPP TS 33.501 [24]

in order to avoid a synchronisation failure when the UE receives an AUTHENTICATION REQUEST message the UE shall store the received RAND together with the RES\* in the volatile memory of the ME when the UE receives a subsequent AUTHENTICATION REQUEST message if the stored RAND value is equal to the new received value in the AUTHENTICATION REQUEST message then the ME shall not pass the RAND to the USIM but shall send the AUTHENTICATION RESPONSE message with the stored RES\* if there is no valid stored RAND in the ME or the stored RAND is different from the new received value in the AUTHENTICATION REQUEST message the ME shall pass the RAND to the USIM shall override any previously stored RAND and RES\* with the new ones and start or reset and restart timer T3516

the RAND and RES\* values stored in the ME shall be deleted and timer T3516 if running shall be stopped

a) upon receipt of a

1) SECURITY MODE COMMAND message

2) SERVICE REJECT message

3) REGISTRATION REJECT message

4) REGISTRATION ACCEPT message

5) AUTHENTICATION REJECT message or

6) SERVICE ACCEPT message;

b) upon expiry of timer T3516;

c) if the UE enters the 5GMM state 5GMM-DEREGISTERED or 5GMM-NULL; or

d) if the UE enters 5GMM-IDLE mode

##### 5.4.1.3.4 authentication completion by the network

upon receipt of an AUTHENTICATION RESPONSE message the network stops the timer T3560 and checks the correctness of RES\* (see 3GPP TS 33.501 [24])

if the 5G AKA based primary authentication and key agreement procedure has been completed successfully and the related ngKSI is stored in the 5G NAS security context of the network the network shall include a different ngKSI value in the AUTHENTICATION REQUEST message when it initiates a new 5G AKA based primary authentication and key agreement procedure

upon receipt of an AUTHENTICATION FAILURE message the network stops the timer T3560 in the case where the 5GMM cause #21 "synch failure" is received the core network may renegotiate with the UDM/AUSF and provide the UE with new authentication parameters

##### 5.4.1.3.5 authentication not accepted by the network

if the authentication response (RES) returned by the UE is not valid the network response depends upon the type of identity used by the UE in the initial NAS message that is

- if the 5G-GUTI was used; or

- if the SUCI was used

if the 5G-GUTI was used the network should initiate an identification procedure to retrieve SUCI from the UE and restart the 5G AKA based primary authentication and key agreement procedure with the received SUCI

if the SUCI was used for identification in the initial NAS message or in a restarted 5G AKA based primary authentication and key agreement procedure or the network decides not to initiate the identification procedure to retrieve SUCI from the UE after an unsuccessful 5G AKA based primary authentication and key agreement procedure the network should send an AUTHENTICATION REJECT message to the UE the network shall maintain if any the 5GMM-context and 5G NAS security context of the UE unchanged

upon receipt of an AUTHENTICATION REJECT message

1) if the AUTHENTICATION REJECT message has been successfully integrity checked by the NAS

the UE shall set the update status to 5U3 ROAMING NOT ALLOWED delete the stored 5G-GUTI TAI list last visited registered TAI ngKSI the list of equivalent PLMNs (if any) and the list of equivalent SNPNs (if any) additionally if a registration procedure was performed the UE shall reset the registration attempt counter or if a service request procedure was performed the UE shall reset the service request attempt counter

in case of PLMN the USIM shall be considered invalid until switching off the UE or the UICC containing the USIM is removed

in case of SNPN if the UE is neither registered for onboarding services in SNPN nor performing initial registration for onboarding services in SNPN and the UE does not support access to an SNPN using credentials from a credentials holder and does not support equivalent SNPNs the entry of the "list of subscriber data" with the SNPN identity of the current SNPN shall be considered invalid until the UE is switched off or the entry is updated additionally the UE shall consider the USIM as invalid for the current SNPN until switching off or the UICC containing the USIM is removed

in case of SNPN if the UE is neither registered for onboarding services in SNPN nor performing initial registration for onboarding services in SNPN and the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the UE shall consider the selected entry of the "list of subscriber data" as invalid for 3GPP access until the UE is switched off or the entry is updated additionally the UE shall consider the USIM as invalid for the entry until switching off or the UICC containing the USIM is removed

in case of SNPN if the UE is registered for onboarding services in SNPN or is performing initial registration for onboarding services in SNPN the UE shall store the SNPN identity in the "permanently forbidden SNPNs for onboarding services in SNPN" list enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection or an SNPN selection for onboarding services according to 3GPP TS 23.122 [5]; and

- if the UE is neither registered for onboarding services in SNPN nor performing initial registration for onboarding services in SNPN the UE shall set

i) the counter for "SIM/USIM considered invalid for GPRS services" events the counter for "USIM considered invalid for 5GS services over non-3GPP access" events and the counter for "SIM/USIM considered invalid for non-GPRS services" events if maintained by the UE in case of PLMN; or

ii) the counter for "the entry for the current SNPN considered invalid for 3GPP access" events and the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events in case of SNPN;

to UE implementation-specific maximum value

if the UE is registered for onboarding services in SNPN or performing initial registration for onboarding services in SNPN the UE shall set the SNPN-specific attempt counter for the current SNPN to the UE implementation-specific maximum value; and

- if the UE is operating in single-registration mode the UE shall handle EMM parameters 4G-GUTI last visited registered TAI TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the authentication procedure is not accepted by the network the USIM shall be considered as invalid also for non-EPS services until switching off or the UICC containing the USIM is removed; and

2) if the AUTHENTICATION REJECT message is received without integrity protection and if timer T3516 or T3520 is running the UE shall start timer T3247 with a random value uniformly drawn from the range between 30 minutes and 60 minutes if the timer is not running (see subclause 5.3.20)

additionally if the UE is neither registered for onboarding services in SNPN nor performing initial registration for onboarding services in SNPN the UE shall

a) if the AUTHENTICATION REJECT message is received over 3GPP access and the counter for "SIM/USIM considered invalid for GPRS services" events in case of PLMN or the counter for "the entry for the current SNPN considered invalid for 3GPP access" events in case of SNPN has a value less than a UE implementation-specific maximum value proceed as specified in subclause 5.3.20 list item 1)-a) of subclause 5.3.20.2 (if the UE is not operating in SNPN access operation mode) or list item a)-1) of subclause 5.3.20.3 (if the UE is operating in SNPN access operation mode) for the case that the 5GMM cause value received is #3;

b) if the AUTHENTICATION REJECT message is received over non-3GPP access and the counter for "USIM considered invalid for 5GS services over non-3GPP access" events in case of PLMN or the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events in case of SNPN has a value less than a UE implementation-specific maximum value proceed as specified in subclause 5.3.20 list item 1)-b) of subclause 5.3.20.2 (if the UE is not operating in SNPN access operation mode) or list item a)-2) of subclause 5.3.20.3 (if the UE is operating in SNPN access operation mode) for the case that the 5GMM cause value received is #3

c) otherwise

i) if the AUTHENTICATION REJECT message is received over 3GPP access

- the UE shall set the update status for 3GPP access to 5U3 ROAMING NOT ALLOWED delete for 3GPP access only the stored 5G-GUTI TAI list last visited registered TAI and ngKSI

- in case of PLMN the UE shall consider the USIM as invalid for 5GS services via 3GPP access and non-EPS service until switching off the UE or the UICC containing the USIM is removed

in case of SNPN the UE shall consider the entry of the "list of subscriber data" with the SNPN identity of the current SNPN shall be considered invalid for 3GPP access until the UE is switched off or the entry is updated additionally the UE shall consider the USIM as invalid for the current SNPN via 3GPP access until switching off or the UICC containing the USIM is removed

- the UE shall set

- the counter for "SIM/USIM considered invalid for GPRS services" events and the counter for "SIM/USIM considered invalid for non-GPRS services" events if maintained by the UE in case of PLMN; or

- the counter for "the entry for the current SNPN considered invalid for 3GPP access" events in case of SNPN;

to UE implementation-specific maximum value

- if the UE is operating in single-registration mode the UE shall handle 4G-GUTI TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the authentication procedure is not accepted by the network the USIM shall be considered as invalid also for non-EPS services until switching off or the UICC containing the USIM is removed; and

ii) if the AUTHENTICATION REJECT message is received over non-3GPP access

- the UE shall set the update status for non-3GPP access to 5U3 ROAMING NOT ALLOWED delete for non-3GPP access only the stored 5G-GUTI TAI list last visited registered TAI and ngKSI;

- in case of PLMN the UE shall consider the USIM as invalid for 5GS services via non-3GPP access until switching off the UE or the UICC containing the USIM is removed

in case of SNPN the UE shall consider the entry of the "list of subscriber data" with the SNPN identity of the current SNPN as invalid for non-3GPP access until the UE is switched off or the entry is updated additionally the UE shall consider the USIM as invalid for the current SNPN and for non-3GPP access until switching off or the UICC containing the USIM is removed; and

- the UE shall set

- the counter for "USIM considered invalid for 5GS services over non-3GPP access" events to UE implementation-specific maximum value in case of PLMN; or

- the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events to UE implementation-specific maximum value in case of SNPN

if the UE is registered for onboarding services in SNPN or performing initial registration for onboarding services in SNPN the UE shall

1) if the SNPN-specific attempt counter for the SNPN sending the AUTHENTICATION REJECT message has a value less than a UE implementation-specific maximum value increment the SNPN-specific attempt counter for the SNPN; or

2) otherwise the UE shall set the update status to 5U3.ROAMING NOT ALLOWED delete the stored 5G-GUTI TAI list last visited registered TAI and ngKSI store the SNPN identity in the "permanently forbidden SNPNs for onboarding services in SNPN" list enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection or an SNPN selection for onboarding services according to 3GPP TS 23.122 [5]

if the AUTHENTICATION REJECT message is received by the UE the UE shall abort any 5GMM signalling procedure stop any of the timers T3510 T3516 T3517 T3519 T3520 or T3521 (if they were running) enter state 5GMM-DEREGISTERED and delete any stored SUCI

depending on local requirements or operator preference for emergency services if the UE initiates a registration procedure with 5GS registration type IE set to "emergency registration" and the AMF is configured to allow emergency registration without user identity the AMF needs not follow the procedures specified for the authentication failure in the present subclause the AMF may continue a current 5GMM specific procedure

##### 5.4.1.3.6 authentication not accepted by the UE

in the 5G authentication challenge the UE shall check the 5G authentication challenge data (RAND AUTN and ngKSI) received in the AUTHENTICATION REQUEST message to verify authenticity of the 5G core network

the ME shall check that ngKSI received in the AUTHENTICATION REQUEST message is not already in use the ME shall forward the RAND and AUTN to the USIM to check

the UE may reject the core network due to an incorrect AUTN or ngKSI parameter if the UE has to reject the 5G authentication challenge the UE shall return AUTHENTICATION FAILURE message to the network with a cause value indicating the reason for the failure (see 3GPP TS 33.501 [24])

incorrect 5G authentication challenge data contains four possible causes for authentication failure

a) MAC code failure

if the UE finds the MAC code (supplied by the core network in the AUTN parameter) to be invalid the UE shall send an AUTHENTICATION FAILURE message to the network with the 5GMM cause #20 "MAC failure" the UE shall then follow the procedure described in subclause 5.4.1.3.7 item c

b) Non-5G authentication unacceptable

if the UE finds that the "separation bit" in the AMF field of AUTN supplied by the core network is set to 0 the UE shall send an AUTHENTICATION FAILURE message to the network with the 5GMM cause #26 "non-5G authentication unacceptable" (see subclause 6.1.3 in 3GPP TS 33.501 [24]) the UE shall then follow the procedure described in subclause 5.4.1.3.7 item d

c) ngKSI already in use

if the UE detects that ngKSI received in the AUTHENTICATION REQUEST message is already in use in the UE shall send an AUTHENTICATION FAILURE message to the network with the 5GMM cause #71 "ngKSI already in use" the UE shall then follow the procedure described in subclause 5.4.1.3.7 item e

d) SQN failure

if the UE finds the sequence number SQN (supplied by the core network in the AUTN parameter) to be out of range the UE shall send an AUTHENTICATION FAILURE message to the network with the 5GMM cause #21 "synch failure" and a re-synchronization token AUTS provided by the USIM (see 3GPP TS 33.102 [23]) the UE shall then follow the procedure described in subclause 5.4.1.3.7 item f

if the UE returns an AUTHENTICATION FAILURE message to the network the UE shall delete any previously stored RAND and RES\* and shall stop timer T3516 if running

if the UE has an emergency PDU session established or is establishing such a PDU session additional UE requirements are specified in subclause 5.4.1.3.7 under "for items c d e and f"

##### 5.4.1.3.7 abnormal cases

a) lower layer failure

upon detection of lower layer failure before the AUTHENTICATION RESPONSE message is received the network shall abort the procedure

b) expiry of timer T3560

the network shall on the first expiry of the timer T3560 retransmit the AUTHENTICATION REQUEST message and shall reset and start timer T3560 this retransmission is repeated four times i.e on the fifth expiry of timer T3560 the network shall abort the 5G AKA based primary authentication and key agreement procedure and any ongoing 5GMM specific procedure and release the N1 NAS signalling connection

c) authentication failure (5GMM cause #20 "MAC failure")

the UE shall send an AUTHENTICATION FAILURE message with 5GMM cause #20 "MAC failure" according to subclause 5.4.1.3.6 to the network and start timer T3520 (see example in figure 5.4.1.3.7.1) furthermore the UE shall stop any of the retransmission timers that are running (e.g T3510 T3517 or T3521) upon the first receipt of an AUTHENTICATION FAILURE message from the UE with 5GMM cause #20 "MAC failure" the network may initiate the identification procedure described in subclause 5.4.3 this is to allow the network to obtain the SUCI from the UE the network may then check that the 5G-GUTI originally used in the 5G authentication challenge corresponded to the correct SUPI upon receipt of the IDENTITY REQUEST message from the network the UE shall proceed as specified in subclause 5.4.3.3

NOTE 1 upon receipt of an AUTHENTICATION FAILURE message from the UE with 5GMM cause #20 "MAC failure" the network may also terminate the 5G AKA based primary authentication and key agreement procedure (see subclause 5.4.1.3.5)

if the mapping of 5G-GUTI to SUPI in the network was incorrect the network should respond by sending a new AUTHENTICATION REQUEST message to the UE upon receiving the new AUTHENTICATION REQUEST message from the network the UE shall stop the timer T3520 if running and then process the 5G challenge information as normal if the mapping of 5G-GUTI to SUPI in the network was correct the network should terminate the 5G AKA based primary authentication and key agreement procedure by sending an AUTHENTICATION REJECT message (see subclause 5.4.1.3.5)

if the network is validated successfully (an AUTHENTICATION REQUEST message that contains a valid SQN and MAC is received) the UE shall send the AUTHENTICATION RESPONSE message to the network and shall start any retransmission timers (e.g T3510 T3517 or T3521) if they were running and stopped when the UE received the first failed AUTHENTICATION REQUEST message

if the UE receives the second AUTHENTICATION REQUEST message and the MAC value cannot be resolved the UE shall follow the procedure specified in this subclause item c starting again from the beginning or if the message contains a UMTS authentication challenge the UE shall follow the procedure specified in item d if the SQN is invalid the UE shall proceed as specified in item f

figure 5.4.1.3.7.1 authentication failure during 5G AKA based primary authentication and key agreement procedure

d) authentication failure (5GMM cause #26 "non-5G authentication unacceptable")

the UE shall send an AUTHENTICATION FAILURE message with 5GMM cause #26 "non-5G authentication unacceptable" to the network and start the timer T3520 (see example in figure 5.4.1.3.7.1) furthermore the UE shall stop any of the retransmission timers that are running (e.g T3510 T3517 or T3521) upon the first receipt of an AUTHENTICATION FAILURE message from the UE with 5GMM cause #26 "non-5G authentication unacceptable" the network may initiate the identification procedure described in subclause 5.4.3 this is to allow the network to obtain the SUCI from the UE the network may then check that the 5G-GUTI originally used in the 5G authentication challenge corresponded to the correct SUPI upon receipt of the IDENTITY REQUEST message from the network the UE shall proceed as specified in subclause 5.4.3.3

NOTE 2 upon receipt of an AUTHENTICATION FAILURE message from the UE with 5GMM cause #26 "non-5G authentication unacceptable" the network may also terminate the 5G AKA based primary authentication and key agreement procedure (see subclause 5.4.1.3.5)

if the mapping of 5G-GUTI to SUPI in the network was incorrect the network should respond by sending a new AUTHENTICATION REQUEST message to the UE upon receiving the new AUTHENTICATION REQUEST message from the network the UE shall stop the timer T3520 if running and then process the 5G challenge information as normal if the mapping of 5G-GUTI to SUPI in the network was correct the network should terminate the 5G AKA based primary authentication and key agreement authentication procedure by sending an AUTHENTICATION REJECT message (see subclause 5.4.1.3.5)

if the network is validated successfully (an AUTHENTICATION REQUEST message that contains a valid 5G authentication challenge is received) the UE shall send the AUTHENTICATION RESPONSE message to the network and shall start any retransmission timers (e.g T3510 T3517 or T3521) if they were running and stopped when the UE received the first failed AUTHENTICATION REQUEST message

e) authentication failure (5GMM cause #71 "ngKSI already in use")

the UE shall send an AUTHENTICATION FAILURE message with 5GMM cause #71 "ngKSI already in use" to the network and start the timer T3520 (see example in figure 5.4.1.3.7.1) furthermore the UE shall stop any of the retransmission timers that are running (e.g T3510 T3517 or T3521) upon the first receipt of an AUTHENTICATION FAILURE message from the UE with 5GMM cause #71 "ngKSI already in use" the network performs necessary actions to select a new ngKSI and send the same 5G authentication challenge to the UE

NOTE 3 upon receipt of an AUTHENTICATION FAILURE message from the UE with 5GMM cause #71 "ngKSI already in use" the network may also re-initiate the 5G AKA based primary authentication and key agreement procedure (see subclause 5.4.1.3.2)

upon receiving the new AUTHENTICATION REQUEST message from the network the UE shall stop the timer T3520 if running and then process the 5G challenge information as normal

if the network is validated successfully (an AUTHENTICATION REQUEST message that contains a valid ngKSI SQN and MAC is received) the UE shall send the AUTHENTICATION RESPONSE message to the network and shall start any retransmission timers (e.g T3510 T3517 or T3521) if they were running and stopped when the UE received the first failed AUTHENTICATION REQUEST message

f) authentication failure (5GMM cause #21 "synch failure")

the UE shall send an AUTHENTICATION FAILURE message with 5GMM cause #21 "synch failure" to the network and start the timer T3520 (see example in figure 5.4.1.3.7.1) furthermore the UE shall stop any of the retransmission timers that are running (e.g T3510 T3517 or T3521) upon the first receipt of an AUTHENTICATION FAILURE message from the UE with the 5GMM cause #21 "synch failure" the network shall use the returned AUTS parameter from the authentication failure parameter IE in the AUTHENTICATION FAILURE message to re-synchronise the re-synchronisation procedure requires the AMF to delete all unused authentication vectors for that SUPI and obtain new vectors from the UDM/AUSF when re-synchronisation is complete the network shall initiate the 5G AKA based primary authentication and key agreement procedure upon receipt of the AUTHENTICATION REQUEST message the UE shall stop the timer T3520 if running

NOTE 4 upon receipt of two consecutive AUTHENTICATION FAILURE messages from the UE with 5GMM cause #21 "synch failure" the network may terminate the 5G AKA based primary authentication and key agreement procedure by sending an AUTHENTICATION REJECT message

if the network is validated successfully (a new AUTHENTICATION REQUEST message is received which contains a valid SQN and MAC) while T3520 is running the UE shall send the AUTHENTICATION RESPONSE message to the network and shall start any retransmission timers (e.g T3510 T3517 or T3521) if they were running and stopped when the UE received the first failed AUTHENTICATION REQUEST message

upon receipt of an AUTHENTICATION REJECT message the UE shall perform the actions as specified in subclause 5.4.1.3.5

g) network failing the authentication check

if the UE deems that the network has failed the authentication check then it shall request RRC to locally release the RRC connection and treat the active cell as barred (see 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C]) the UE shall start any retransmission timers (e.g T3510 T3517 or T3521) if they were running and stopped when the UE received the first AUTHENTICATION REQUEST message containing an incorrect authentication challenge data causing authentication failure

h) transmission failure of AUTHENTICATION RESPONSE message or AUTHENTICATION FAILURE message indication from lower layers (if the 5G AKA based primary authentication and key agreement procedure is triggered by a registration procedure)

the UE shall stop the timer T3520 if running and re-initiate the registration procedure

i) transmission failure of AUTHENTICATION RESPONSE message or AUTHENTICATION FAILURE message indication with change in the current TAI (if the 5G AKA based primary authentication and key agreement procedure is triggered by a service request procedure)

the UE shall stop the timer T3520 if running

if the current TAI is not in the TAI list the 5G AKA based primary authentication and key agreement procedure shall be aborted and a registration procedure for mobility and periodic registration update shall be initiated

if the current TAI is still part of the TAI list it is up to the UE implementation how to re-run the ongoing procedure that triggered the 5G AKA based primary authentication and key agreement procedure

j) transmission failure of AUTHENTICATION RESPONSE message or AUTHENTICATION FAILURE message indication without change in the current TAI (if the authentication procedure is triggered by a service request procedure)

the UE shall stop the timer T3520 if running it is up to the UE implementation how to re-run the ongoing procedure that triggered the 5G AKA based primary authentication and key agreement procedure

k) lower layers indication of non-delivered NAS PDU due to handover

if the AUTHENTICATION REQUEST message could not be delivered due to an intra AMF handover and the target TA is included in the TAI list then upon successful completion of the intra AMF handover the AMF shall retransmit the AUTHENTICATION REQUEST message if a failure of handover procedure is reported by the lower layer and the N1 NAS signalling connection exists the AMF shall retransmit the AUTHENTICATION REQUEST message

l) change in the current TAI

if the current TAI is not in the TAI list before the AUTHENTICATION RESPONSE message is sent the UE may discard sending the AUTHENTICATION RESPONSE message to the network and continue with the initiation of the registration procedure for mobility and periodic registration update as described in subclause 5.5.1.3.2

m) AUTHENTICATION REJECT message is received without integrity protection and neither timer T3516 nor T3520 is running

if an AUTHENTICATION REJECT message is received without integrity protection and if neither timer T3516 nor T3520 is running then the UE shall discard the AUTHENTICATION REJECT message additionally the UE may request RRC to locally release the RRC connection and treat the active cell as barred (see 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C])

for items c d e and f if no emergency service is started or is ongoing

the UE shall stop timer T3520 if the timer is running and the UE enters 5GMM-IDLE mode e.g upon detection of a lower layer failure release of the N1 NAS signalling connection or as the result of an inter-system change in 5GMM-CONNECTED mode from N1 mode to S1 mode

the UE shall deem that the network has failed the authentication check or assume that the authentication is not genuine and proceed as described in item g above if any of the following occurs

- the timer T3520 expires;

- the UE detects any combination of the 5G authentication failures 5GMM causes #20 "MAC failure" #21 "synch failure" #26 "non-5G authentication unacceptable" or #71 "ngKSI already in use" during three consecutive authentication challenges the 5G authentication challenges shall be considered as consecutive only if the 5G authentication challenges causing the second and third 5G authentication failure are received by the UE while the timer T3520 started after the previous 5G authentication failure is running

for items c d e and f if there is an emergency service started or is ongoing

the UE shall stop timer T3520 if the timer is running and the UE enters 5GMM-IDLE mode e.g upon detection of a lower layer failure release of the N1 NAS signalling connection or as the result of an inter-system change in 5GMM-CONNECTED mode from N1 mode to S1 mode

if there is an ongoing

- service request procedure for emergency services fallback the UE shall abort the service request procedure stop timer T3517 and locally release any resources allocated for the service request procedure and enter state 5GMM-REGISTERED; or

- registration procedure for mobility and periodic registration update triggered upon a request from the upper layers to perform an emergency services fallback procedure the UE shall abort the registration procedure for mobility and periodic registration update stop timer T3510 and locally release any resources allocated for the registration procedure for mobility and periodic registration update and enter the state 5GMM-REGISTERED; and

the UE shall attempt to select an E-UTRA cell connected to EPC or 5GCN according to the domain priority and selection rules specified in 3GPP TS 23.167 [6] if the UE finds a suitable E-UTRA cell it proceeds with the appropriate EMM or 5GMM procedures if the UE operating in single-registration mode has changed to S1 mode it shall disable the N1 mode capability for 3GPP access

depending on local requirements or operator preference for emergency services if the UE has an emergency PDU session established or is establishing an emergency PDU session the AMF need not follow the procedures specified for the authentication failure specified in the present subclause the AMF may respond to the AUTHENTICATION FAILURE message by initiating the security mode control procedure selecting the "null integrity protection algorithm" 5G-IA0 "null ciphering algorithm" 5G-EA0 or may abort the 5G AKA based primary authentication and key agreement procedure and continue using the current security context if any the AMF shall indicate to the SMF to perform the release of all non-emergency PDU sessions if any if there is an ongoing PDU session establishment procedure the AMF shall indicate to the SMF to perform the release of all non-emergency PDU sessions upon completion of the PDU session establishment procedure the network shall behave as if the UE is registered for emergency services

if a UE has an emergency PDU session established or is establishing an emergency PDU session and sends an AUTHENTICATION FAILURE message to the AMF with the 5GMM cause appropriate for these cases (#20 #21 #26 or #71 respectively) and receives the SECURITY MODE COMMAND message before the timeout of timer T3520 the UE shall deem that the network has passed the authentication check successfully stop timer T3520 respectively and execute the security mode control procedure

if a UE has an emergency PDU session established or is establishing an emergency PDU session when timer T3520 expires the UE shall not deem that the network has failed the authentication check and not behave as described in item g instead the UE shall continue using the current security context if any release all non-emergency PDU sessions if any by initiating UE-requested PDU session release procedure if there is an ongoing PDU session establishment procedure the UE shall release all non-emergency PDU sessions upon completion of the PDU session establishment procedure

the UE shall start any retransmission timers (e.g T3510 T3517 or T3521) if

- they were running and stopped when the UE received the AUTHENTICATION REQUEST message and detected an authentication failure; and

- the procedures associated with these timers have not yet been completed

the UE shall behave as if the UE is registered for emergency services

### 5.4.2 security mode control procedure

#### 5.4.2.1 general

the purpose of the NAS security mode control procedure is to take a 5G NAS security context into use and initialise and start NAS signalling security between the UE and the AMF with the corresponding 5G NAS keys and 5G NAS security algorithms

furthermore the network may also initiate the security mode control procedure in the following cases

a)- in order to change the 5G NAS security algorithms for a current 5G NAS security context already in use;

b) in order to change the value of uplink NAS COUNT used in the latest SECURITY MODE COMPLETE message as described in 3GPP TS 33.501 [24] subclause 6.9.4.4; and

c) in order to provide the selected EPS NAS security algorithms to the UE

for restrictions concerning the concurrent running of a security mode control procedure with other security related procedures in the AS or inside the core network see 3GPP TS 33.501 [24] subclause 6.9.5

if the security mode control procedure is initiated after successful 5G AKA based primary authentication and key agreement procedure and the security mode control procedure intends to bring into use the partial native 5G NAS security context created by the 5G AKA based primary authentication and key agreement procedure and the UE accepts received security mode command (see subclause 5.4.2.3) the ME shall

a) delete the valid KAUSF and the valid KSEAF if any; and

b) consider the new KAUSF to be the valid KAUSF and the new KSEAF to be the valid KSEAF reset the SOR counter and the UE parameter update counter to zero and store the valid KAUSF the valid KSEAF the SOR counter and the UE parameter update counter as specified in annex c and use the valid KAUSF in the verification of SOR transparent container and UE parameters update transparent container if any are received

NOTE the AMF does not perform a security mode control procedure when the 5G AKA based primary authentication procedure successfully authenticates a 5G ProSe layer-3 remote UE accessing the network via a 5G ProSe layer-3 UE-to-network relay UE served by the AMF

#### 5.4.2.2 NAS security mode control initiation by the network

the AMF initiates the NAS security mode control procedure by sending a SECURITY MODE COMMAND message to the UE and starting timer T3560 (see example in figure 5.4.2.2)

the AMF shall reset the downlink NAS COUNT counter and use it to integrity protect the initial SECURITY MODE COMMAND message if the security mode control procedure is initiated

a) to take into use the security context created after a successful execution of the 5G AKA based primary authentication and key agreement procedure or the EAP based primary authentication and key agreement procedure; or

b) upon receipt of REGISTRATION REQUEST message if the AMF needs to create a mapped 5G NAS security context (i.e the type of security context flag is set to "mapped security context" in the ngKSI IE included in the SECURITY MODE COMMAND message)

the AMF shall send the SECURITY MODE COMMAND message unciphered but shall integrity protect the message with the 5G NAS integrity key based on KAMF or mapped K'AMF indicated by the ngKSI included in the message the AMF shall set the security header type of the message to "integrity protected with new 5G NAS security context"

the AMF shall create a locally generated KAMF and send the SECURITY MODE COMMAND message including an ngKSI value in the ngKSI IE set to "000" and 5G-IA0 and 5G-EA0 as the selected NAS security algorithms only when the security mode control procedure is initiated

a) during an initial registration procedure for emergency services if no valid 5G NAS security context is available;

b) during a registration procedure for mobility and periodic registration update for a UE that has an emergency PDU session if no valid 5G NAS security context is available;

c) during a service request procedure for a UE that has an emergency PDU session if no valid 5G NAS security context is available; or

d) after a failed primary authentication and key agreement procedure for a UE that has an emergency PDU session or is establishing an emergency PDU session if continued usage of a valid 5G NAS security context is not possible

when the AMF sends the SECURITY MODE COMMAND message including an ngKSI value in the ngKSI IE set to "000" and 5G-IA0 and 5G-EA0 as the selected NAS security algorithms if

a) the AMF supports N26 interface;

b) the UE set the S1 mode bit to "S1 mode supported" in the 5GMM capability IE of the REGISTRATION REQUEST message; and

c) the security mode control procedure is initiated during an initial registration procedure for emergency services during a registration procedure for mobility and periodic registration update for a UE that has an emergency PDU session or during a service request procedure for a UE that has an emergency PDU session

the SECURITY MODE COMMAND message shall also include the selected EPS NAS security algorithms IE the selected EPS NAS security algorithms shall be set to EIA0 and EEA0

the UE shall process a SECURITY MODE COMMAND message including an ngKSI value in the ngKSI IE set to "000" and 5G-IA0 and 5G-EA0 as the selected NAS security algorithms and if accepted create a locally generated KAMF when the security mode control procedure is initiated

a) during an initial registration procedure for emergency services;

b) during a registration procedure for mobility and periodic registration update for a UE that has an emergency PDU session;

c) during a service request procedure for a UE that has an emergency PDU session; or

d) after a primary authentication and key agreement procedure for a UE that has an emergency PDU session or is establishing an emergency PDU session

NOTE 1 the process for creation of the locally generated KAMF by the AMF and the UE is implementation dependent the KAMF is specified in 3GPP TS 33.501 [24]

upon receipt of a REGISTRATION REQUEST message if the AMF does not have the valid current 5G NAS security context indicated by the UE the AMF shall either

a) indicate the use of the new mapped 5G NAS security context to the UE by setting the type of security context flag in the ngKSI IE to "mapped security context" and the KSI value related to the security context of the source system; or

b) set the ngKSI value to "000" in the ngKSI IE if the AMF sets 5G-IA0 and 5G-EA0 as the selected NAS security algorithms for a UE that has an emergency PDU session

upon receipt of a REGISTRATION REQUEST message if the AMF has the valid current 5G NAS security context indicated by the UE the AMF supports N26 interface and the UE set the S1 mode bit to "S1 mode supported" in the 5GMM capability IE of the REGISTRATION REQUEST message and the UE is not registered for disaster roaming services the AMF shall check whether the selected EPS NAS security algorithms was successfully provided to the UE if not the AMF shall initiate the NAS security mode control procedure by sending a SECURITY MODE COMMAND message with the selected EPS NAS security algorithms IE to the UE

while having a current mapped 5G NAS security context with the UE if the AMF needs to take the native 5G NAS security context into use the AMF shall include the ngKSI that indicates the native 5G NAS security context in the SECURITY MODE COMMAND message

the AMF shall include the replayed security capabilities of the UE (including the security capabilities with regard to NAS RRC and UP (user plane) ciphering as well as NAS and RRC integrity and other possible target network security capabilities i.e E-UTRAN if the UE included them in the message to network) the selected 5GS ciphering and integrity algorithms and the ngKSI

if a UE is already registered over one access to a PLMN and the AMF decides to skip primary authentication and key agreement procedure when the UE attempts to register over the other access to the same PLMN the AMF shall take into use the UE's current 5G NAS security context over the other access that the UE is registering in this case SECURITY MODE COMMAND message is not sent to the UE

if the UE is registered to the same AMF and the same PLMN over both 3GPP access and non-3GPP access and the UE is in 5GMM-CONNECTED mode over both the 3GPP and non-3GPP accesses then at any time the primary authentication and key agreement procedure has successfully completed over

a) the 3GPP access the AMF includes the ngKSI in the SECURITY MODE COMMAND message over the 3GPP access when the AMF sends the SECURITY MODE COMMAND message to UE over the non-3GPP access to take into use the new 5G NAS security context the AMF shall include the same ngKSI in the SECURITY MODE COMMAND message to identify the new 5G NAS security context; or

b) the non-3GPP access the AMF includes the ngKSI in the SECURITY MODE COMMAND message over the non-3GPP access when the AMF sends the SECURITY MODE COMMAND message to UE over the 3GPP access to take into use the new 5G NAS security context the AMF shall include the same ngKSI in the SECURITY MODE COMMAND message to identify the new 5G NAS security context

the AMF may initiate a SECURITY MODE COMMAND in order to change the 5G security algorithms for a current 5G NAS security context already in use the AMF re-derives the 5G NAS keys from KAMF with the new 5G algorithm identities as input and provides the new 5GS algorithm identities within the SECURITY MODE COMMAND message the AMF shall set the security header type of the message to "integrity protected with new 5G NAS security context"

if during an ongoing registration procedure the AMF is initiating a SECURITY MODE COMMAND (i.e after receiving the REGISTRATION REQUEST message but before sending a response to that message) and

a) the REGISTRATION REQUEST message does not successfully pass the integrity check at the AMF; or

b) the AMF can not decipher the value part of the NAS message container IE in the REGISTRATION REQUEST message;

the AMF shall include the additional 5G security information IE with the RINMR bit set to "Retransmission of the initial NAS message requested" in the SECURITY MODE COMMAND message requesting the UE to send the entire REGISTRATION REQUEST message in the SECURITY MODE COMPLETE message as described in 3GPP TS 33.501 [24]

if during an ongoing deregistration procedure the AMF is initiating a SECURITY MODE COMMAND (i.e after receiving the DEREGISTRATION REQUEST message but before sending a response to that message) and

a) the DEREGISTRATION REQUEST message does not successfully pass the integrity check at the AMF; or

b) the AMF can not decipher the value part of the NAS message container IE in the DEREGISTRATION REQUEST message;

the AMF shall include the additional 5G security information IE with the RINMR bit set to "Retransmission of the initial NAS message requested" in the SECURITY MODE COMMAND message requesting the UE to send the entire DEREGISTRATION REQUEST message in the SECURITY MODE COMPLETE message as described in 3GPP TS 33.501 [24]

NOTE 2 the AMF uses the UE security capability which was provided by the UE

if during an ongoing service request procedure for a UE with an emergency PDU session the AMF is initiating a SECURITY MODE COMMAND (i.e after receiving the SERVICE REQUEST message or the CONTROL PLANE SERVICE REQUEST message but before sending a response to that message) and the SERVICE REQUEST message or the CONTROL PLANE SERVICE REQUEST message does not successfully pass the integrity check at the AMF the AMF shall include the additional 5G security information IE with the RINMR bit set to "Retransmission of the initial NAS message requested" in the SECURITY MODE COMMAND message requesting the UE to send the entire

a) SERVICE REQUEST message; or

b) CONTROL PLANE SERVICE REQUEST message excluding non-cleartext IEs except the uplink data status IE if needed (see subclause 5.4.2.3);

in the SECURITY MODE COMPLETE message as described in 3GPP TS 33.501 [24]

additionally the AMF may request the UE to include its IMEISV in the SECURITY MODE COMPLETE message

if the AMF supports N26 interface and the UE set the S1 mode bit to "S1 mode supported" in the 5GMM capability IE of the REGISTRATION REQUEST message and the AMF needs to provide the selected EPS NAS security algorithms to the UE the AMF shall select ciphering and integrity algorithms to be used in the EPS and indicate them to the UE via the selected EPS NAS security algorithms IE in the SECURITY MODE COMMAND message

NOTE 3 the AS and NAS security capabilities are the same i.e if the UE supports one algorithm for NAS the same algorithm is also supported for AS

if the AMF performs horizontal key derivation e.g during the mobility and periodic registration update or when the UE is already registered in the PLMN with another access type as described in 3GPP TS 33.501 [24] the AMF shall include horizontal derivation parameter in the SECURITY MODE COMMAND message

if the security mode control procedure is initiated after successful EAP based primary authentication and key agreement procedure and the security mode control procedure intends to bring into use the partial native 5G NAS security context created by the EAP based primary authentication and key agreement procedure the AMF shall set the EAP message IE of the SECURITY MODE COMMAND message to an EAP-success message to be sent to the UE if the SECURITY MODE COMMAND message is provided to a 5G-RG that is acting on behalf of an AUN3 device and the EAP message IE is set to an EAP-success message the AMF shall include the AUN3 device security key IE in the SECURITY MODE COMMAND message with its value set to

a) the master session key if the AUN3 device does not support 5G key hierarchy; or

b) the KWAGF key if the AUN3 device supports 5G key hierarchy

NOTE 4 the network is aware from the AUN3 device subscription data in UDM whether the AUN3 device supports 5G key hierarchy or not as specified in subclause 7B.7 of 3GPP TS 33.501 [24]

figure 5.4.2.2 security mode control procedure

#### 5.4.2.3 NAS security mode command accepted by the UE

upon receipt of the SECURITY MODE COMMAND message the UE shall check whether the security mode command can be accepted or not this is done by performing the integrity check of the message and by checking that the received replayed UE security capabilities IE has not been altered compared to the latest values that the UE sent to the network

when the SECURITY MODE COMMAND message includes an EAP-success message the UE handles the EAP-success message and the ABBA as described in subclause 5.4.1.2.2.8 5.4.1.2.3.1 5.4.1.2.3A.1 5.4.1.2.3B.1 and 5.4.1.2.3C.1

if

a) the UE is registered for emergency services performing initial registration for emergency services establishing an emergency PDU session or has an emergency PDU session established;

b) the W-AGF acts on behalf of the FN-RG;

c) the W-AGF acts on behalf of the N5GC device; or

d) the 5G-RG acts on behalf of the AUN3 device

and the SECURITY MODE COMMAND message is received with ngKSI value "000" and 5G-IA0 and 5G-EA0 as selected 5G NAS security algorithms the UE shall locally derive and take in use 5G NAS security context the UE shall delete existing current 5G NAS security context

the UE shall accept a SECURITY MODE COMMAND message indicating the "null integrity protection algorithm" 5G-IA0 as the selected 5G NAS integrity algorithm only if the message is received when

a) the UE is registered for emergency services performing initial registration for emergency services establishing an emergency PDU session or has an emergency PDU session established;

b) the W-AGF acts on behalf of the FN-RG;

c) the W-AGF acts on behalf of the N5GC device; or

d) the 5G-RG acts on behalf of the AUN3 device

if the type of security context flag included in the SECURITY MODE COMMAND message is set to "native security context" and if the ngKSI matches a valid non-current native 5G NAS security context held in the UE while the UE has a mapped 5G NAS security context as the current 5G NAS security context the UE shall take the non-current native 5G NAS security context into use which then becomes the current native 5G NAS security context and delete the mapped 5G NAS security context

the UE shall ignore the replayed S1 UE security capabilities IE if this IE is included in the SECURITY MODE COMMAND message

if the SECURITY MODE COMMAND message can be accepted the UE shall take the 5G NAS security context indicated in the message into use the UE shall in addition reset the uplink NAS COUNT counter if

a) the SECURITY MODE COMMAND message is received in order to take a 5G NAS security context into use created after a successful execution of the 5G AKA based primary authentication and key agreement procedure or the EAP based primary authentication and key agreement procedure; or

b) the SECURITY MODE COMMAND message received includes the type of security context flag set to "mapped security context" in the NAS key set identifier IE the ngKSI does not match the current 5G NAS security context if it is a mapped 5G NAS security context

if the SECURITY MODE COMMAND message can be accepted and a new 5G NAS security context is taken into use and SECURITY MODE COMMAND message does not indicate the "null integrity protection algorithm" 5G-IA0 as the selected NAS integrity algorithm the UE shall

- if the SECURITY MODE COMMAND message has been successfully integrity checked using an estimated downlink NAS COUNT equal to 0 then the UE shall set the downlink NAS COUNT of this new 5G NAS security context to 0;

- otherwise the UE shall set the downlink NAS COUNT of this new 5G NAS security context to the downlink NAS COUNT that has been used for the successful integrity checking of the SECURITY MODE COMMAND message

if the SECURITY MODE COMMAND message includes the horizontal derivation parameter indicating "KAMF derivation is required" the UE shall derive a new K'AMF as specified in 3GPP TS 33.501 [24] for KAMF to K'AMF derivation in mobility and set both uplink and downlink NAS COUNTs to zero when the new 5G NAS security context is taken into use for current access and the UE is registered with the same PLMN over the 3GPP access and the non-3GPP access

a) the UE is in 5GMM-IDLE mode over the non-current access the AMF and the UE shall activate the new 5G NAS security context over the non-current access as described in 3GPP TS 33.501 [24] the AMF and the UE shall set the downlink NAS COUNT and uplink NAS COUNT to zero for the non-current access; or

b) the UE is in 5GMM-CONNECTED mode over the non-current access the AMF shall send the SECURITY MODE COMMAND message over the non-current access to activate the new 5G NAS security context that was activated over the current access as described in 3GPP TS 33.501 [24] the AMF shall include the same ngKSI in the SECURITY MODE COMMAND message to identify the new 5G NAS security context

NOTE 1 if the UE was in 5GMM-CONNECTED mode over the non-current access when the new 5G NAS security context was taken into use for the current access and the UE enters 5GMM-IDLE mode over the non-current access before receiving a SECURITY MODE COMMAND message over the non-current access the UE conforms to bullet a)

NOTE 2 if the UE was in 5GMM-CONNECTED mode over the non-current access when the new 5G NAS security context was taken into use and the N1 NAS signalling connection is lost over the non-current access before sending a SECURITY MODE COMMAND message over the non-current access the AMF conforms to bullet a)

if the SECURITY MODE COMMAND message includes the horizontal derivation parameter indicating "KAMF derivation is not required" or the additional 5G security information IE is not included in the message the UE is registered with the same PLMN over the 3GPP access and non-3GPP access then after the completion of a security mode control procedure over the current access

a) the UE is in 5GMM-IDLE mode over the non-current access the AMF and the UE shall activate the new 5G NAS security context for the non-current access if a primary authentication and key agreement procedure was completed before the security mode control procedure the AMF and the UE shall set the downlink NAS COUNT and uplink NAS COUNT to zero for the non-current access otherwise the downlink NAS COUNT and uplink NAS COUNT for the non-3GPP access are not changed; or

b) the UE is in 5GMM-CONNECTED mode over the non-current access the AMF shall send the SECURITY MODE COMMAND message over the non-current access to activate the new 5G NAS security context that was activated over the current access as described in 3GPP TS 33.501 [24] the AMF shall include the same ngKSI in the SECURITY MODE COMMAND message to identify the new 5G NAS security context

NOTE 3 if the UE was in 5GMM-CONNECTED mode over the non-current access when the new 5G NAS security context was taken into use for the current access and the UE enters 5GMM-IDLE mode over the non-current access before receiving a SECURITY MODE COMMAND message over the non-current access the UE conforms to bullet a)

NOTE 4 if the UE was in 5GMM-CONNECTED mode over the non-current access when the new 5G NAS security context was taken into use and the N1 NAS signalling connection is lost over the non-current access before sending a SECURITY MODE COMMAND message over the non-current access the AMF conforms to bullet a)

if the SECURITY MODE COMMAND message can be accepted the UE shall send a SECURITY MODE COMPLETE message integrity protected with the selected 5GS integrity algorithm and the 5G NAS integrity key based on the KAMF or mapped K'AMF if the type of security context flag is set to "mapped security context" indicated by the ngKSI when the SECURITY MODE COMMAND message includes the type of security context flag set to "mapped security context" in the NAS key set identifier IE then the UE shall check whether the SECURITY MODE COMMAND message indicates the ngKSI of the current 5GS security context if it is a mapped 5G NAS security context in order not to re-generate the K'AMF

furthermore if the SECURITY MODE COMMAND message can be accepted the UE shall cipher the SECURITY MODE COMPLETE message with the selected 5GS ciphering algorithm and the 5GS NAS ciphering key based on the KAMF or mapped K'AMF indicated by the ngKSI the UE shall set the security header type of the message to "integrity protected and ciphered with new 5G NAS security context"

from this time onward the UE shall cipher and integrity protect all NAS signalling messages with the selected 5GS integrity and ciphering algorithms

if the AMF indicated in the SECURITY MODE COMMAND message that the IMEISV is requested and

a) if the UE

1) supports at least one 3GPP access technology the UE shall include its IMEISV in the IMEISV IE of the SECURITY MODE COMPLETE message; or

2) does not support any 3GPP access technology (i.e satellite NG-RAN NG-RAN satellite E-UTRAN E-UTRAN UTRAN or GERAN) and supports NAS over untrusted or trusted non-3GPP access the UE shall include its EUI-64 in the non-IMEISV PEI IE of the SECURITY MODE COMPLETE message; or

b) if

1) the 5G-RG contains neither an IMEISV nor an IMEI or when the 5G-RG acts on behalf of the AUN3 device; or

2) when the W-AGF acts on behalf of the FN-RG (or on behalf of the N5GC device)

the 5G-RG or the W-AGF acting on behalf of the FN-RG (or on behalf of the N5GC device) shall include the MAC address and the MAC address usage restriction indication determined as specified in subclause 5.3.2 in the non-IMEISV PEI IE in the SECURITY MODE COMPLETE message

if during an ongoing registration procedure deregistration procedure or service request procedure the UE receives a SECURITY MODE COMMAND message which includes the additional 5G security information IE with the RINMR bit set to "Retransmission of the initial NAS message requested" the UE shall include the entire unciphered REGISTRATION REQUEST message DEREGISTRATION REQUEST message SERVICE REQUEST message or CONTROL PLANE SERVICE REQUEST message which the UE had previously included in the NAS message container IE of the initial NAS message (i.e REGISTRATION REQUEST message DEREGISTRATION REQUEST MESSAGE SERVICE REQUEST message or CONTROL PLANE SERVICE REQUEST message respectively) in the NAS message container IE of the SECURITY MODE COMPLETE message the retransmitted CONTROL PLANE SERVICE REQUEST message

a) shall not include any non-cleartext IE except the uplink data status IE; and

b) may include the uplink data status IE

if prior to receiving the SECURITY MODE COMMAND message the UE without a valid 5G NAS security context had sent a REGISTRATION REQUEST message the UE shall include the entire REGISTRATION REQUEST message in the NAS message container IE of the SECURITY MODE COMPLETE message as described in subclause 4.4.6

if the UE operating in the single-registration mode receives the selected EPS NAS security algorithms IE the UE shall use the IE according to 3GPP TS 33.501 [24]

for a UE operating in single-registration mode in a network supporting N26 interface after an inter-system change from S1 mode to N1 mode in 5GMM-CONNECTED mode the UE shall set the value of the selected EPS NAS security algorithms IE in the 5G NAS security context to the NAS security algorithms that were received from the source MME when the UE was in S1 mode

#### 5.4.2.4 NAS security mode control completion by the network

the AMF shall upon receipt of the SECURITY MODE COMPLETE message stop timer T3560 from this time onward the AMF shall integrity protect and encipher all signalling messages with the selected 5GS integrity and ciphering algorithms

if the SECURITY MODE COMPLETE message contains a NAS message container IE with a REGISTRATION REQUEST message the AMF shall complete the ongoing registration procedure by considering the REGISTRATION REQUEST message contained in the NAS message container IE as the message that triggered the procedure

if the SECURITY MODE COMPLETE message contains a NAS message container IE with a DEREGISTRATION REQUEST message the AMF shall complete the ongoing deregistration procedure by considering the DEREGISTRATION REQUEST message contained in the NAS message container IE as the message that triggered the procedure

if the SECURITY MODE COMPLETE message contains a NAS message container IE with a REGISTRATION REQUEST message the 5GMM capability IE included in the REGISTRATION REQUEST message indicates "S1 mode supported" and the AMF supports N26 interface the AMF shall initiate another NAS security mode control procedure in order to provide the selected EPS NAS security algorithms to the UE as described in subclause 5.4.2.2 this second NAS security mode control procedure should be initiated as part of 5GMM common procedures of the ongoing registration procedure

if the SECURITY MODE COMPLETE message contains a NAS message container IE with a SERVICE REQUEST message the AMF shall complete the ongoing service request procedure by considering the SERVICE REQUEST message contained in the NAS message container IE as the message that triggered the procedure

if the SECURITY MODE COMPLETE message contains a NAS message container IE with a CONTROL PLANE SERVICE REQUEST message the AMF shall complete the ongoing service request procedure by considering the CONTROL PLANE SERVICE REQUEST message contained in the NAS message container IE as the message that triggered the procedure

#### 5.4.2.5 NAS security mode command not accepted by the UE

if the security mode command cannot be accepted the UE shall send a SECURITY MODE REJECT message the SECURITY MODE REJECT message contains a 5GMM cause that typically indicates one of the following cause values

#23 UE security capabilities mismatch

#24 security mode rejected unspecified

if the UE detects that the received replayed UE security capabilities IE has been altered compared to the latest values that the UE sent to the network the UE shall set the cause value to #23 "UE security capabilities mismatch"

upon receipt of the SECURITY MODE REJECT message the AMF shall stop timer T3560 the AMF shall also abort the ongoing procedure that triggered the initiation of the NAS security mode control procedure

both the UE and the AMF shall apply the 5G NAS security context in use before the initiation of the security mode control procedure if any to protect the SECURITY MODE REJECT message and any other subsequent messages according to the rules in subclause 4.4.4 and 4.4.5

#### 5.4.2.6 abnormal cases in the UE

the following abnormal cases can be identified

a) transmission failure of SECURITY MODE COMPLETE message or SECURITY MODE REJECT message indication from lower layers (if the security mode control procedure is triggered by a registration procedure)

the UE shall abort the security mode control procedure and re-initiate the registration procedure

b) transmission failure of SECURITY MODE COMPLETE message or SECURITY MODE REJECT message indication with change in the current TAI (if the security mode control procedure is triggered by a service request procedure)

if the current TAI is not in the TAI list the security mode control procedure shall be aborted and a registration procedure shall be initiated

if the current TAI is still part of the TAI list the security mode control procedure shall be aborted and it is up to the UE implementation how to re-run the ongoing procedure that triggered the security mode control procedure

c) transmission failure of SECURITY MODE COMPLETE message or SECURITY MODE REJECT message indication without change in the current TAI (if the security mode control procedure is triggered by a service request procedure)

the security mode control procedure shall be aborted and it is up to the UE implementation how to re-run the ongoing procedure that triggered the security mode control procedure

d) NAS security mode command not accepted by the UE as specified in subclause 5.4.2.5 and there is an ongoing

1) service request procedure for emergency services fallback the UE shall abort the service request procedure stop timer T3517 locally release the N1 NAS signalling connection and locally release any resources allocated for the service request procedure and enter state 5GMM-REGISTERED; or

2) registration procedure for mobility and periodic registration update triggered upon a request from the upper layers to perform an emergency services fallback procedure the UE shall abort the registration procedure for mobility and periodic registration update stop timer T3510 locally release the N1 NAS signalling connection and locally release any resources allocated for the registration procedure for mobility and periodic registration update and enter the state 5GMM-REGISTERED; and

the UE shall attempt to select an E-UTRA cell connected to EPC or 5GCN according to the domain priority and selection rules specified in 3GPP TS 23.167 [6] if the UE finds a suitable E-UTRA cell it proceeds with the appropriate EMM or 5GMM procedures if the UE operating in single-registration mode has changed to S1 mode it shall disable the N1 mode capability for 3GPP access

#### 5.4.2.7 abnormal cases on the network side

the following abnormal cases can be identified

a) lower layer failure before the SECURITY MODE COMPLETE or SECURITY MODE REJECT message is received

the network shall abort the security mode control procedure

b) expiry of timer T3560

the network shall on the first expiry of the timer T3560 retransmit the SECURITY MODE COMMAND message and shall reset and start timer T3560 this retransmission is repeated four times i.e on the fifth expiry of timer T3560 the procedure shall be aborted

c) collision between security mode control procedure and registration service request or de-registration procedure not indicating switch off

the network shall abort the security mode control procedure and proceed with the UE initiated procedure

d) collision between security mode control procedure and other 5GMM procedures than in item c

the network shall progress both procedures

e) lower layers indication of non-delivered NAS PDU due to handover

if the SECURITY MODE COMMAND message could not be delivered due to an intra AMF handover and the target TA is included in the TAI list then upon successful completion of the intra AMF handover the AMF shall retransmit the SECURITY MODE COMMAND message if a failure of the handover procedure is reported by the lower layer and the N1 signalling connection exists the AMF shall retransmit the SECURITY MODE COMMAND message

### 5.4.3 identification procedure

#### 5.4.3.1 general

the purpose of this procedure is to request a particular UE to provide specific identification parameters e.g the SUCI the IMEI the IMEISV the EUI-64 or the MAC address the SUCI is a privacy preserving identifier containing the concealed SUPI and the IMEI the IMEISV the EUI-64 and the MAC address are formats of PEI

#### 5.4.3.2 identification initiation by the network

the AMF initiates the identification procedure by sending an IDENTITY REQUEST message to the UE and starting timer T3570 (see example in figure 5.4.3.2.1) the IDENTITY REQUEST message specifies the requested identification parameters in the identity type information element

figure 5.4.3.2.1 identification procedure

#### 5.4.3.3 identification response by the UE

a UE shall be ready to respond to an IDENTITY REQUEST message at any time whilst in 5GMM-CONNECTED mode

upon receipt of the IDENTITY REQUEST message

a) if the identity type IE in the IDENTITY REQUEST message is not set to "SUCI" the UE shall send an IDENTITY RESPONSE message to the network the IDENTITY RESPONSE message shall contain the identification parameters as requested by the network; and

b) if the identity type IE in the IDENTITY REQUEST message is set to "SUCI" the UE shall

1) if timer T3519 is not running generate a fresh SUCI as specified in 3GPP TS 33.501 [24] send an IDENTITY RESPONSE message with the SUCI start timer T3519 and store the value of the SUCI sent in the IDENTITY RESPONSE message; and

2) if timer T3519 is running send an IDENTITY RESPONSE message with the stored SUCI

#### 5.4.3.4 identification completion by the network

upon receipt of the IDENTITY RESPONSE the network shall stop the timer T3570

#### 5.4.3.5 abnormal cases in the UE

the following abnormal cases can be identified

a) transmission failure of the IDENTITY RESPONSE message (if the identification procedure is triggered by a registration procedure)

the UE shall re-initiate the registration procedure

b) requested identity is not available

if the UE cannot encode the requested identity in the IDENTITY RESPONSE message e.g because no valid USIM is available then it shall encode the identity type as "No identity"

#### 5.4.3.6 abnormal cases on the network side

the following abnormal cases can be identified

a) lower layer failure

upon detection of a lower layer failure before the IDENTITY RESPONSE is received the network shall abort any ongoing 5GMM procedure

b) expiry of timer T3570

the network shall on the first expiry of the timer T3570 retransmit the IDENTITY REQUEST message and reset and restart the timer T3570 this retransmission is repeated four times i.e on the fifth expiry of timer T3570 the network shall abort the identification procedure and any ongoing 5GMM procedure

c) collision of an identification procedure with a registration procedure for initial registration

if the network receives a REGISTRATION REQUEST message indicating either "initial registration" or "emergency registration" in the 5GS registration type IE before the ongoing identification procedure has been completed and no registration procedure is pending on the network (i.e no REGISTRATION ACCEPT/REJECT message has still to be sent as an answer to a REGISTRATION REQUEST message) the network shall proceed with the registration procedure for initial registration

d) collision of an identification procedure with a registration procedure for initial registration when the identification procedure has been caused by a registration procedure for initial registration

if the network receives a REGISTRATION REQUEST message indicating either "initial registration" or "emergency registration" in the 5GS registration type IE before the ongoing identification procedure has been completed and a registration procedure for initial registration is pending (i.e a REGISTRATION ACCEPT/REJECT message has to be sent as an answer to an earlier REGISTRATION REQUEST message) then

- if one or more of the information elements in the REGISTRATION REQUEST message differ from the ones received within the previous REGISTRATION REQUEST message the network shall proceed with the new registration procedure for initial registration; or

- if the information elements do not differ then the network shall not treat any further this new REGISTRATION REQUEST message

e) collision of an identification procedure with a registration procedure for mobility and periodic registration update

if the network receives a REGISTRATION REQUEST message indicating either "mobility registration updating" or "periodic registration updating" in the 5GS registration type IE before the ongoing identification procedure has been completed the network shall progress both procedures

f) collision of an identification procedure with a UE initiated de-registration procedure

if the network receives a DEREGISTRATION REQUEST message with "switch off" indication in the De-registration type IE before the ongoing identification procedure has been completed the network shall abort the identification procedure and shall progress the UE-initiated de-registration procedure;

else the network shall complete the identification procedure and shall respond to the UE-initiated de-registration procedure as described in subclause 5.5.2.2

### 5.4.4 generic UE configuration update procedure

#### 5.4.4.1 general

the purpose of this procedure is to

a) allow the AMF to update the UE configuration for access and mobility management-related parameters decided and provided by the AMF by providing new parameter information within the command;

b) request the UE to perform a registration procedure for mobility and periodic registration update towards the network to update access and mobility management-related parameters decided and provided by the AMF (see subclause 5.5.1.3);

c) deliver the UAV authorization information to the UE as described in 3GPP TS 23.256 [6AB]; or

d) update the PEIPS assistance information in the UE (see subclause 5.3.25)

this procedure is initiated by the network and can only be used when the UE has an established 5GMM context and the UE is in 5GMM-CONNECTED mode when the UE is in 5GMM-IDLE mode the AMF may use the paging or notification procedure to initiate the generic UE configuration update procedure the AMF can request a confirmation response in order to ensure that the parameter has been updated by the UE

this procedure shall be initiated by the network to assign a new 5G-GUTI to the UE after

a) a successful service request procedure invoked as a response to a paging request from the network and before the

1) release of the N1 NAS signalling connection; or

2) suspension of the N1 NAS signalling connection due to user plane CIoT 5GS optimization i.e before the UE and the AMF enter 5GMM-IDLE mode with suspend indication; or

b) the AMF receives an indication from the lower layers that it has received the NGAP UE context resume request message as specified in 3GPP TS 38.413 [31] for a UE in 5GMM-IDLE mode with suspend indication and this resumption is a response to a paging request from the network and before the

1) release of the N1 NAS signalling connection; or

2) suspension of the N1 NAS signalling connection due to user plane CIoT 5GS optimization i.e before the UE and the AMF enter 5GMM-IDLE mode with suspend indication

if the service request procedure was triggered due to 5GSM downlink signalling pending the procedure for assigning a new 5G-GUTI can be initiated by the network after the transport of the 5GSM downlink signalling

the following parameters are supported by the generic UE configuration update procedure without the need to request the UE to perform the registration procedure for mobility and periodic registration update

a) 5G-GUTI;

b) TAI list;

c) service area list;

d) NITZ information;

e) LADN information;

e1) extended LADN information;

f) rejected NSSAI;

NOTE a cause value associated with a rejected S-NSSAI can be included in the rejected NSSAI IE or in the extended rejected NSSAI IE and a back-off timer value associated with rejected S-NSSAI(s) can be included in the extended rejected NSSAI IE

g) void;

h) Operator-defined access category definitions;

i) SMS indication;

j) "CAG information list";

k) UE radio capability ID;

l) 5GS registration result;

m) truncated 5G-S-TMSI configuration;

n) T3447 value;

o) "list of PLMN(s) to be used in disaster condition";

p) disaster roaming wait range;

q) disaster return wait range;

r) PEIPS assistance information;

s) priority indicator;

t) NSAG information;

u) RAN timing synchronization;

v) alternative NSSAI;

w) discontinuous coverage maximum time offset;

x) void;

y) partially rejected NSSAI;

z) On-demand NSSAI; and

z1) RAT utilization control information

Editor's note wheter the RAT utilization control information applies to the single PLMN or multiple PLMNs (including equivalent PLMNs) is FFS

the following parameters can be sent to the UE with or without a request to perform the registration procedure for mobility and periodic registration update

a) allowed NSSAI;

b) configured NSSAI;

c) network slicing subscription change indication;

d) NSSRG information;

e) S-NSSAI location validity information;

e1) S-NSSAI time validity information;

f) feature authorization indication; and

g) partially allowed NSSAI

the following parameters are sent to the UE with a request to perform the registration procedure for mobility and periodic registration update

a) MICO indication;

b) UE radio capability ID deletion indication; and

c) additional configuration indication

the following parameters can be included in the Service-level-AA container IE to be sent to the UE without a request to perform the registration procedure for mobility and periodic registration update

a) Service-level device ID;

b) Service-level-AA payload type;

c) Service-level-AA payload;

d) Service-level-AA response; or

e) Service-level-AA service status indication

the following parameters are sent over 3GPP access only

a) LADN information;

a1) extended LADN information;

b) MICO indication;

c) TAI list;

d) service area list;

e) "CAG information list";

f) UE radio capability ID;

g) UE radio capability ID deletion indication;

h) truncated 5G-S-TMSI configuration;

i) additional configuration indication;

j) T3447 value;

k) Service-level-AA container;

l) NSAG information;

m) RAN timing synchronization

o) S-NSSAI location validity information;

p) discontinuous coverage maximum time offset; and

q) RAT utilization control information

the following parameters are managed and sent per access type i.e. independently over 3GPP access or non-3GPP access

a) allowed NSSAI;

b) rejected NSSAI (when the NSSAI is rejected for the current registration area or is rejected for the maximum number of UEs reached); and

c) if the UE is not registered to the same PLMN or SNPN over 3GPP and non-3GPP access

- 5G-GUTI;

- NITZ information;

- rejected NSSAI (when the NSSAI is rejected for the current PLMN or SNPN or rejected for the failed or revoked NSSAA);

- configured NSSAI;

- NSSRG information;

- SMS indication;

- 5GS registration result;

- PEIPS assistance information;

- MPS indicator;

- S-NSSAI time validity information;

- alternative NSSAI; and

- MCS indicator

if the UE is registered to the same PLMN or SNPN over 3GPP and non-3GPP access the following parameters are managed commonly and sent over 3GPP access or non-3GPP access

a) 5G-GUTI;

b) NITZ information;

c) rejected NSSAI (when the NSSAI is rejected for the current PLMN or SNPN or rejected for the failed or revoked NSSAA);

d) configured NSSAI;

e) SMS indication; and

f) 5GS registration result;

g) "list of PLMN(s) to be used in disaster condition";

h) disaster roaming wait range;

i) disaster return wait range;

j) PEIPS assistance information;

k) NSSRG information;

l) MPS indicator;

m) S-NSSAI time validity information; and

n) MCS indicator

figure 5.4.4.1.1 generic UE configuration update procedure

#### 5.4.4.2 generic UE configuration update procedure initiated by the network

the AMF shall initiate the generic UE configuration update procedure by sending the CONFIGURATION UPDATE COMMAND message to the UE

the AMF shall in the CONFIGURATION UPDATE COMMAND message either

a) include one or more of the following parameters 5G-GUTI TAI list allowed NSSAI that may include the mapped S-NSSAI(s) LADN information extended LADN information service area list MICO indication NITZ information configured NSSAI that may include the mapped S-NSSAI(s) NSSRG information S-NSSAI location validity information S-NSSAI time validity information rejected S-NSSAI(s) in the rejected NSSAI IE or in the extended rejected NSSAI IE network slicing subscription change indication operator-defined access category definitions SMS indication "CAG information list" UE radio capability ID 5GS registration result UE radio capability ID deletion indication truncated 5G-S-TMSI configuration T3447 value "list of PLMN(s) to be used in disaster condition" disaster roaming wait range disaster return wait range PEIPS assistance information the priority indicator the NSAG information alternative NSSAI partially allowed NSSAI partially rejected NSSAI on-demand NSSAI feature authorization indication discontinuous coverage maximum time offset or RAT utilization control information;

b) include the configuration update indication IE with the registration requested bit set to "registration requested"; or

c) include a combination of both a) and b)

if the UE is registering or registered for onboarding services in SNPN the serving SNPN shall not provide the configured NSSAI the allowed NSSAI or the rejected NSSAI to the UE

if the UE supports extended rejected NSSAI the rejected S-NSSAI(s) shall be included in the extended rejected NSSAI IE otherwise the rejected S-NSSAI(s) shall be included in the rejected NSSAI IE

in roaming scenarios if the extended rejected NSSAI IE is included in the CONFIGURATION UPDATE COMMAND message the AMF shall provide mapped S-NSSAI(s) for the rejected NSSAI

if an acknowledgement from the UE is requested the AMF shall indicate "acknowledgement requested" in the acknowledgement bit of the configuration update indication IE in the CONFIGURATION UPDATE COMMAND message and shall start timer T3555 acknowledgement shall be requested for all parameters except when only NITZ information is included

to initiate parameter re-negotiation between the UE and network the AMF shall indicate "registration requested" in the registration requested bit of the configuration update indication IE in the CONFIGURATION UPDATE COMMAND message

NOTE 1 generic UE configuration update procedure can be initiated by the AMF for updating the emergency number list the extended emergency number list or both by indicating "registration requested" in the registration requested bit of the configuration update indication IE in the CONFIGURATION UPDATE COMMAND message to the UE

if a new allowed NSSAI information or AMF re-configuration of supported S-NSSAIs requires an AMF relocation the AMF shall indicate "registration requested" in the registration requested bit of the configuration update indication IE and include the allowed NSSAI IE in the CONFIGURATION UPDATE COMMAND message

if the AMF includes a new allowed NSSAI in the CONFIGURATION UPDATE COMMAND message and the subscription information includes the NSSRG information then the S-NSSAIs of the allowed NSSAI shall be associated with at least one common NSSRG value if the network has pending NSSAI the S-NSSAIs in the pending NSSAI and allowed NSSAI shall be associated with at least one common NSSRG value

if the AMF includes a new partially allowed NSSAI and the new partially allowed NSSAI requires an AMF relocation the AMF shall indicate "registration requested" in the registration requested bit of the configuration update indication IE and include the partially allowed NSSAI IE in the CONFIGURATION UPDATE COMMAND message

if the AMF includes a new configured NSSAI in the CONFIGURATION UPDATE COMMAND message and the new configured NSSAI requires an AMF relocation as specified in 3GPP TS 23.501 [8] the AMF shall indicate "registration requested" in the registration requested bit of the configuration update indication IE in the message

if the AMF includes a new configured NSSAI in the CONFIGURATION UPDATE COMMAND message the subscription information includes the NSSRG information and the UE has set the NSSRG bit in the 5GMM capability IE of the REGISTRATION REQUEST message to

a) "NSSRG supported" then the AMF shall include the NSSRG information in the CONFIGURATION UPDATE COMMAND message; or

b) "NSSRG not supported" then the configured NSSAI shall include one or more S-NSSAIs each of which is associated with all the NSSRG value(s) of the default S-NSSAI(s) or the configured NSSAI shall include based on the indication received from the UDM as specified in 3GPP TS 23.501 [8] all subscribed S-NSSAIs even if these S-NSSAIs do not share any common NSSRG value

if the AMF needs to update the NSSRG information and the UE has set the NSSRG bit to "NSSRG supported" in the 5GMM capability IE of the REGISTRATION REQUEST message then the AMF shall include the new NSSRG information in the CONFIGURATION UPDATE COMMAND message

if the AMF includes a new NSSRG information in the CONFIGURATION UPDATE COMMAND message and the AMF determines that the UE needs to provide a new requested NSSAI due to no NSSRG value common to all the S-NSSAI(s) of the allowed NSSAI based on the new NSSRG information then the CONFIGURATION UPDATE COMMAND message shall indicate "registration requested" in the registration requested bit of the configuration update indication IE

if the UE supports S-NSSAI time validity information and the AMF needs to update the S-NSSAI time validity information then the AMF shall include the new S-NSSAI time validity information in the CONFIGURATION UPDATE COMMAND message

if the AMF needs to update the S-NSSAI location validity information toward a UE which has set the SLVI bit to "S-NSSAI location validity information supported" in the 5GMM capability IE of the REGISTRATION REQUEST message then the AMF shall include the new S-NSSAI location validity information in the CONFIGURATION UPDATE COMMAND message

if the CONFIGURATION UPDATE COMMAND message is initiated only due to changes to the allowed NSSAI and these changes require the UE to initiate a registration procedure but the AMF is unable to determine an allowed NSSAI for the UE as specified in 3GPP TS 23.501 [8] then the CONFIGURATION UPDATE COMMAND message shall indicate "registration requested" in the registration requested bit of the configuration update indication IE and shall not contain any other parameters

if the slice deregistration inactivity timer has expired the UE does not support network slice usage control and the AMF removes the on-demand S-NSSAI from the allowed NSSAI over the corresponding access type the AMF shall include the new allowed NSSAI in the CONFIGURATION UPDATE COMMAND message

if

- the AMF needs to enforce a change in the restriction on the use of enhanced coverage or use of CE mode b as described in subclause 5.3.18;

- the AMF decides to inform a UE in 5GMM-CONNECTED mode and registered for disaster roaming services that a disaster condition is no longer applicable; or

- the AMF needs to redirect the UE to EPC as described in subclause 4.8.4A.2;

NOTE 1A the case of the AMF triggering a generic UE configuration update procedure to inform a UE registered for disaster roaming services that a disaster condition is no longer applicable is only applicable for a UE already in 5GMM-CONNECTED mode

the AMF shall indicate "registration requested" in the registration requested bit of the configuration update indication IE and "release of N1 NAS signalling connection not required" in the signalling connection maintain request bit of the additional configuration indication IE in the CONFIGURATION UPDATE COMMAND message

if the AMF needs to change the SMSF associated with the UE the AMF may indicate "registration requested" in the registration requested bit of the configuration update indication IE and "release of N1 NAS signalling connection not required" in the signalling connection maintain request bit of the additional configuration indication IE in the CONFIGURATION UPDATE COMMAND message

if a network slice-specific authentication and authorization procedure for an S-NSSAI is completed as a

a) success the AMF shall include this S-NSSAI in the allowed NSSAI over the same access of the requested S-NSSAI or in the partially allowed NSSAI over 3GPP access; or

b) failure the AMF shall include this S-NSSAI in the rejected NSSAI for the failed or revoked NSSAA with the rejection cause "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization" over either 3GPP access or non-3GPP access

if authorization is revoked for an S-NSSAI that is in the current allowed NSSAI for an access type the AMF shall

a) provide a new allowed NSSAI to the UE excluding the S-NSSAI for which authorization is revoked; and

b) provide a new rejected NSSAI for the failed or revoked NSSAA including the S-NSSAI in the rejected NSSAI for which the authorization is revoked with the rejection cause "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization"

the allowed NSSAI the partially allowed NSSAI and the rejected NSSAI shall be included in the CONFIGURATION UPDATE COMMAND message to reflect the result of the procedures subject to network slice-specific authentication and authorization

NOTE 2 if there are multiple S-NSSAIs subject to network slice-specific authentication and authorization it is implementation specific if the AMF informs the UE about the outcome of the procedures in one or more CONFIGURATION UPDATE COMMAND messages

if the AMF includes the network slicing indication IE in the CONFIGURATION UPDATE COMMAND message with the network slicing subscription change indication set to "Network slicing subscription changed" and changes to the allowed NSSAI require the UE to initiate a registration procedure but the AMF is unable to determine an allowed NSSAI for the UE as specified in 3GPP TS 23.501 [8] then the CONFIGURATION UPDATE COMMAND message shall additionally indicate "registration requested" in the registration requested bit of the configuration update indication IE and shall not include an allowed NSSAI

if EAC mode is activated for an S-NSSAI the AMF shall perform NSAC for the S-NSSAI subject to NSAC before such S-NSSAI is included in the allowed NSSAI in the CONFIGURATION UPDATE COMMAND message if EAC mode is deactivated for an S-NSSAI the AMF shall perform NSAC for the S-NSSAI subject to NSAC after such S-NSSAI is included in the allowed NSSAI in the CONFIGURATION UPDATE COMMAND message

if the UE supports extended rejected NSSAI and the AMF determines that maximum number of UEs reached for one or more S-NSSAI(s) in the allowed NSSAI as specified in subclause 4.6.2.5 the AMF shall include the rejected NSSAI containing one or more S-NSSAIs with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" in the extended rejected NSSAI IE in the CONFIGURATION UPDATE COMMAND message in addition the AMF may include a back-off timer value for each S-NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" included in the extended rejected NSSAI IE of the CONFIGURATION UPDATE COMMAND message to avoid that large numbers of UEs simultaneously initiate deferred requests the network should select the value for the backoff timer for each S-NSSAI for the informed UEs so that timeouts are not synchronised

if the UE does not indicate support for extended rejected NSSAI and the maximum number of UEs has been reached the AMF should include the rejected NSSAI containing one or more S-NSSAIs with the rejection cause "S-NSSAI not available in the current registration area" in the rejected NSSAI IE and should not include these S-NSSAIs in the allowed NSSAI in the CONFIGURATION UPDATE COMMAND message in addition the AMF may based on the network policies start a local implementation specific timer for the UE per rejected S-NSSAI and upon expiration of the local implementation specific timer the AMF may remove the rejected S-NSSAI from the rejected NSSAI and update to the UE by initiating the generic UE configuration update procedure

NOTE 3 based on network policies the AMF can include the S-NSSAI(s) for which the maximum number of UEs has been reached in the rejected NSSAI with rejection causes other than "S-NSSAI not available in the current registration area"

if the UE has set the NSAG bit to "NSAG supported" in the 5GMM capability IE of the REGISTRATION REQUEST message the AMF may include the NSAG information IE in the CONFIGURATION UPDATE COMMAND message up to 4 NSAG entries are allowed to be associated with a TAI list in the NSAG information IE

NOTE 3A how the AMF selects NSAG entries to be included in the NSAG information IE is implementation specific e.g take the NSAG priority and the current registration area into account

NOTE 3B if the NSAG for the PLMN and its equivalent PLMN(s) have different associations with S-NSSAIs then the AMF includes a TAI list for the NSAG entry in the NSAG information IE

if the UE supports network slice replacement and the AMF determines to provide the mapping information between the S-NSSAI to be replaced and the alternative S-NSSAI to the UE then the AMF shall include the alternative NSSAI IE the allowed NSSAI IE including the alternative S-NSSAI if not included in the current allowed NSSAI and the configured NSSAI IE including the alternative S-NSSAI if not included in the current configured NSSAI in the CONFIGURATION UPDATE COMMAND message if the AMF determines that the replaced S-NSSAI is available then the AMF shall provide the updated alternative NSSAI excluding the replaced S-NSSAI and the corresponding alternative S-NSSAI in the alternative NSSAI IE in the CONFIGURATION UPDATE COMMAND message if the AMF determines that all the replaced S-NSSAI(s) are available then the AMF shall provide the alternative NSSAI IE with length of alternative NSSAI contents set to 0 in the CONFIGURATION UPDATE COMMAND message if the AMF determines that the replaced S-NSSAI is not supported due to the UE moving outside of NS-AoS of the S-NSSAI while the alternative S-NSSAI is available then the AMF shall provide the updated allowed NSSAI and partially allowed NSSAI if available excluding the replaced S-NSSAI if included in the allowed NSSAI or partially allowed NSSAI in the CONFIGURATION UPDATE COMMAND message

if the UE supports partial network slice and the AMF needs to update the partially allowed NSSAI partially rejected NSSAI or both then the AMF shall include the partially allowed NSSAI IE the partially rejected NSSAI IE or both in the CONFIGURATION UPDATE COMMAND message

if the UE supports network slice usage control and the AMF needs to update the on-demand NSSAI the AMF shall include the On-demand NSSAI IE in the CONFIGURATION UPDATE COMMAND message

if the AMF needs to update the LADN information the AMF shall include the LADN information in the LADN information IE of the CONFIGURATION UPDATE COMMAND message

if the UE supports LADN per DNN and S-NSSAI and the AMF needs to update the extended LADN information the AMF shall include the extended LADN information in the extended LADN information IE of the CONFIGURATION UPDATE COMMAND message

if

- the UE does not support LADN per DNN and S-NSSAI;

- the UE is subscribed to the LADN DNN for a single S-NSSAI only; and

- the AMF only has the extended LADN information;

the AMF may decide to provide the LADN service area for that LADN DNN of the extended LADN information as the LADN information and include the LADN information in the LADN information IE of the CONFIGURATION UPDATE COMMAND message

NOTE 3C if the LADN service area is configured per DNN and S-NSSAI in order to serve the UEs that do not support LADN per DNN and S-NSSAI it is recommended that the LADN DNN is only served by a single S-NSSAI

NOTE 3D in case of the UE is subscribed to the LADN DNN for multiple S-NSSAIs the AMF can treat this as no extended LADN information is available

NOTE 3E the AMF allocates the LADN service area and the TAI list associated with the S-NSSAI in the partially allowed NSSAI independently if applicable

if the UE does not support LADN per DNN and S-NSSAI and the AMF has neither the LADN information nor the extended LADN information the AMF shall not provide any LADN information to the UE

if the AMF needs to update the "CAG information list" the AMF shall include the CAG information list IE or the extended CAG information list IE in the CONFIGURATION UPDATE COMMAND message

NOTE 4 if the UE supports extended CAG information list the CAG information list can be included either in the CAG information list IE or extended CAG information list IE

if the UE does not support extended CAG information list the CAG information list shall not be included in the extended CAG information list IE

if the AMF needs to update the "CAG information list" the UE has an emergency PDU session and the AMF can determine that the UE is in

a) a CAG cell and none of the CAG-ID(s) supported by the CAG cell is authorized based on the "allowed CAG list" for the current PLMN in the updated "CAG information list"; or

b) a non-CAG cell and the entry for the current PLMN in the updated "CAG information list" includes an "indication that the UE is only allowed to access 5GS via CAG cells";

the AMF may indicate to the SMF to perform a local release of

a) all non-emergency single access PDU sessions associated with 3GPP access;

b) all MA PDU sessions without a PDN connection established as a user-plane resource and without user plane resources established on non-3GPP access; and

c) the 3GPP access user plane resources of all those MA PDU sessions with user plane resources established on both accesses

the AMF shall not indicate to the SMF to release the emergency PDU session if the AMF indicated to the SMF to perform a local release of

a) all single access non-emergency PDU sessions associated with 3GPP access;

b) all MA PDU sessions without a PDN connection established as a user-plane resource and without user plane resources established on non-3GPP access; and

c) the 3GPP access user plane resources of all those MA PDU sessions with user plane resources established on both accesses;

the network shall behave as if the UE is registered for emergency services over 3GPP access and shall set the emergency registered bit of the 5GS registration result IE to "Registered for emergency services" in the CONFIGURATION UPDATE COMMAND message

if the AMF is initiating the generic UE configuration update procedure to indicate to a UE which is registered for disaster roaming services and which has an ongoing emergency PDU session that the UE is registered for emergency services as described in subclause 4.24 the AMF shall set the emergency registered bit of the 5GS registration result IE to "Registered for emergency services" in the CONFIGURATION UPDATE COMMAND message

if the AMF

- updated the "CAG information list" to remove one or more CAG-ID(s) authorized based on the allowed CAG list for the serving PLMN or an equivalent PLMN; or

- updated the "CAG information list" to set the "indication that the UE is only allowed to access 5GS via CAG cells" for the serving PLMN or an equivalent PLMN which was not set before

then upon completion of the configuration update procedure and if the UE does not have an emergency PDU session the AMF shall initiate the release of the N1 NAS signalling connection according to subclause 5.3.1.3

if the AMF needs to update the truncated 5G-S-TMSI configuration for a UE in NB-N1 mode using control plane CIoT 5GS optimization the AMF shall include the truncated 5G-S-TMSI configuration IE in the CONFIGURATION UPDATE COMMAND message

if the AMF includes a UE radio capability ID deletion indication IE in the CONFIGURATION UPDATE COMMAND message the AMF shall indicate "registration requested" in the registration requested bit of the configuration update indication IE

if the UE is not in NB-N1 mode and the UE supports RACS the AMF may include either a UE radio capability ID IE or a UE radio capability ID deletion indication IE in the CONFIGURATION UPDATE COMMAND message

during an established 5GMM context the network may send none one or more CONFIGURATION UPDATE COMMAND messages to the UE if more than one CONFIGURATION UPDATE COMMAND message is sent the messages need not have the same content

upon receipt of the result of the UUAA-MM procedure from the UAS-NF the AMF shall include

a) the service-level-AA response with the SLAR field set to

1) "Service level authentication and authorization was successful" if the AMF detects the UUAA-MM procedure has succeeded; or

2) "Service level authentication and authorization was not successful or service level authorization is revoked" if the AMF detects the UUAA-MM procedure has failed;

b) if the CAA-Level UAV ID is provided by the UAS-NF the service-level device ID with the value set to the CAA-Level UAV ID; and;

c) if a payload is received from the UAS-NF

1) the service-level-AA payload with the value set to the payload; and

2) if a payload type associated with the payload is received the service-level-AA payload type with the values set to the payload type; and

3) if the payload type associated with the payload is for C2 authorization payload the service-level-AA response with C2AR field set to either "C2 authorization was successful" or "C2 authorization was not successful or C2 authorization is revoked" according to the authorization result received from the UAS-NF;

in the Service-level-AA container IE of the CONFIGURATION UPDATE COMMAND message

NOTE 5 UAS security information can be included in the UUAA payload by the USS as specified in 3GPP TS 33.256 [24B]

NOTE 5A0 a list of USS addresses where each entry contains a USS address and a corresponding geographical area can be included in the UUAA payload by the USS as specified in 3GPP TS 23.256 [6AB]

NOTE 5A the service-level-AA payload associated with the payload type "C2 authorization payload" can include pairing information for the direct C2 communication or the security information as specified in TS 33.256 [24B] or both

NOTE 6 if the AMF receives the HTTP code set to "4xx" or "5xx" as specified in 3GPP TS 29.500 [20AA] or the AMF detects that the UUAA-MM failure as specified in 3GPP TS 29.256 [21B] then the AMF considers the UUAA-MM procedure has failed

if the AMF needs to deliver to the UE the UUAA revocation notification received from the UAS-NF the AMF shall include the service-level-AA response with SLAR set to "Service level authentication and authorization was not successful or service level authorization is revoked" in the Service-level-AA container IE of the CONFIGURATION UPDATE COMMAND message

if the UE supports UAS services and UAS services become enabled for the UE (e.g because of the aerial subscription becomes a part of the UE subscription data retrieved from the UDM) the AMF may include the service-level-AA service status indication with UAS field set to "UAS services enabled" in the Service-level-AA container IE of the CONFIGURATION UPDATE COMMAND message

if the UE supports MINT the AMF may include the list of PLMNs to be used in disaster condition IE in the CONFIGURATION UPDATE COMMAND message

if the UE supports MINT the AMF may include the disaster roaming wait range IE in the CONFIGURATION UPDATE COMMAND message

if the UE supports MINT the AMF may include the disaster return wait range IE in the CONFIGURATION UPDATE COMMAND message

NOTE 7 the AMF can determine the content of the "list of PLMN(s) to be used in disaster condition" the value of the disaster roaming wait range and the value of the disaster return wait range based on the network local configuration

if the UE supports discontinuous coverage the AMF may include the discontinuous coverage maximum time offset IE in the CONFIGURATION UPDATE COMMAND message

if the UE supports and the network supports and accepts the use of the PEIPS assistance information and the AMF needs to update the PEIPS assistance information the AMF may include the PEIPS assistance information in the updated PEIPS assistance information IE of the CONFIGURATION UPDATE COMMAND message

if the AMF needs to inform the UE that the use of access identity 1 is valid or is no longer valid then

1) if the UE supports MPS indicator update via the UE configuration update procedure the AMF

a) informs the UE by setting the MPS indicator bit of the priority indicator IE to "Access identity 1 valid" or "Access identity 1 not valid" respectively in the CONFIGURATION UPDATE COMMAND message based on operator policy the AMF sets the MPS indicator bit in the CONFIGURATION UPDATE COMMAND message based on the MPS priority information in the user's subscription context obtained from the UDM; or

b) indicates "registration requested" in the registration requested bit of the configuration update indication IE in the CONFIGURATION UPDATE COMMAND message; or

2) if the UE supports MCS indicator update via the UE configuration update procedure the AMF

a) informs the UE by setting the MCS indicator bit of the priority indicator IE to "Access identity 2 valid" or "Access identity 2 not valid" respectively in the CONFIGURATION UPDATE COMMAND message based on operator policy the AMF sets the MCS indicator bit in the CONFIGURATION UPDATE COMMAND message based on the MCS priority information in the user's subscription context obtained from the UDM; or

b) indicates "registration requested" in the registration requested bit of the configuration update indication IE in the CONFIGURATION UPDATE COMMAND message; or

3) otherwise the AMF shall indicate "registration requested" in the registration requested bit of the configuration update indication IE in the CONFIGURATION UPDATE COMMAND message

if the UE has set the reconnection to the network due to RAN timing synchronization status change (RANtiming) bit to "Reconnection to the network due to RAN timing synchronization status change supported" in the 5GMM capability IE of the REGISTRATION REQUEST message the AMF may include the RAN timing synchronization IE with the RecReq bit set to "Reconnection requested" in the CONFIGURATION UPDATE COMMAND message

when the UE is operating as an MBSR and its status of the MBSR authorization changes to not authorized for MBSR operation based on the UE subscription and local policy and the UE is allowed to operate as a UE then the AMF shall include the feature authorization indication IE in the CONFIGURATION UPDATE COMMAND message and shall set the MBSRAI field to "not authorized to operate as MBSR but allowed to operate as a UE" and the AMF can request the SMF to release the PDU session for OAM access (see 3GPP TS 23.501 [8]) provided in the serving PLMN when the UE that was not allowed for MBSR operation becomes to be allowed for MBSR operation based on the UE subscription and local policy then the AMF shall include the feature authorization indication IE in the CONFIGURATION UPDATE COMMAND message and shall set the MBSRAI field to "authorized to operate as MBSR"

if the UE supports RAT utilization control and the AMF needs to update the RAT utilization control information the AMF shall include the RAT utilization control IE with the length of RAT utilization control contents field set to a non-zero value in the CONFIGURATION UPDATE COMMAND message in the RAT utilization control IE the AMF shall not indicate that the access technology of the NG-RAN cell on which the CONFIGURATION UPDATE COMMAND message is sent as restricted if the UE supports RAT utilization control and the AMF needs to remove the RAT utilization control information the AMF shall include the RAT utilization control IE with the length of RAT utilization control contents field set to zero in the CONFIGURATION UPDATE COMMAND message

#### 5.4.4.3 generic UE configuration update accepted by the UE

upon receiving the CONFIGURATION UPDATE COMMAND message the UE shall stop timer T3346 if running and use the contents to update appropriate information stored within the UE

if "acknowledgement requested" is indicated in the acknowledgement bit of the configuration update indication IE in the CONFIGURATION UPDATE COMMAND message the UE shall send a CONFIGURATION UPDATE COMPLETE message

if the UE receives a new 5G-GUTI in the CONFIGURATION UPDATE COMMAND message the UE shall consider the new 5G-GUTI as valid the old 5G-GUTI as invalid stop timer T3519 if running and delete any stored SUCI; otherwise the UE shall consider the old 5G-GUTI as valid the UE shall provide the 5G-GUTI to the lower layer of 3GPP access if the CONFIGURATION UPDATE COMMAND message is sent over the non-3GPP access and the UE is in 5GMM-REGISTERED in both 3GPP access and non-3GPP access in the same PLMN

if the UE receives a new TAI list in the CONFIGURATION UPDATE COMMAND message the UE shall consider the new TAI list as valid and the old TAI list as invalid; otherwise the UE shall consider the old TAI list as valid if the registration area contains TAIs belonging to different PLMNs which are equivalent PLMNs and

a) the UE already has stored allowed NSSAI for the current registration area the UE shall store the allowed NSSAI for the current registration area in each of the allowed NSSAIs which are associated with each of the PLMNs in the registration area;

b) the UE already has stored rejected NSSAI for the current registration area the UE shall store the rejected NSSAI for the current registration area in each of the rejected NSSAIs which are associated with each of the PLMNs in the registration area;

c) the UE already has stored rejected NSSAI for the failed or revoked NSSAA the UE shall store the rejected NSSAI for the failed or revoked NSSAA in each of the rejected NSSAIs which are associated with each of the PLMNs in the registration area;

d) the UE already has stored rejected NSSAI for the maximum number of UEs reached the UE shall store the rejected NSSAI for the maximum number of UEs reached in each of the rejected NSSAIs which are associated with each of the PLMNs in the registration area; and

e) the UE already has stored pending NSSAI the UE shall store the pending NSSAI in each of the pending NSSAIs which are associated with each of the PLMNs in the registration area

if the UE receives a new truncated 5G-S-TMSI configuration in the CONFIGURATION UPDATE COMMAND message the UE shall consider the new truncated 5G-S-TMSI configuration as valid and the old truncated 5G-S-TMSI configuration as invalid; otherwise the UE shall consider the old truncated 5G-S-TMSI configuration as valid

if the UE receives a new service area list in the CONFIGURATION UPDATE COMMAND message the UE shall consider the new service area list as valid and the old service area list as invalid; otherwise the UE shall consider the old service area list if any as valid

if the UE receives new NITZ information in the CONFIGURATION UPDATE COMMAND message the UE considers the new NITZ information as valid and the old NITZ information as invalid; otherwise the UE shall consider the old NITZ information as valid

if the UE receives a LADN information IE in the CONFIGURATION UPDATE COMMAND message the UE shall consider the old LADN information as invalid and the new LADN information as valid if any; otherwise the UE shall consider the old LADN information as valid

if the UE receives an extended LADN information IE in the CONFIGURATION UPDATE COMMAND message the UE shall consider the old extended LADN information as invalid and the new extended LADN information as valid if any; otherwise the UE shall consider the old extended LADN information as valid

if the UE receives a new allowed NSSAI for the associated access type in the CONFIGURATION UPDATE COMMAND message the UE shall consider the new allowed NSSAI as valid for the associated access type store the allowed NSSAI for the associated access type as specified in subclause 4.6.2.2 and consider the old allowed NSSAI for the associated access type as invalid; otherwise the UE shall consider the old allowed NSSAI as valid for the associated access type

if the UE receives a new configured NSSAI in the CONFIGURATION UPDATE COMMAND message the UE shall consider the new configured NSSAI for the registered PLMN or SNPN as valid and the old configured NSSAI for the registered PLMN or SNPN as invalid; otherwise the UE shall consider the old configured NSSAI for the registered PLMN or SNPN as valid the UE shall store the new configured NSSAI as specified in subclause 4.6.2.2 in addition if the CONFIGURATION UPDATE COMMAND message contains

a) an NSSRG information IE the UE shall store the contents of the NSSRG information IE as specified in subclause 4.6.2.2 if the UE receives a new configured NSSAI in the CONFIGURATION UPDATE COMMAND message and no NSSRG information IE the UE shall delete any stored NSSRG information if any as specified in subclause 4.6.2.2;

NOTE 1 when the UE receives the NSSRG information IE the UE may provide the NSSRG information to lower layers for the purpose of NSAG-aware cell reselection

b) an S-NSSAI location validity information IE the UE shall store the contents of the S-NSSAI location validity information IE as specified in subclause 4.6.2.2 if the UE receives a new configured NSSAI in the CONFIGURATION UPDATE COMMAND message and no S-NSSAI location validity information IE the UE shall delete any stored S-NSSAI location validity information if any as specified in subclause 4.6.2.2;

c) an S-NSSAI time validity information IE the UE shall store the contents of the S-NSSAI time validity information IE as specified in subclause 4.6.2.2 if the UE receives a new configured NSSAI in the CONFIGURATION UPDATE COMMAND message and no S-NSSAI time validity information IE the UE shall delete any stored S-NSSAI time validity information if any as specified in subclause 4.6.2.2; or

d) an On-demand NSSAI IE the UE shall store the contents of the On-demand NSSAI IE as specified in subclause 4.6.2.2 if the UE receives a new configured NSSAI IE in the CONFIGURATION UPDATE COMMAND message and no On-demand NSSAI IE the UE shall delete any stored on-demand NSSAI as specified in subclause 4.6.2.2 the UE shall stop slice deregistration inactivity timer if running for the S-NSSAI which is deleted from the on-demand NSSAI

if the CONFIGURATION UPDATE COMMAND message contains partially allowed NSSAI IE the UE shall store the contents of the partially allowed NSSAI IE as specified in subclause 4.6.2.2 if the CONFIGURATION UPDATE COMMAND message contains partially rejected NSSAI IE the UE shall store the contents of the partially rejected NSSAI IE as specified in subclause 4.6.2.2

if the UE receives the network slicing indication IE in the CONFIGURATION UPDATE COMMAND message with the network slicing subscription change indication set to "Network slicing subscription changed" the UE shall delete the network slicing information and the NSSAI inclusion mode for each and every PLMN or SNPN except for the current PLMN or SNPN as specified in subclause 4.6.2.2 and remove all tracking areas from the list of "5GS forbidden tracking areas for roaming" which were added due to rejection of S-NSSAI due to "S-NSSAI not available in the current registration area"

if the UE receives Operator-defined access category definitions IE in the CONFIGURATION UPDATE COMMAND message and the Operator-defined access category definitions IE contains one or more operator-defined access category definitions the UE shall delete any operator-defined access category definitions stored for the RPLMN and shall store the received operator-defined access category definitions for the RPLMN if the UE receives the Operator-defined access category definitions IE in the CONFIGURATION UPDATE COMMAND message and the Operator-defined access category definitions IE contains no operator-defined access category definitions the UE shall delete any operator-defined access category definitions stored for the RPLMN if the CONFIGURATION UPDATE COMMAND message does not contain the Operator-defined access category definitions IE the UE shall not delete the operator-defined access category definitions stored for the RPLMN

if the UE receives the SMS indication IE in the CONFIGURATION UPDATE COMMAND message with the SMS availability indication set to

a) "SMS over NAS not available" the UE shall consider that SMS over NAS transport is not allowed by the network; and

b) "SMS over NAS available" the UE may request the use of SMS over NAS transport by performing a registration procedure for mobility and periodic registration update as specified in subclause 5.5.1.3 after the completion of the generic UE configuration update procedure

if the UE receives the CAG information list IE or the extended CAG information list IE in the CONFIGURATION UPDATE COMMAND message the UE shall

a) replace the "CAG information list" stored in the UE with the received CAG information list IE or the extended CAG information list IE when received in the HPLMN or EHPLMN;

NOTE 2 when the UE receives the CAG information list IE or the extended CAG information list IE in the HPLMN whose PLMN code is derived from the IMSI the EHPLMN list is present and is not empty and the HPLMN is not present in the EHPLMN list the UE behaves as if it receives the CAG information list IE or the extended CAG information list IE in a VPLMN

b) replace the serving VPLMN's entry of the "CAG information list" stored in the UE with the serving VPLMN's entry of the received CAG information list IE or the extended CAG information list IE when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN; or

NOTE 3 when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN entries of a PLMN other than the serving VPLMN if any in the received CAG information list IE or the extended CAG information list IE are ignored

c) remove the serving VPLMN's entry of the "CAG information list" stored in the UE when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN and the CAG information list IE or the extended CAG information list IE does not contain the serving VPLMN's entry

the UE shall store the "CAG information list" received in the CAG information list IE or the extended CAG information list IE as specified in annex c

if the received "CAG information list" includes an entry containing the identity of the current PLMN and the UE had set the CAG bit to "CAG supported" in the 5GMM capability IE of the REGISTRATION REQUEST message the UE shall operate as follows

a) if the UE receives the CONFIGURATION UPDATE COMMAND message via a CAG cell none of the CAG-ID(s) supported by the current CAG cell is authorized based on the "Allowed CAG list" of the entry for the current PLMN in the received "CAG information list" and

1) the entry for the current PLMN in the received "CAG information list" does not include an "indication that the UE is only allowed to access 5GS via CAG cells" then the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C] with the updated "CAG information list"; or

2) the entry for the current PLMN in the received "CAG information list" includes an "indication that the UE is only allowed to access 5GS via CAG cells" and

i) if one or more CAG-ID(s) are authorized based on the "Allowed CAG list" of the entry for the current PLMN in the received "CAG information list" the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] with the updated "CAG information list"; or

ii) if no CAG-ID is authorized based on the "Allowed CAG list" of the entry for the current PLMN in the received "CAG information list" and

A) the UE does not have an emergency PDU session then the UE shall enter the state 5GMM-REGISTERED.PLMN-SEARCH and shall apply the PLMN selection process defined in 3GPP TS 23.122 [5] with the updated "CAG information list"; or

B) the UE has an emergency PDU session then the UE shall perform a local release of all PDU sessions associated with 3GPP access except for the emergency PDU session and enter the state 5GMM-REGISTERED.LIMITED-SERVICE; or

b) if the UE receives the CONFIGURATION UPDATE COMMAND message via a non-CAG cell and the entry for the current PLMN in the received "CAG information list" includes an "indication that the UE is only allowed to access 5GS via CAG cells" and

1) if one or more CAG-ID(s) are authorized based on the "allowed CAG list" for the current PLMN in the received "CAG information list" the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] with the updated "CAG information list"; or

2) if no CAG-ID is authorized based on the "Allowed CAG list" of the entry for the current PLMN in the received "CAG information list"and

i) the UE does not have an emergency PDU session then the UE shall enter the state 5GMM-REGISTERED.PLMN-SEARCH and shall apply the PLMN selection process defined in 3GPP TS 23.122 [5] with the updated "CAG information list"; or

ii) the UE has an emergency PDU session then the UE shall perform a local release of all PDU sessions associated with 3GPP access except for the emergency PDU session and enter the state 5GMM-REGISTERED.LIMITED-SERVICE

if the received "CAG information list" does not include an entry containing the identity of the current PLMN and the UE receives the CONFIGURATION UPDATE COMMAND message via a CAG cell the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C] with the updated "CAG information list"

if the CONFIGURATION UPDATE COMMAND message indicates "registration requested" in the registration requested bit of the configuration update indication IE and

a) contains no other parameters or contains at least one of the following parameters a new allowed NSSAI a new partially allowed NSSAI a new configured NSSAI a new NSSRG information or the network slicing subscription change indication and

1) an emergency PDU session exists the UE shall after the completion of the generic UE configuration update procedure and the release of the emergency PDU session release the existing N1 NAS signalling connection additionally the UE shall

i) if any Tsor-cm timer(s) were running and have stopped attempt to obtain service on a higher priority PLMN (see 3GPP TS 23.122 [5]); or

ii) in all other cases start a registration procedure for mobility and periodic registration update as specified in subclause 5.5.1.3; or

2) no emergency PDU session exists the UE shall after the completion of the generic UE configuration update procedure and the release of the existing N1 NAS signalling connection

i) if any Tsor-cm timer(s) were running and have stopped attempt to obtain service on a higher priority PLMN (see 3GPP TS 23.122 [5]); or

ii) in all other cases start a registration procedure for mobility and periodic registration update as specified in subclause 5.5.1.3;

b) a MICO indication is included without a new allowed NSSAI a new configured NSSAI a new NSSRG information or the network slicing subscription change indication the UE shall after the completion of the generic UE configuration update procedure start a periodic registration procedure for mobility and registration update as specified in subclause 5.5.1.3 to re-negotiate MICO mode with the network;

c) an additional configuration indication IE is included and

1) "release of N1 NAS signalling connection not required" is indicated in the signalling connection maintain request bit of the additional configuration indication IE; and

2) a new allowed NSSAI a new configured NSSAI a new NSSRG information or the network slicing subscription change indication is not included in the CONFIGURATION UPDATE COMMAND message

the UE shall after the completion of the generic UE configuration update procedure start a registration procedure for mobility and periodic registration update as specified in subclause 5.5.1.3; or

d) a UE radio capability ID deletion indication IE set to "Network-assigned UE radio capability IDs deletion requested" is included and

1) the UE is not in NB-N1 mode;

2) a new allowed NSSAI a new configured NSSAI a new NSSRG information or a network slicing subscription change indication is not included; and

3) the UE has set the RACS bit to "RACS supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

the UE shall after the completion of the generic UE configuration update procedure start a registration procedure for mobility and periodic registration update as specified in subclause 5.5.1.3

the UE receiving the rejected NSSAI in the CONFIGURATION UPDATE COMMAND message takes the following actions based on the rejection cause in the rejected S-NSSAI(s)

"S-NSSAI not available in the current PLMN or SNPN"

the UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current PLMN or SNPN as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current PLMN or SNPN over any access until switching off the UE the UICC containing the USIM is removed the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated or the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2

"S-NSSAI not available in the current registration area"

the UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current registration area as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current registration area over the current access until switching off the UE the UE moving out of the current registration area the UICC containing the USIM is removed the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated or the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2

"S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization"

the UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the failed or revoked NSSAA as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN or SNPN over any access until switching off the UE the UICC containing the USIM is removed the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated or the rejected S-NSSAI(s) are removed as described in subclause 4.6.1 and 4.6.2.2

"S-NSSAI not available due to maximum number of UEs reached"

unless the back-off timer value received along with the S-NSSAI is zero the UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the maximum number of UEs reached as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN or SNPN over the current access until switching off the UE the UICC containing the USIM is removed the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated or the rejected S-NSSAI(s) are removed as described in subclauses 4.6.1 and 4.6.2.2

NOTE 4 if the back-off timer value received along with the S-NSSAI in the rejected NSSAI for the maximum number of UEs reached is zero as specified in subclause 10.5.7.4a of 3GPP TS 24.008 [12] the UE does not consider the S-NSSAI as the rejected S-NSSAI

if there is one or more S-NSSAIs in the rejected NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" then for each S-NSSAI the UE shall behave as follows

a) stop the timer T3526 associated with the S-NSSAI if running;

b) start the timer T3526 with

1) the back-off timer value received along with the S-NSSAI if back-off timer value is received along with the S-NSSAI that is neither zero nor deactivated; or

2) an implementation specific back-off timer value if no back-off timer value is received along with the S-NSSAI; and

c) remove the S-NSSAI from the rejected NSSAI for the maximum number of UEs reached when the timer T3526 associated with the S-NSSAI expires

if the UE receives the NSAG information IE in the CONFIGURATION UPDATE COMMAND message the UE shall store the NSAG information as specified in subclause 4.6.2.2

if the UE receives the alternative NSSAI IE in the CONFIGURATION UPDATE COMMAND message the UE shall store the alternative NSSAI as specified in subclause 4.6.2.2

if the UE receives a T3447 value IE in the CONFIGURATION UPDATE COMMAND message and has indicated "service gap control supported" in the REGISTRATION REQUEST then the UE shall replace the stored T3447 value with the received value in the T3447 value IE and if neither zero nor deactivated use the received T3447 value with the timer T3447 next time it is started if the received T3447 value is zero or deactivated then the UE shall stop the timer T3447 if running

if the UE is not in NB-N1 mode the UE has set the RACS bit to "RACS supported" in the 5GMM capability IE of the REGISTRATION REQUEST message and the CONFIGURATION UPDATE COMMAND message includes

a) a UE radio capability ID deletion indication IE set to "Network-assigned UE radio capability IDs deletion requested" the UE shall delete any network-assigned UE radio capability IDs associated with the RPLMN or RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the selected entry of the "list of subscriber data" or the selected PLMN subscription stored at the UE; or

b) a UE radio capability ID IE the UE shall store the UE radio capability ID as specified in annex c

if the UE is not currently registered for emergency services and the emergency registered bit of the 5GS registration result IE in the CONFIGURATION UPDATE COMMAND message is set to "Registered for emergency services" the UE shall consider itself registered for emergency services and shall locally release all non-emergency PDU sessions if any

if the UE receives the service-level-AA container IE of the CONFIGURATION UPDATE COMMAND message the UE passes it to the upper layer

NOTE 5 the service-level-AA container IE can include a service-level-AA payload of type "C2 authorization payload" that includes pairing information for the direct C2 communication or the security information as specified in TS 33.256 [24B] or both

if the CONFIGURATION UPDATE COMMAND message includes the service-level-AA response in the Service-level-AA container IE with the SLAR field set to "Service level authentication and authorization was not successful or service level authorization is revoked" the UE shall forward the service-level-AA response to the upper layers so the UUAA authorization data is deleted as specified in 3GPP TS 33.256 [24B]

if the UE receives the list of PLMNs to be used in disaster condition IE in the CONFIGURATION UPDATE COMMAND message and the UE supports MINT the UE shall delete the "list of PLMN(s) to be used in disaster condition" stored in the ME together with the PLMN ID of the RPLMN if any and may store the "list of PLMN(s) to be used in disaster condition" included in the list of PLMNs to be used in disaster condition IE in the ME together with the PLMN ID of the RPLMN

if the UE receives the disaster roaming wait range IE in the CONFIGURATION UPDATE COMMAND message and the UE supports MINT the UE shall delete the disaster roaming wait range stored in the ME if any and store the disaster roaming wait range included in the disaster roaming wait range IE in the ME

if the UE receives the disaster return wait range IE in the CONFIGURATION UPDATE COMMAND message and the UE supports MINT the UE shall delete the disaster roaming wait range stored in the ME if any and store the disaster roaming wait range included in the disaster roaming wait range IE in the ME

if the UE receives the discontinuous coverage maximum time offset IE in the CONFIGURATION UPDATE COMMAND message the UE shall replace any previously received discontinuous coverage maximum time offset value on the same satellite NG-RAN RAT type and PLMN with the latest received timer value

if the UE receives the updated PEIPS assistance information IE in the CONFIGURATION UPDATE COMMAND message and the UE supports NR paging subgrouping the UE shall use the PEIPS assistance information included in the updated PEIPS assistance information IE

if the UE receives a CONFIGURATION UPDATE COMMAND message with the MPS indicator bit in the priority indicator IE set to "Access identity 1 valid"

- via 3GPP access; or

- via non-3GPP access if the UE is registered to the same PLMN or SNPN over 3GPP access and non-3GPP access;

the UE shall act as a UE with access identity 1 configured for MPS as described in subclause 4.5.2 in all NG-RAN of the registered PLMN and its equivalent PLMNs or in the case of SNPN as described in subclause 4.5.2A in all NG-RAN of the registered SNPN and its equivalent SNPNs

if the UE receives a CONFIGURATION UPDATE COMMAND message with the MPS indicator bit in the priority indicator IE set to "Access identity 1 valid"

- via non-3GPP access; or

- via 3GPP access if the UE is registered to the same PLMN or SNPN over 3GPP access and non-3GPP access;

the UE shall act as a UE with access identity 1 configured for MPS as described in subclause 4.5.2 in non-3GPP access of the registered PLMN and its equivalent PLMNs or in the case of SNPN as described in subclause 4.5.2A in non-3GPP access of the registered SNPN and its equivalent SNPNs

the MPS indicator bit in the priority indicator IE provided in the CONFIGURATION UPDATE COMMAND message is valid

- in all NG-RAN of the registered PLMN and its equivalent PLMNs or in the case of SNPN in all NG-RAN of the registered SNPN and its equivalent SNPNs until

- the UE receives a REGISTRATION ACCEPT message with the MPS indicator bit set to "Access identity 1 not valid" or the UE receives a CONFIGURATION UPDATE COMMAND message with the MPS indicator bit of the priority indicator IE set to "Access identity 1 not valid"

- via 3GPP access; or

- via non-3GPP access if the UE is registered to the same PLMN or SNPN over 3GPP access and non-3GPP access; or

- the UE selects a non-equivalent PLMN (or in the case of SNPN selects a non-equivalent SNPN); or

- in non-3GPP access of the registered PLMN and its equivalent PLMNs or in the case of SNPN in non-3GPP access of the registered SNPN and its equivalent SNPNs until

- the UE receives a REGISTRATION ACCEPT message with the MPS indicator bit set to "Access identity 1 not valid" or the UE receives a CONFIGURATION UPDATE COMMAND message with the MPS indicator bit of the priority indicator IE set to "Access identity 1 not valid"

- via non-3GPP access; or

- via 3GPP access if the UE is registered to the same PLMN or SNPN over 3GPP access and non-3GPP access; or

- the UE selects a non-equivalent PLMN (or in the case of SNPN selects a non-equivalentSNPN)

access identity 1 is only applicable while the UE is in N1 mode

if the UE receives a CONFIGURATION UPDATE COMMAND message with the MCS indicator bit in the priority indicator IE set to "Access identity 2 valid"

- via 3GPP access; or

- via non-3GPP access if the UE is registered to the same PLMN or SNPN over 3GPP access and non-3GPP access;

the UE shall act as a UE with access identity 2 configured for MCS as described in subclause 4.5.2 in all NG-RAN of the registered PLMN and its equivalent PLMNs or in the case of SNPN as described in subclause 4.5.2A in all NG-RAN of the registered SNPN and its equivalent SNPNs

if the UE receives a CONFIGURATION UPDATE COMMAND message with the MCS indicator bit in the priority indicator IE set to "Access identity 2 valid"

- via non-3GPP access; or

- via 3GPP access if the UE is registered to the same PLMN or SNPN over 3GPP access and non-3GPP access;

the UE shall act as a UE with access identity 2 configured for MCS as described in subclause 4.5.2 in non-3GPP access of the registered PLMN and its equivalent PLMNs or in the case of SNPN as described in subclause 4.5.2A in non-3GPP access of the registered SNPN and its equivalent SNPNs

the MCS indicator bit in the priority indicator IE provided in the CONFIGURATION UPDATE COMMAND message is valid

- in all NG-RAN of the registered PLMN and its equivalent PLMNs or in the case of SNPN in all NG-RAN of the registered SNPN and its equivalent SNPNs until

- the UE receives a REGISTRATION ACCEPT message with the MCS indicator bit set to "Access identity 2 not valid" or the UE receives a CONFIGURATION UPDATE COMMAND message with the MCS indicator bit of the priority indicator IE set to "Access identity 2 not valid"

- via 3GPP access; or

- via non-3GPP access if the UE is registered to the same PLMN or SNPN over 3GPP access and non-3GPP access; or

- the UE selects a non-equivalent PLMN (or in the case of SNPN selects a non-equivalent SNPN); or

- in non-3GPP access of the registered PLMN and its equivalent PLMNs or in the case of SNPN in non-3GPP access of the registered SNPN and its equivalent SNPNs until

- the UE receives a REGISTRATION ACCEPT message with the MCS indicator bit set to "Access identity 2 not valid" or the UE receives a CONFIGURATION UPDATE COMMAND message with the MCS indicator bit of the priority indicator IE set to "Access identity 2 not valid"

- via non-3GPP access; or

- via 3GPP access if the UE is registered to the same PLMN or SNPN over 3GPP access and non-3GPP access; or

- the UE selects a non-equivalent PLMN (or in the case of SNPN selects a non-equivalentSNPN)

access identity 2 is only applicable while the UE is in N1 mode

if the UE supporting UAS services is not currently registered for UAS services and the CONFIGURATION UPDATE COMMAND message includes the service-level-AA service status indication in the Service-level-AA container IE with the UAS field set to "UAS services enabled" then the UE passes the service-level-AA service status indication to the upper layers

if the UE supporting the reconnection to the network due to RAN timing synchronization status change receives the RAN timing synchronization IE with the RecReq bit set to "Reconnection requested" in the CONFIGURATION UPDATE COMMAND message the UE shall operate as specified in subclauses 5.3.1.4 5.5.1.3.2 and 5.6.1.1

if the UE operating as MBSR receives the MBSRAI field of the feature authorization indication IE in the CONFIGURATION UPDATE COMMAND message the UE NAS layer informs the lower layers of the status of MBSR authorization

if the UE supporting RAT utilization control receives the RAT utilization control IE with the length of RAT utilization control contents field set to a non-zero value in the CONFIGURATION UPDATE COMMAND message the UE shall store the received RAT utilization control information together with the PLMN identity of the current PLMN in the list of "PLMNs with associated RAT restrictions" and replace the previously stored one associated with the current PLMN if any with the newly received RAT utilization control information if the UE supports RAT utilization control and the CONFIGURATION UPDATE COMMAND message contains the RAT utilization control IE with the length of RAT utilization control contents field set to zero the UE shall remove the previously stored RAT utilization control information associated with the current PLMN if any if the CONFIGURATION UPDATE COMMAND message does not contain the RAT utilization control IE the UE shall maintain the stored RAT utilization control information associated with the current PLMN if any

#### 5.4.4.4 generic UE configuration update completion by the network

upon receipt of the CONFIGURATION UPDATE COMPLETE message the AMF shall stop the timer T3555

if a new 5G-GUTI was included in the CONFIGURATION UPDATE COMMAND message the AMF shall consider the new 5G-GUTI as valid and the old 5G-GUTI as invalid

if a new TAI list was included in the CONFIGURATION UPDATE COMMAND message the AMF shall consider the new TAI list as valid and the old TAI list as invalid

if a new truncated 5G-S-TMSI configuration was included in the CONFIGURATION UPDATE COMMAND message the AMF shall consider the new truncated 5G-S-TMSI configuration as valid and the old truncated 5G-S-TMSI configuration as invalid

if a new service area list was included in the CONFIGURATION UPDATE COMMAND message the AMF shall consider the new service area list as valid and the old service area list as invalid

if new allowed NSSAI information was included in the CONFIGURATION UPDATE COMMAND message the AMF shall consider the new allowed NSSAI information as valid and the old allowed NSSAI information as invalid if new configured NSSAI information was included in the CONFIGURATION UPDATE COMMAND message the AMF shall consider the new configured NSSAI information as valid and the old configured information as invalid if there are active PDU sessions associated with S-NSSAI(s) not included in the new allowed NSSAI the AMF shall notify the SMF(s) associated with these PDU sessions to initiate the network-requested PDU session release procedure according to subclause 6.3.3 in the present specification and subclause 5.15.5.2.2 in 3GPP TS 23.501 [8]

NOTE if a dedicated S-NSSAI for MWAB is not included in the new allowed NSSAI information then the AMF can delay the notification of the SMF associated with the PDU session associated with the S-NSSAI and DNN combination for MWAB to initiate the network-requested PDU session release procedure for a locally configured time

if "registration requested" was indicated in the registration requested bit of the configuration update indication IE in the CONFIGURATION UPDATE COMMAND message and

a) the CONFIGURATION UPDATE COMMAND message contained

1) an allowed NSSAI a configured NSSAI or both;

2) the network slicing indication IE with the network slicing subscription change indication set to "Network slicing subscription changed"; or

3) no other parameters; and

b) no emergency PDU session has been established for the UE;

then the AMF shall initiate the release of the N1 NAS signalling connection

if an LADN information IE was included in the CONFIGURATION UPDATE COMMAND message the AMF shall consider the old LADN information as invalid and the new LADN information as valid if any if an extended LADN information IE was included in the CONFIGURATION UPDATE COMMAND message the AMF shall consider the old extended LADN information as invalid and the new extended LADN information as valid

if a T3447 value was included in the CONFIGURATION UPDATE COMMAND message the AMF shall consider the T3447 value as valid and if neither zero nor deactivated use the T3447 value with the timer T3447 next time it is started if the T3447 value included in the CONFIGURATION UPDATE COMMAND message contained an indication that the timer is deactivated or timer value zero then the AMF shall stop the timer T3447 if running

if a CAG information list IE or an extended CAG information list IE was included in the CONFIGURATION UPDATE COMMAND message the AMF shall consider the new "CAG information list" as valid and the old "CAG information list" as invalid

if a UE radio capability ID IE was included in the CONFIGURATION UPDATE COMMAND message the AMF shall consider the new UE radio capability ID as valid and the old UE radio capability ID as invalid

if an updated PEIPS assistance information IE was included in the CONFIGURATION UPDATE COMMAND message the AMF shall consider the new PEIPS assistance information as valid and the old PEIPS assistance information if any as invalid

if a RAT utilization control IE was included in the CONFIGURATION UPDATE COMMAND message the AMF shall consider the new "RAT utilization control information" as valid and the old "RAT utilization control information" as invalid

#### 5.4.4.5 abnormal cases in the UE

the following abnormal cases can be identified

a) transmission failure of the CONFIGURATION UPDATE COMPLETE message with TAI change from lower layers

if the current TAI is not in the TAI list the generic UE configuration update procedure shall be aborted and a registration procedure for mobility and periodic registration update shall be initiated

if the current TAI is still part of the TAI list it is up to the UE implementation how to re-run the ongoing procedure that triggered the generic UE configuration update procedure

b) transmission failure of CONFIGURATION UPDATE COMPLETE message indication without TAI change from lower layers

it is up to the UE implementation how to re-run the ongoing procedure that triggered the generic UE configuration update procedure

c) generic UE configuration update and de-registration procedure collision

if the UE receives CONFIGURATION UPDATE COMMAND message after sending a DEREGISTRATION REQUEST message and the access type included in the DEREGISTRATION REQEUST message is same as the access in which the CONFIGURATION UPDATE COMMAND message is received then the UE shall ignore the CONFIGURATION UPDATE COMMAND message and proceed with the de-registration procedure otherwise the UE shall proceed with both the procedures

d) void

e) generic UE configuration update and service request procedure collision

if the SERVICE REQUEST message does not include UE request type IE with request type value set to "NAS signalling connection release" and the UE receives a CONFIGURATION UPDATE COMMAND message before the ongoing service request procedure has been completed the UE shall proceed with both the procedures

if the SERVICE REQUEST message includes UE request type IE with request type value set to "NAS signalling connection release" and the UE receives a CONFIGURATION UPDATE COMMAND message before the ongoing service request procedure has been completed the UE shall ignore the CONFIGURATION UPDATE COMMAND message and proceed with the service request procedure

f) "CAG information list" is received and the UE is operating in SNPN access operation mode

if the UE receives the CAG information list IE in the CONFIGURATION UPDATE COMMAND message and the UE is operating in SNPN access operation mode the UE shall ignore the content of CAG information list IE

#### 5.4.4.6 abnormal cases on the network side

the following abnormal cases can be identified

a) expiry of timer T3555

the network shall on the first expiry of the timer T3555 retransmit the CONFIGURATION UPDATE COMMAND message and shall reset and start timer T3555 this retransmission is repeated four times i.e on the fifth expiry of timer T3555 the procedure shall be aborted in addition if the CONFIGURATION UPDATE COMMAND message includes the 5G-GUTI IE the network shall behave as described in case b)-1) below

b) lower layer failure

if a lower layer failure is detected before the CONFIGURATION UPDATE COMPLETE message is received and

1) if the CONFIGURATION UPDATE COMMAND message includes the 5G-GUTI IE the old and the new 5G-GUTI shall be considered as valid until the old 5G-GUTI can be considered as invalid by the AMF if a new TAI list was provided in the CONFIGURATION UPDATE COMMAND message the old and new TAI list shall also be considered as valid until the old TAI list can be considered as invalid by the AMF

additionally if the updated PEIPS assistance information IE in the CONFIGURATION UPDATE COMMAND message includes a new paging subgroup ID and the UE is previously assigned a different paging subgroup ID then the AMF shall consider both the old and new paging subgroup IDs as valid until the old paging subgroup ID can be considered as invalid by the AMF

during this period the AMF

i) may first use the old 5G-S-TMSI from the old 5G-GUTI and the old paging subgroup ID if any for paging within the area defined by the old TAI list for an implementation dependent number of paging attempts for network originated transactions if a new TAI list was provided in the CONFIGURATION UPDATE COMMAND message the new TAI list should also be used for paging upon response from the UE the AMF may re-initiate the CONFIGURATION UPDATE COMMAND if the updated PEIPS assistance information IE in the CONFIGURATION UPDATE COMMAND message includes a new paging subgroup ID then the AMF may re-initiate the CONFIGURATION UPDATE COMMAND if the response is received from a tracking area within the old and new TAI list the network shall re-initiate the CONFIGURATION UPDATE COMMAND message if no response is received to the paging attempts the network may use the new 5G-S-TMSI from the new 5G-GUTI and the new paging subgroup ID if any for paging for an implementation dependent number of paging attempts in this case if a new TAI list was provided with new 5G-GUTI in the CONFIGURATION UPDATE COMMAND message the new TAI list shall be used instead of the old TAI list upon response from the UE the AMF shall consider the new 5G-GUTI and the new PEIPS assistance information as valid and the old 5G-GUTI and the old PEIPS assistance information as invalid

ii) shall consider the new 5G-GUTI as valid if it is used by the UE and additionally the new TAI list as valid if it was provided with this 5G-GUTI in the CONFIGURATION UPDATE COMMAND message; and

iii) may use the identification procedure followed by a new generic UE configuration update procedure if the UE uses the old 5G-GUTI; or

2) if the CONFIGURATION UPDATE COMMAND message does not include the 5G-GUTI IE and

i) the CONFIGURATION UPDATE COMMAND message does not contain the allowed NSSAI IE the rejected NSSAI IE the extended rejected NSSAI IE or the updated PEIPS assistance information IE the network shall abort the procedure; or

ii) the CONFIGURATION UPDATE COMMAND message contains the allowed NSSAI IE the rejected NSSAI IE the extended rejected NSSAI IE or the updated PEIPS assistance information IE the network shall either abort the procedure or retransmit the CONFIGURATION UPDATE COMMAND message on expiry of the timer T3555 the retransmission shall not be repeated more than four times if the retransmission is repeated for four times the network shall abort the procedure

c) generic UE configuration update and UE initiated de-registration procedure collision

if the network receives a DEREGISTRATION REQUEST message before the ongoing generic UE configuration update procedure has been completed the network shall abort the generic UE configuration update procedure and shall progress the de-registration procedure

d) generic UE configuration update and registration procedure for mobility and periodic registration update collision

if the network receives a REGISTRATION REQUEST message before the ongoing generic UE configuration update procedure has been completed the network shall abort the generic UE configuration update procedure and shall progress the registration procedure for mobility and periodic registration update procedure

e) generic UE configuration update and service request procedure collision

if the network receives a SERVICE REQUEST message before the ongoing generic UE configuration update procedure has been completed and the SERVICE REQUEST message does not include UE request type IE with request type value set to "NAS signalling connection release" both the procedures shall be progressed

if the network receives a SERVICE REQUEST message before the ongoing generic UE configuration update procedure has been completed and the SERVICE REQUEST message includes UE request type IE with request type value set to "NAS signalling connection release" the network shall abort the generic UE configuration update procedure and shall progress the service request procedure

### 5.4.5 NAS transport procedure(s)

#### 5.4.5.1 general

the purpose of the NAS transport procedures is to provide a transport of payload between the UE and the AMF the type of the payload is identified by the payload container type IE and includes one of the following

a) a single 5GSM message;

b) SMS;

c) an LPP message (see 3GPP TS 37.355 [26]);

c1) an SLPP message (see 3GPP TS 38.355 [26A]);

d) an SOR transparent container;

e) a UE policy container;

f) a UE parameters update transparent container;

g) a location services message (see 3GPP TS 24.080 [13A]);

h) a CIoT user data container;

i) a Service-level-AA container;

j) a UPP-CMI container; or

k) multiple payloads

for payload type a) to e) g) and h) along with the payload the NAS transport procedure may transport the associated information (e.g PDU session information for 5GSM message payload)

for payload type k) the payload container IE consists a list of payload container entries where each of payload container entry contains the payload and optional associated information (e.g PDU session information for 5GSM message payload)

NOTE payload type can be set to "Multiple payloads" if there are more than one payloads to be transported using the NAS transport procedures

#### 5.4.5.2 UE-initiated NAS transport procedure

##### 5.4.5.2.1 general

the purpose of the UE-initiated NAS transport procedure is to provide a transport of

a) a single 5GSM message as defined in subclause 8.3;

b) SMS (see 3GPP TS 24.011 [13]);

c) an LPP message;

c1) an SLPP message;

d) an SOR transparent container;

e) a UE policy container;

f) a UE parameters update transparent container;

g) a location services message;

h) a CIoT user data container;

i) a Service-level-AA container;

j) a UPP-CMI container; or

k) multiple of the above types

and

- for a) to e) g) and h) optional associated payload routing information from the UE to the AMF in a 5GMM message; and

- for k) the payload container IE consists a list of payload container entries where each of the payload container entry contains the payload and optional associated payload routing information (e.g PDU session information for 5GSM message payload)

##### 5.4.5.2.2 UE-initiated NAS transport procedure initiation

in the connected mode the UE initiates the NAS transport procedure by sending the UL NAS TRANSPORT message to the AMF as shown in figure 5.4.5.2.2.1

in case a in subclause 5.4.5.2.1 the UE shall

- include the PDU session information (PDU session ID old PDU session ID S-NSSAI mapped S-NSSAI (if available in roaming scenarios) DNN request type alternative S-NSSAI MA PDU session information non-3GPP access path switching indication) if available;

- set the payload container type IE to "N1 SM information"; and

- set the payload container IE to the 5GSM message

the UE shall set the PDU session ID IE to the PDU session ID if an old PDU session ID is to be included the UE shall set the old PDU session ID IE to the old PDU session ID

if an alternative S-NSSAI is to be included the UE shall set the alternative S-NSSAI IE to the alternative S-NSSAI and shall set the S-NSSAI IE to the S-NSSAI to be replaced

if an S-NSSAI is to be included the UE shall set the S-NSSAI IE to the S-NSSAI selected for the PDU session from the allowed NSSAI for the current PLMN or SNPN associated with the mapped S-NSSAI (if available in roaming scenarios)

if a DNN is to be included the UE shall set the DNN IE to the DNN 5GSM procedures specified in clause 6 describe conditions for inclusion of the S-NSSAI mapped S-NSSAI (if available in roaming scenarios) and the DNN

if a request type is to be included the UE shall set the request type IE to the request type the request type is not provided along 5GSM messages other than the PDU SESSION ESTABLISHMENT REQUEST message and the PDU SESSION MODIFICATION REQUEST message

if an MA PDU session information is to be included the UE shall set the MA PDU session information IE to the MA PDU session information the MA PDU session information is not provided along 5GSM messages other than the PDU SESSION ESTABLISHMENT REQUEST message and the PDU SESSION MODIFICATION REQUEST message as specified in 3GPP TS 24.193 [13B]

if the UE supports the non-3GPP access path switching for the PDU session and the AMF has indicated its support for the non-3GPP access path switching the UE shall include the Non-3GPP access path switching indication information element and set the NAPS bit to "non-3GPP access path switching supported" the non-3GPP access path switching indication is not provided along 5GSM messages other than the PDU SESSION ESTABLISHMENT REQUEST message

in case b in subclause 5.4.5.2.1 the UE shall

- set the payload container type IE to "SMS"; and

- set the payload container IE to the SMS payload

based on the UE preferences regarding access selection for mobile originated (MO) transmission of SMS over NAS as described in 3GPP TS 23.501 [8]

- when SMS over NAS is preferred to be sent over 3GPP access the UE attempts to deliver MO SMS over NAS via the 3GPP access if the UE is registered over both 3GPP access and non-3GPP access if the delivery of SMS over NAS via the 3GPP access is not available the UE attempts to deliver MO SMS over NAS via the non-3GPP access; and

- when SMS over NAS is preferred to be sent over non-3GPP access the UE attempts to deliver MO SMS over NAS via the non-3GPP access if the UE is registered over both 3GPP access and non-3GPP access if the delivery of SMS over NAS via the non-3GPP access is not available the UE attempts to deliver MO SMS over NAS via the 3GPP access

in case c in subclause 5.4.5.2.1 the UE shall

- set the payload container type IE to "LTE positioning protocol (LPP) message container";

- set the payload container IE to the LPP message payload; and

- set the additional information IE to the routing information provided by the upper layer location services application

in case c1 in subclause 5.4.5.2.1 the UE shall

- set the payload container type IE to "SLPP message container";

- set the payload container IE to the SLPP message payload; and

- set the additional information IE to the routing information provided by the upper layer location services application

in case d in subclause 5.4.5.2.1 the UE

- shall set the payload container type IE to "SOR transparent container"; and

- shall set the payload container IE to the UE acknowledgement due to successful reception of steering of roaming information and;

i) shall set the ME support of SOR-CMCI indicator to "SOR-CMCI supported by the ME" ;

ii) shall set the ME support of SOR-SNPN-SI indicator to "SOR-SNPN-SI supported by the ME" if the UE supports access to an SNPN using credentials from a credentials holder and the UE is operating in SNPN access operation mode or may set the ME support of SOR-SNPN-SI indicator to "SOR-SNPN-SI supported by the ME" if the UE supports access to an SNPN using credentials from a credentials holder and the UE is not operating in SNPN access operation mode; and

iii) shall set the ME support of SOR-SNPN-SI-LS indicator to "SOR-SNPN-SI-LS supported by the ME" if the UE supports access to an SNPN providing access for localized services in SNPN

in the payload container IE carrying the acknowledgement (see 3GPP TS 23.122 [5])

in case e in subclause 5.4.5.2.1 the UE shall

- set the payload container type IE to "UE policy container"; and

- set the contents of the payload container IE as specified in annex d

in case f in subclause 5.4.5.2.1 the UE shall

- set the payload container type IE to "UE parameters update transparent container"; and

- set the contents of the payload container IE to the UE acknowledgement due to successful reception of UE parameters update data (see 3GPP TS 23.502 [9])

in case g in subclause 5.4.5.2.1 the UE shall

- set the payload container type IE to "Location services message container";

- set the payload container IE to the location services message payload;

- set the additional information IE to the routing information if preconfigured or provided by AMF in a previous procedure or provided by the upper layer location services application; and

- include the payload container information IE with the PRU bit set to "Payload container related to PRU" if the location services message payload is related to PRU (see 3GPP TS 24.080 [13A])

NOTE the AMF may configure the routing information to the UE during the PRU association procedure or the PRU disassociation procedure as specified in 3GPP TS 23.273 [6B]

in case h in subclause 5.4.5.2.1

- if the UE is not located outside the LADN service area the UE shall

- include the PDU session ID and release assistance indication (if available);

- set the payload container type IE to "CIoT user data container"; and

- set the payload container IE to the user data container; or

- if the UE is located outside the LADN service area the UE shall not perform the UE-initiated NAS transport procedure to send CIoT user data via the control plane for a PDU session for LADN

in case i in subclause 5.4.5.2.1 the UE shall

- set the payload container type IE to "Service-level-AA container"; and

- set the payload container IE to the Service-level-AA container

in case j in subclause 5.4.5.2.1 the UE shall

- set the payload container type IE to "UPP-CMI container";

- set the payload container IE to the UPP-CMI container; and

- set the additional information IE to the routing information if provided by AMF in a previous procedure or provided by the upper layer location services application

in case k in subclause 5.4.5.2.1 the UE shall

- set the payload container type IE to "Multiple payloads"; and

- set each payload container entry of the payload container IE (see subclause 9.11.3.39) as follows

i) set the payload container type field of the payload container entry to a payload container type value set in the payload container type IE as specified in cases a) to j) above;

ii) set the payload container entry contents field of the payload container entry to the payload container contents set in the payload container IE as specified in cases a) to j) above and

iii) set the optional IE fields if any to the optional associated payload routing information as specified in cases a to j above

figure 5.4.5.2.2.1 UE-initiated NAS transport procedure

##### 5.4.5.2.3 UE-initiated NAS transport of messages accepted by the network

upon reception of a UL NAS TRANSPORT message if the payload container type IE is set to

a) "N1 SM information" the AMF looks up a PDU session routing context for

1) the UE and the PDU session ID IE in case the old PDU session ID IE is not included and

NOTE 1 if the old PDU session ID IE is not included in the UL NAS TRANSPORT message and the AMF has received a reallocation requested indication from the SMF the AMF needs to ignore the reallocation requested indication

i) if the AMF has a PDU session routing context for the PDU session ID and the UE and the request type IE is either not included or is included but set to other value than "initial request" "existing PDU session" "initial emergency request" "existing emergency PDU session" or "MA PDU request" the AMF shall send the 5GSM message and the PDU session ID IE towards the SMF identified by the SMF ID of the PDU session routing context;

ii) if the AMF has a PDU session routing context for the PDU session ID and the UE the PDU session routing context indicates that the PDU session is not an emergency PDU session the request type IE is included and is set to "existing PDU session" or "MA PDU request" and the S-NSSAI associated with the PDU session identified by the PDU session ID is allowed for the target access type the AMF shall send the 5GSM message the PDU session ID the S-NSSAI the mapped S-NSSAI (in roaming scenarios) the DNN (if received) and the request type towards the SMF identified by the SMF ID of the PDU session routing context;

iii) if the AMF does not have a PDU session routing context for the PDU session ID and the UE and the request type IE is included and is set to "initial request" or "MA PDU request"

A) the AMF shall select an SMF with following handlings in case the UE is not registered for onboarding services in SNPN

if the S-NSSAI IE is not included the UE does not have a partially allowed NSSAI and the allowed NSSAI contains

- one S-NSSAI the AMF shall use the S-NSSAI in the allowed NSSAI as the S-NSSAI additionally for a UE for which the AMF has provided a NS-AoS the AMF shall use the S-NSSAI in the allowed NSSAI if the UE is inside the NS-AoS with respect to the S-NSSAI;

- two or more S-NSSAIs and the user's subscription context obtained from UDM contains only one default S-NSSAI that is included in the allowed NSSAI the AMF shall use the S-NSSAI in the allowed NSSAI that matches the default S-NSSAI as the S-NSSAI; or

- two or more S-NSSAIs and the user's subscription context obtained from UDM contains two or more default S-NSSAI(s) included in the allowed NSSAI the AMF shall use an S-NSSAI in the allowed NSSAI selected based on operator policy as the S-NSSAI

if S-NSSAI IE is not included the UE has both a partially allowed NSSAI and an allowed NSSAI the AMF shall select an S-NSSAI from the partially allowed NSSAI or the allowed NSSAI based on operator policy additionally

- for the case when the AMF determines to use the allowed NSSAI for selecting an S-NSSAI and for a UE for which the AMF has provided a NS-AoS the AMF shall use the S-NSSAI in the allowed NSSAI if the UE is inside the NS-AoS with respect to the S-NSSAI; or

- for the case when the AMF determines to use the partially allowed NSSAI for selecting an S-NSSAI the AMF shall use the S-NSSAI in the partially allowed NSSAI if the current TAI is in the list of TAs where the S-NSSAI is allowed

if the S-NSSAI or the mapped S-NSSAI (in roaming scenarios) is an S-NSSAI to be replaced and the alternative S-NSSAI is not provided by the UE the AMF shall retrieve an alternative S-NSSAI (see subclause 5.15.19 of 3GPP TS 23.501 [8])

if the S-NSSAI or the mapped S-NSSAI (in roaming scenarios) is an S-NSSAI to be replaced and the alternative S-NSSAI is provided by the UE but the AMF determines that the replaced S-NSSAI is available the AMF shall use the S-NSSAI to be replaced (see subclause 5.15.19 of 3GPP TS 23.501 [8])

if the DNN IE is included the AMF shall use the UE requested DNN as the DNN determined by the AMF; and

if the DNN IE is not included and the user's subscription context obtained from UDM

- contains the default DNN for the S-NSSAI the AMF shall use the default DNN as the DNN determined by the AMF; and

- does not contain the default DNN for the S-NSSAI the AMF shall use a locally configured DNN as the DNN determined by the AMF;

A1) the AMF shall select an SMF with following handlings in case the UE is registered for onboarding services in SNPN

- if the AMF onboarding configuration data does not contain a configured SMF used for onboarding services in SNPN and contains the S-NSSAI used for onboarding services in SNPN the AMF shall use the S-NSSAI used for onboarding services in SNPN as the S-NSSAI;

- if the AMF onboarding configuration data does not contain a configured SMF used for onboarding services in SNPN and contains the DNN used for onboarding services in SNPN the AMF shall use the DNN used for onboarding services in SNPN as the DNN;

- if the AMF onboarding configuration data does not contain the S-NSSAI used for onboarding services in SNPN does not contain the DNN used for onboarding services in SNPN and contains a configured SMF used for onboarding services in SNPN the AMF shall select the configured SMF used for onboarding services in SNPN;

- if the AMF onboarding configuration data contains the S-NSSAI used for onboarding services in SNPN the DNN used for onboarding services in SNPN or both and contains a configured SMF used for onboarding services in SNPN the AMF shall use the S-NSSAI used for onboarding services in SNPN if any as the S-NSSAI and use the DNN used for onboarding services in SNPN if any as the DNN or shall select the configured SMF used for onboarding services in SNPN according to local policy; and

- if the AMF onboarding configuration data contains none of the S-NSSAI used for onboarding services in SNPN the DNN used for onboarding services in SNPN and a configured SMF used for onboarding services in SNPN the AMF handling is implementation specific; and

NOTE 2 the AMF can e.g use a locally configured DNN used for onboarding services in SNPN as the DNN determined by the AMF

NOTE 3 SMF selection is outside the scope of the present document

NOTE 4 as part of SMF selection the PCF can provide the AMF with a DNN selected by the network different from the DNN determined by the AMF

B) if the SMF selection is successful

- if the DNN selected by the network is a LADN DNN the AMF shall determine the UE presence in LADN service area (see subclause 6.2.6);

- the AMF shall store a PDU session routing context for the PDU session ID and the UE shall set the SMF ID in the stored PDU session routing context to the SMF ID corresponding to the DNN in the user's subscription context obtained from the UDM; and

- the AMF shall send the 5GSM message the PDU session ID the S-NSSAI the mapped S-NSSAI (in roaming scenarios) the DNN determined by the AMF DNN selected by the network (if different from DNN determined by the AMF) the request type the MA PDU session information the non-3GPP access path switching indication UE presence in LADN service area (if DNN received corresponds to an LADN DNN) the onboarding indication (if the UE is registered for onboarding services in SNPN) and the alternative S-NSSAI associated with the S-NSSAI to be replaced (if available) towards the SMF identified by the SMF ID of the PDU session routing context;

NOTE 5 the MA PDU session information is not sent towards the SMF if the DNN received corresponds to an LADN DNN

iv) if the AMF does not have a PDU session routing context for the PDU session ID and the UE the request type IE is included and is set to "existing PDU session" or "MA PDU request" and the AMF retrieves an SMF ID associated with

A) the PDU session ID matching the PDU session ID received from the UE if any; or

B) the DNN matching the DNN received from the UE otherwise;

such that the SMF ID includes a PLMN identity corresponding to the UE's HPLMN or the current PLMN then

A) the AMF shall store a PDU session routing context for the PDU session ID and the UE shall set the SMF ID in the stored PDU session routing context to the retrieved SMF ID; and

B) the AMF shall send the 5GSM message the PDU session ID the S-NSSAI the mapped S-NSSAI (in roaming scenarios) the DNN (if received) and the request type towards the SMF identified by the SMF ID of the PDU session routing context;

v) if the AMF does not have a PDU session routing context for the PDU session ID and the UE the request type IE is included and is set to "initial emergency request" and the AMF does not have a PDU session routing context for another PDU session ID of the UE indicating that the PDU session is an emergency PDU session

A) the AMF shall select an SMF the AMF shall use the emergency DNN from the AMF emergency configuration data as the DNN if configured the AMF shall derive the SMF from the emergency DNN or use the statically configured SMF from the AMF emergency configuration data if configured; and

B) if the SMF selection is successful

- the AMF shall store a PDU session routing context for the PDU session ID and the UE shall set the SMF ID in the stored PDU session routing context to the SMF ID of the selected SMF and shall store an indication that the PDU session is an emergency PDU session in the stored PDU session routing context; and

- the AMF shall send the 5GSM message the PDU session ID the S-NSSAI (if configured in the AMF emergency configuration data) the DNN (if configured in the AMF emergency configuration data) and the request type towards the SMF identified by the SMF ID of the PDU session routing context; and

vi) if the AMF does not have a PDU session routing context for the PDU session ID and the UE the request type IE is included and is set to "initial emergency request" and the AMF has a PDU session routing context indicating that the PDU session is an emergency PDU session for another PDU session ID of the UE

A) the AMF shall store a PDU session routing context for the PDU session ID and the UE and shall set the SMF ID in the stored PDU session routing context to the SMF ID of the PDU session routing context for the other PDU session ID of the UE; and

B) the AMF shall send the 5GSM message the PDU session ID the S-NSSAI (if configured in the AMF emergency configuration data) the DNN (if configured in the AMF emergency configuration data) and the request type towards the SMF identified by the SMF ID of the PDU session routing context; or

vii) if the AMF has a PDU session routing context for the PDU session ID and the UE the PDU session routing context indicates that the PDU session is an emergency PDU session and the request type IE is included and is set to "existing emergency PDU session" the AMF shall send the 5GSM message the PDU session ID the S-NSSAI (if configured in the AMF emergency configuration data) the DNN (if configured in the AMF emergency configuration data) and the request type towards the SMF identified by the SMF ID of the PDU session routing context; and

viii) if the AMF does not have a PDU session routing context for the PDU session ID and the UE the request type IE is included and is set to "existing emergency PDU session" and the AMF retrieves an SMF ID associated with emergency services such that the SMF ID includes a PLMN identity corresponding to the current PLMN then

A) the AMF shall store a PDU session routing context for the PDU session ID and the UE shall set the SMF ID in the stored PDU session routing context to the retrieved SMF ID; and

B) the AMF shall send the 5GSM message the PDU session ID the S-NSSAI (if configured in the AMF emergency configuration data) the DNN (if configured in the AMF emergency configuration data) and the request type towards the SMF identified by the SMF ID of the PDU session routing context; or

2) the UE and the old PDU session ID IE in case the old PDU session ID IE is included and

i) the AMF has a PDU session routing context for the old PDU session ID and the UE and does not have a PDU session routing context for the PDU session ID and the UE the request type IE is included and is set to "initial request" and the AMF received a reallocation requested indication from the SMF indicating that the SMF is to be reused the AMF shall store a PDU session routing context for the PDU session ID and the UE set the SMF ID in the stored PDU session routing context to the SMF ID of the PDU session routing context for the old PDU session ID and the UE if the DNN is a LADN DNN the AMF shall determine the UE presence in LADN service area (see subclause 6.2.6) the AMF shall send the 5GSM message the PDU session ID the old PDU session ID the S-NSSAI (if received) the mapped S-NSSAI (in roaming scenarios) the DNN the request type UE presence in LADN service area (if DNN received corresponds to an LADN DNN) and the alternative S-NSSAI (if received) towards the SMF identified by the SMF ID of the PDU session routing context;

ii) the AMF has a PDU session routing context for the old PDU session ID and the UE and does not have a PDU session routing context for the PDU session ID and the UE the request type IE is included and is set to "initial request" and the AMF received a reallocation requested indication from the SMF indicating that the SMF is to be reallocated

A) the AMF shall select an SMF with the following handling;

if the S-NSSAI IE is not included and the allowed NSSAI contains

- one S-NSSAI the AMF shall use the S-NSSAI in the allowed NSSAI as the S-NSSAI;

- two or more S-NSSAIs and the user's subscription context obtained from UDM contains only one default S-NSSAI that is included in the allowed NSSAI the AMF shall use the S-NSSAI in the allowed NSSAI that matches the default S-NSSAI; or

- two or more S-NSSAIs and the user's subscription context obtained from UDM contains two or more default S-NSSAI(s) included in the allowed NSSAI the AMF shall use an S-NSSAI in the allowed NSSAI selected based on operator policy as the S-NSSAI

if the DNN is a LADN DNN the AMF shall determine the UE presence in LADN service area (see subclause 6.2.6)

B) if the SMF selection is successful

- the AMF shall store a PDU session routing context for the PDU session ID and the UE and set the SMF ID of the PDU session routing context to the SMF ID of the selected SMF; and

- the AMF shall send the 5GSM message the PDU session ID the old PDU session ID the S-NSSAI the mapped S-NSSAI (in roaming scenarios) the DNN the request type the MA PDU session information the non-3GPP access path switching indication UE presence in LADN service area (if DNN received corresponds to an LADN DNN) and the alternative S-NSSAI (if received) towards the SMF identified by the SMF ID of the PDU session routing context for the PDU session ID and the UE;

NOTE 6 the MA PDU session information is not sent towards the SMF if the DNN received corresponds to an LADN DNN

b) "SMS" the AMF shall send the content of the payload container IE to the SMSF associated with the UE;

c) "LTE positioning protocol (LPP) message container" the AMF shall send the payload container type and the content of the payload container IE to the LMF associated with the routing information included in the additional information IE of the UL NAS TRANSPORT message;

c1) "SLPP message container" the AMF shall send the payload container type and the content of the payload container IE to the LMF associated with the routing information included in the additional information IE of the UL NAS TRANSPORT message;

d) "SOR transparent container" the AMF shall send the content of the payload container IE to the UDM (see 3GPP TS 29.503 [20AB]);

e) "UE policy container" the AMF shall send the content of the payload container IE to the PCF

f) "UE parameters update transparent container" the AMF shall send the content of the payload container IE to the UDM

g) "Location services message container"

1) if the additional information IE is not included in the UL NAS TRANSPORT message the AMF shall provide the payload container type the content of the payload container IE and the content of the payload container information IE if included to the location services application; and

2) if the additional information IE is included in the UL NAS TRANSPORT message the AMF shall send the payload container type and the content of the payload container IE and the content of the payload container information IE if included to an LMF associated with routing information included in the additional information IE of the UL NAS TRANSPORT message or to a selected LMF if the payload container information IE is included in the UL NAS TRANSPORT message and the PRU bit of the payload container information IE indicates "Payload container related to PRU"

h) "CIoT user data container" the AMF shall look up a PDU session routing context for the UE and the PDU session ID and

1) send the content of the payload container IE towards the SMF identified by the SMF ID of the PDU session routing context; and

2) initiate the release of the N1 NAS signalling connection

i) if the release assistance indication IE is included in the UL NAS TRANSPORT message and the DDX field of the release assistance indication IE indicates "No further uplink and no further downlink data transmission subsequent to the uplink data transmission is expected" and if there is no downlink signalling or downlink data for the UE; or

ii) upon subsequent delivery of the next received downlink data transmission to the UE if the release assistance indication IE is included in the UL NAS TRANSPORT message and the DDX field of the release assistance indication IE indicates "Only a single downlink data transmission and no further uplink data transmission subsequent to the uplink data transmission is expected" and if there is no additional downlink signalling or downlink data for the UE

i) "Service-level-AA container" and the Service-level-AA container is included in the payload container IE of the UL NAS TRANSPORT message and the Service-level device ID included in the Service-level-AA container is set to a CAA-level UAV ID the AMF shall send the content of the payload container IE to the UAS-NF corresponding to the CAA-level UAV ID if the Service-level device ID is not included in the Service-level-AA container and a CAA-level UAV ID is included in the 5GMM context of the UE then the AMF shall send the content of the payload container IE to the UAS-NF corresponding to the CAA-level UAV ID included in the 5GMM context of the UE

j) "UPP-CMI container"

1) if the additional information IE is not included in the UL NAS TRANSPORT message the AMF shall provide the payload container type and the content of the payload container IE to the location services application; or

2) if the additional information IE is included in the UL NAS TRANSPORT message the AMF shall send the payload container type and the content of the payload container IE to an LMF associated with routing information included in the additional information IE of the UL NAS TRANSPORT message

NOTE 7 LMF selection for user plane positioning is outside the scope of the present document

k) "Multiple payloads" the AMF shall first decode the content of the payload container IE (see subclause 9.11.3.39) to obtain the number of payload container entries and for each payload container entry the AMF shall

i) decode the payload container type field;

ii) decode the optional IE fields and the payload container contents field in the payload container entry; and

iii) handle the content of each payload container entry the same as the content of the payload container IE and the associated optional IEs as specified in bullets a) to j) above according to the payload container type field

##### 5.4.5.2.4 UE-initiated NAS transport of messages not accepted by the network

upon reception of an UL NAS TRANSPORT message if the payload container type IE is set to "N1 SM information" and the UE is not configured for high priority access in selected PLMN or SNPN and

a) if the request type IE is set to "initial request" "existing PDU session" or "MA PDU request";

1) DNN based congestion control is activated for the DNN included in the UL NAS TRANSPORT message or DNN based congestion control is activated for the selected DNN in case of no DNN included in the UL NAS TRANSPORT message e.g configured by operation and maintenance the AMF shall send back to the UE the 5GSM message which was not forwarded a back-off timer value and 5GMM cause #22 "congestion" as specified in subclause 5.4.5.3.1 case f);

2) S-NSSAI and DNN based congestion control is activated for the S-NSSAI and DNN included in the UL NAS TRANSPORT message or S-NSSAI and DNN based congestion control is activated for the S-NSSAI included in the UL NAS TRANSPORT message and the selected DNN in case of no DNN included in the UL NAS TRANSPORT message or S-NSSAI and DNN based congestion control is activated for the selected S-NSSAI in case of no S-NSSAI included in the UL NAS TRANSPORT message and the DNN included in the UL NAS TRANSPORT message or S-NSSAI and DNN based congestion control is activated for the selected S-NSSAI and the selected DNN in case of no S-NSSAI and no DNN included in the UL NAS TRANSPORT message e.g configured by operation and maintenance the AMF shall send back to the UE the 5GSM message which was not forwarded a back-off timer value and 5GMM cause #67 "insufficient resources for specific slice and DNN" as specified in subclause 5.4.5.3.1 case f);

3) S-NSSAI only based congestion control is activated for the S-NSSAI included in the UL NAS TRANSPORT message or S-NSSAI based congestion control is activated for the selected S-NSSAI in case of no S-NSSAI included in the UL NAS TRANSPORT message e.g configured by operation and maintenance the AMF shall send back to the UE the 5GSM message which was not forwarded a back-off timer value and 5GMM cause #69 "insufficient resources for specific slice" as specified in subclause 5.4.5.3.1 case f);

b) void;

c) if the request type IE is set to "modification request" and the PDU session is not an emergency PDU session;

1) DNN based congestion control is activated for the stored DNN e.g configured by operation and maintenance the AMF shall send back to the UE the 5GSM message which was not forwarded a back-off timer value and 5GMM cause #22 "congestion" as specified in subclause 5.4.5.3.1 case f);

2) S-NSSAI and DNN based congestion control is activated for the stored S-NSSAI and DNN e.g configured by operation and maintenance the AMF shall send back to the UE the 5GSM message which was not forwarded a back-off timer value and 5GMM cause #67 "insufficient resources for specific slice and DNN" as specified in subclause 5.4.5.3.1 case f);

3) S-NSSAI only based congestion control is activated for the stored S-NSSAI e.g configured by operation and maintenance the AMF shall send back to the UE the 5GSM message which was not forwarded a back-off timer value and 5GMM cause #69 "insufficient resources for specific slice" as specified in subclause 5.4.5.3.1 case f); or

d) the timer T3447 is running and the UE does not support service gap control

1) the request type IE

i) is set to "initial request";

ii) is set to "existing PDU session"; or

iii) is set to "modification request" and the PDU session being modified is a non-emergency PDU session;

2) the current NAS signalling connection was not triggered by paging; and

3) mobile terminated signalling has not been sent or no user-plane resources have been established for any PDU session after the establishment of the current NAS signalling connection

the AMF shall send back to the UE the message which was not forwarded send the 5GMM cause #22 "Congestion" and may include a back-off timer set to the remaining time of the timer T3447 as specified in subclause 5.4.5.3.1 case f)

upon reception of a UL NAS TRANSPORT message if the payload container type IE is set to "N1 SM information" the request type IE is set to "initial request" "existing PDU session" or "MA PDU request" and the AMF determines that the PLMN's maximum number of PDU sessions has already been reached for the UE the AMF shall send back to the UE the 5GSM message which was not forwarded and 5GMM cause #65 "maximum number of PDU sessions reached" as specified in subclause 5.4.5.3.1 case h)

upon reception of a UL NAS TRANSPORT message if the payload container type IE is set to "N1 SM information" the request type IE is set to "initial request" and

a) the UE is in NB-N1 mode;

b) the UE has indicated preference for user plane CIoT 5GS optimization;

c) the network accepted the use of user plane CIoT 5GS optimization; and

d) the AMF determines that there are user-plane resources established for a number of PDU sessions that is equal to the UE' s maximum number of supported user-plane resources (see 3GPP TS 23.501 [8])

the AMF shall either

a) send back to the UE the message which was not forwarded as specified in in subclause 5.4.5.3.1 case h1); or

b) proceed with the PDU session establishment and include the control plane CIoT 5GS optimisation indication or control plane only indicator to the SMF

upon reception of a UL NAS TRANSPORT message if the payload container type IE is set to "N1 SM information" the request type IE is set to "initial request" and

a) the UE does not support S-NSSAI location validity information;

b) the S-NSSAI is subject to NS-AoS; and

c) the AMF determines that the UE is not in the NS-AoS

the AMF may send back to the UE the message which was not forwarded as specified in subclause 5.4.5.3.1 case h6) include the 5GMM cause #69 "insufficient resources for specific slice" and include a back-off timer

upon reception of an UL NAS TRANSPORT message if the payload container type IE is set to "CIoT user data container" the UE is not configured for high priority access in selected PLMN and

a) the timer T3447 is running and the UE does not support service gap control;

b) the current NAS signalling connection was not triggered by paging; and

c) mobile terminated signalling has not been sent or no user-plane resources have been established for any PDU session after the establishment of the current NAS signalling connection;

the AMF shall send back to the UE the CIoT user data which was not forwarded send the 5GMM cause #22 "Congestion" and include a back-off timer set to the remaining time of the timer T3447 as specified in subclause 5.4.5.3.1 case l2)

upon reception of a UL NAS TRANSPORT message if the payload container type IE is set to "N1 SM information" the request type IE is set to "existing PDU session" and

a) the UE is in NB-N1 mode;

b) the UE has indicated preference for user plane CIoT 5GS optimization;

c) the network accepted the use of user plane CIoT 5GS optimization; and

d) the AMF determines that there are user-plane resources established for a number of PDU sessions that equals to the UE's maximum number of supported user-plane resources (see 3GPP TS 23.501 [8])

the AMF shall send back to the UE the message which was not forwarded as specified in in subclause 5.4.5.3.1 case h1)

upon reception of an UL NAS TRANSPORT message if the payload container type IE is set to "N1 SM information" the request type IE is set to "initial request" or "modification request" the associated S-NSSAI that the AMF determined through the S-NSSAI IE or the PDU session ID IE is an S-NSSAI for which the AMF is performing NSSAA and the AMF determines to not forward the 5GSM message to the SMF based on local policy the AMF shall send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case h2)

upon reception of an UL NAS TRANSPORT message if the payload container type IE is set to "SMS" "LTE positioning protocol (LPP) message container" or "UPP-CMI container" or "SLPP message container" the UE is not configured for high priority access in selected PLMN and

a) the timer T3447 is running and the UE does not support service gap control;

b) the current NAS signalling connection was not triggered by paging; and

c) mobile terminated signalling has not been sent or no user-plane resources have been established for any PDU session after the establishment of the current NAS signalling connection;

the AMF shall abort the procedure

NOTE 1 in this state the NAS signalling connection can be released by the network

upon reception of an UL NAS TRANSPORT message if the payload container type IE is set to "N1 SM information" the request type IE is set to "initial request" and

a) the determined DNN S-NSSAI or both DNN and S-NSSAI are identified for UAS services; and

b) the UE is marked in the UE's 5GMM context that it is not allowed to request UAS services;

the AMF shall send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case h4)

NOTE 2 the UE marked in the UE's 5GMM context as not allowed to request UAS services happens in the case that the UUAA-MM procedure needs to be performed during the registration procedure according to operator policy

##### 5.4.5.2.5 abnormal cases on the network side

the following abnormal cases in AMF are identified

a) if the payload container type IE is set to "N1 SM information" and

1) if the old PDU session ID IE is not included in the UL NAS TRANSPORT message the AMF does not have a PDU session routing context for the PDU session ID and the UE the request type IE is set to "initial request" or "MA PDU request" and the SMF selection fails then the AMF shall send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f);

2) if the old PDU session ID IE is included in the UL NAS TRANSPORT message the AMF has a PDU session routing context for the old PDU session ID and the UE and does not have a PDU session routing context for the PDU session ID and the UE the request type IE is set to "initial request" the AMF received a reallocation requested indication from the SMF indicating that the SMF is to be reallocated and the SMF selection fails then the AMF shall send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f);

3) if the AMF does not have a PDU session routing context for the PDU session ID and the UE the request type IE is set to "existing PDU session" or "MA PDU request" and the user's subscription context obtained from the UDM does not contain an SMF ID for the PDU session ID matching the PDU session ID received from the UE or for the DNN matching the DNN received from the UE such that the SMF ID includes a PLMN identity corresponding to the UE's HPLMN or the current PLMN or the PLMN ID part of the current SNPN then the AMF may send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f)

4) if the old PDU session ID IE is included in the UL NAS TRANSPORT message and the AMF has a PDU session routing context for the old PDU session ID and the UE and does not have a PDU session routing context for the PDU session ID and the UE the request type IE is set to "initial request" and the AMF has not received a reallocation requested indication the AMF should select an SMF with following handlings

i) if the S-NSSAI IE is not included and the allowed NSSAI contains

A) one S-NSSAI the AMF shall use the S-NSSAI in the allowed NSSAI as the S-NSSAI;

B) two or more S-NSSAIs and the user's subscription context obtained from UDM contains only one default S-NSSAI that is included in the allowed NSSAI the AMF shall use the S-NSSAI in the allowed NSSAI as the S-NSSAI; or

C) two or more S-NSSAIs and the user's subscription context obtained from UDM contains two or more default S-NSSAI(s) included in the allowed NSSAI the AMF shall use an S-NSSAI in the allowed NSSAI selected based on operator policy as the S-NSSAI;

ii) if the DNN IE is not included and the user's subscription context obtained from UDM

A) contains the default DNN for the S-NSSAI the AMF shall use the default DNN as the DNN; and

B) does not contain the default DNN for the S-NSSAI the AMF shall use a locally configured DNN as the DNN;

iii) if the DNN selected by the network is a LADN DNN the AMF shall determine the UE presence in LADN service area (see subclause 6.2.6);

iv) if the SMF selection is successful the AMF should store a PDU session routing context for the PDU session ID and the UE set the SMF ID in the stored PDU session routing context to the selected SMF ID and forward the 5GSM message the PDU session ID the old PDU session ID the S-NSSAI the mapped S-NSSAI (in roaming scenarios) the DNN determined by the AMF DNN selected by the network (if different from DNN determined by the AMF) the request type and UE presence in LADN service area (if DNN selected by the network corresponds to an LADN DNN) towards the SMF ID of the PDU session routing context; and

v) if the SMF selection fails then the AMF shall send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f);

5) if the AMF has a PDU session routing context for the PDU session ID and the UE the PDU session routing context indicates that the PDU session is an emergency PDU session the request type IE is set to "initial emergency request" the AMF should forward the 5GSM message the PDU session ID the S-NSSAI (if configured in the AMF emergency configuration data) the DNN (if configured in the AMF emergency configuration data) and the request type towards the SMF ID of the PDU session routing context;

6) if the request type IE is set to "initial emergency request" and the S-NSSAI or the DNN is received the AMF ignores the received S-NSSAI or the DNN and uses the emergency DNN from the AMF emergency configuration data if any;

7) if the AMF does not have a PDU session routing context for the PDU session ID and the UE and the request type IE of the UL NAS TRANSPORT message is either not provided or is provided but set to other value than "initial request" "existing PDU session" "initial emergency request" "existing emergency PDU session" and "MA PDU request" then the AMF may send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f);

8) if the AMF unsuccessfully attempted to forward the 5GSM message the PDU session ID the S-NSSAI the mapped S-NSSAI (in roaming scenarios) the DNN and the request type (if received) towards a SMF ID then the AMF may send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f)

9) if the old PDU session ID IE is included in the UL NAS TRANSPORT message the AMF does not have a PDU session routing context for the old PDU session ID and the UE the AMF does not have a PDU session routing context for the PDU session ID and the UE the request type IE is set to "initial request" the AMF should select an SMF with following handlings

i) if the S-NSSAI IE is not included and the allowed NSSAI contains

A) one S-NSSAI the AMF shall use the S-NSSAI in the allowed NSSAI as the S-NSSAI;

B) two or more S-NSSAIs and the user's subscription context obtained from UDM contains only one default S-NSSAI that is included in the allowed NSSAI the AMF shall use the default S-NSSAI in the allowed NSSAI as the S-NSSAI; or

C) two or more S-NSSAIs and the user's subscription context obtained from UDM contains two or more default S-NSSAI(s) included in the allowed NSSAI the AMF shall use an S-NSSAI in the allowed NSSAI selected based on operator policy as the S-NSSAI

ii) if the DNN IE is not included and the user's subscription context obtained from UDM

A) contains the default DNN for the S-NSSAI the AMF shall use the default DNN as the DNN; and

B) does not contain the default DNN for the S-NSSAI the AMF shall use a locally configured DNN as the DNN;

iii) if the DNN selected by the network is a LADN DNN the AMF shall determine the UE presence in LADN service area (see subclause 6.2.6);

iv) if the SMF selection is successful the AMF should store a PDU session routing context for the PDU session ID and the UE set the SMF ID in the stored PDU session routing context to the selected SMF ID and forward the 5GSM message the PDU session ID the old PDU session ID the S-NSSAI the mapped S-NSSAI (in roaming scenarios) the DNN determined by the AMF DNN selected by the network (if different from DNN determined by the AMF) the request type and UE presence in LADN service area (if DNN selected by the network corresponds to an LADN DNN) towards the SMF ID of the PDU session routing context; and

v) if the SMF selection fails then the AMF shall send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f);

10) if the AMF has a PDU session routing context for the PDU session ID and the UE the PDU session routing context indicates that the PDU session is not an emergency PDU session and the request type IE is included and is set to "existing emergency PDU session" the AMF may send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f);

11) if the AMF has a PDU session routing context for the PDU session ID and the UE the PDU session routing context indicates that the PDU session is an emergency PDU session and the request type IE is included and is set to "existing PDU session" the AMF may forward the 5GSM message the PDU session ID the S-NSSAI (if configured in the AMF emergency configuration data) the DNN (if configured in the AMF emergency configuration data) and the request type towards the SMF identified by the SMF ID of the PDU session routing context;

12) if the AMF has a PDU session routing context for the PDU session ID and the UE the request type IE is set to "initial request" then the AMF shall perform a local release of the PDU session identified by the PDU session ID and shall request the SMF to perform a local release of the PDU session and proceed as specified in subclause 5.4.5.2.3;

13) if the request type IE is set to "initial request" or "modification request" and the S-NSSAI IE contains an S-NSSAI that is not allowed by the network then the AMF shall send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) case f) or h4);

14) if the request type IE is set to "existing PDU session" the AMF has a PDU session routing context for the PDU session ID and the UE the PDU session routing context indicates that the PDU session is not an emergency PDU session and the S-NSSAI associated with the PDU session identified by the PDU session ID is not allowed for the target access type the AMF shall send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) case f) or h4);

15) if the request type IE is set to "initial request" "existing PDU session" "modification request" or "MA PDU request" the UE is not configured for high priority access in selected PLMN or SNPN and the UE is in non-allowed area or is not in allowed area the AMF shall send back to the UE the 5GSM message which was not forwarded and 5GMM cause #28 "Restricted service area" as specified in subclause 5.4.5.3.1 case i);

15a) if the request type IE is set to "initial request" or "initial emergency request" and the AMF determines that the UE has registered to a PLMN via a satellite NG-RAN cell that is not allowed to operate at the present UE location then the AMF may send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case i1); and

16) if the request type IE is set to "initial request" or "MA PDU request" the AMF is pending the receipt of a REGISTRATION REQUEST message indicating "mobility registration updating" in the 5GS registration type IE and an emergency PDU session exists for the UE (see subclause 5.4.4.3) the AMF shall send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f);

17) if the timer T3447 is running and the UE supports service gap control and

i) the request type IE

A) is set to "initial request";

B) is set to "existing PDU session"; or

c is set to "modification request" and the PDU session being modified is a non-emergency PDU session;

ii) the UE is not configured for high priority access in selected PLMN;

iii) the current NAS signalling connection was not triggered by paging; and

iv) mobile terminated signalling has not been sent or no user-plane resources have been established for any PDU session after the establishment of the current NAS signalling connection

then the AMF shall send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f);

18) if the AMF has a PDU session routing context for the PDU session ID and the UE the request type IE is not included the UE is not configured for high priority access in selected PLMN or SNPN and the PDU session is not an emergency PDU session then the AMF shall forward the 5GSM message and the PDU session ID IE towards the SMF identified by the SMF ID of the PDU session routing context with

i) an exemptionind attribute indicating "message was exempted from the DNN based congestion activated in the AMF" as specified in 3GPP TS 29.502 [20A] if DNN based congestion control is activated for the selected DNN;

ii) an exemptionind attribute indicating "message was exempted from the S-NSSAI and DNN based congestion activated in the AMF" as specified in 3GPP TS 29.502 [20A] if S-NSSAI and DNN based congestion control is activated for the selected S-NSSAI and the selected DNN; or

iii) an exemptionind attribute indicating "message was exempted from the S-NSSAI only based congestion activated in the AMF" as specified in 3GPP TS 29.502 [20A] if S-NSSAI only based congestion control is activated for the selected S-NSSAI;

19) if the request type IE is set to "MA PDU request" and the S-NSSAI IE contains an S-NSSAI that is not allowed by the network on neither access then the AMF shall send to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f);

20) if the request type IE is set to "initial request" and the UE is registered for emergency services over the current access then the AMF may send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f); and

21) if the request type IE is set to "existing PDU session" the UE is attempting to transfer a PDU session from 3GPP access to non-3GPP access and the PDU session is associated with control plane only indication then the AMF shall send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e)

22) if the request type IE is set to "MA PDU request" and the UE requested DNN corresponds to an LADN DNN the AMF shall send back to the UE the 5GSM message which was not forwarded and 5GMM cause #90 "payload was not forwarded" as specified in subclause 5.4.5.3.1 case hx)

23) if the request type IE is set to "initial request" the UE requested DNN corresponds to an LADN DNN and the MA PDU session information IE is included the AMF shall not forward the MA PDU session information towards the SMF

24) if the request type IE is set to "modification request" the DNN associated with the PDU session corresponds to an LADN DNN and MA PDU session information IE is included the AMF shall not forward the MA PDU session information towards the SMF

b) if the payload container type IE is set to "SMS" and

1) the AMF does not have an SMSF address associated with the UE;

2) the AMF cannot forward the content of the payload container IE to the SMSF associated with the SMSF address available in the AMF; or

3) the AMF determines that the UE has registered to a PLMN via a satellite NG-RAN cell that is not allowed to operate at the present UE location;

then the AMF shall abort the procedure

c) if the payload container type IE is set to "LTE positioning protocol (LPP) message container" or "SLPP message container" and

1) if the additional information IE is not included in the UL NAS TRANSPORT message;

2) the AMF cannot forward the content of the payload container IE to the LMF associated with the routing information included in the additional information IE; or

3) the AMF determines that the UE has registered to a PLMN via a satellite NG-RAN cell that is not allowed to operate at the present UE location;

then the AMF shall abort the procedure

d) if the payload container type IE is set to "UE policy container" and

1) the AMF does not have a PCF address associated with the UE;

2) the AMF cannot forward the content of the payload container IE to the PCF associated with the PCF address available in the AMF; or

3) the AMF determines that the UE has registered to a PLMN via a satellite NG-RAN cell that is not allowed to operate at the present UE location;

then the AMF shall abort the procedure

e) if the payload container type IE is set to "Location services message container" and

1) if the additional information IE is included in the UL NAS TRANSPORT message and the AMF cannot forward the content of the payload container IE to an LMF associated with the routing information included in the additional information IE;

2) the AMF determines that the UE has registered to a PLMN via a satellite NG-RAN cell that is not allowed to operate at the present UE location;

3) the AMF determines that the payload container content is related to PRU and the UE has not a valid PRU subscription information; or

4) any combination of bullets 1 to 3

then the AMF shall abort the procedure

f) if the payload container type IE is set to "SMS" or "LTE positioning protocol (LPP) message container" or "SLPP message container"

1) the timer T3447 is running and the UE supports service gap control;

2) the UE is not configured for high priority access in selected PLMN;

3) the current NAS signalling connection was not triggered by paging; and

4) mobile terminated signalling has not been sent or no user-plane resources have been established for any PDU session after the establishment of the current NAS signalling connection

the AMF shall abort the procedure

NOTE in this state the N1 NAS signalling connection can be released by the network

g) if the payload container type IE is set to "CIoT user data container" and

1) if the AMF does not have a PDU session routing context for the PDU session ID and the UE; or

2) if the AMF unsuccessfully attempted to forward the user data container and the PDU session ID

then the AMF may send back to the UE the CIoT user data container which was not forwarded as specified in subclause 5.4.5.3.1 case l1)

h) if the payload container type IE is set to "CIoT user data container"

1) if the timer T3447 is running and the UE supports service gap control;

2) the UE is not configured for high priority access in selected PLMN;

3) the current N1 NAS signalling connection was not triggered by paging; and

4) mobile terminated signalling has not been sent or no user-plane resources have been established for any PDU session after the establishment of the current NAS signalling connection

then the AMF shall send back to the UE the CIoT user data container which was not forwarded as specified in subclause 5.4.5.3.1 case l1)

i) if the payload container type IE is set to "SOR transparent container" "UE parameters update transparent container" or "Service-level-AA container" and the AMF determines that the UE has registered to a PLMN via a satellite NG-RAN cell that is not allowed to operate at the present UE location then the AMF shall abort the procedure

j) if the payload container type IE is set to "UPP-CMI container" and

1) if the additional information IE is not included in the UL NAS TRANSPORT message;

2) the AMF cannot forward the content of the payload container IE to the LMF associated with the routing information included in the additional information IE; or

3) the AMF determines that the UE has registered to a PLMN via a satellite NG-RAN cell that is not allowed to operate at the present UE location;

then the AMF shall abort the procedure

##### 5.4.5.2.6 abnormal cases in the UE

the following abnormal cases can be identified

a) the lower layers indicate that the access attempt is barred

the UE shall not start the UE-initiated NAS transport procedure the UE stays in the current serving cell and applies the normal cell reselection process

if the access category for the access attempt is 6 due to a request from upper layers to send a mobile originated SMS over NAS and the UE is registered to the network via both 3GPP access and non-3GPP access the UE may transmit the UL NAS TRANSPORT message via non-3GPP access if available

otherwise the UE-initiated NAS transport procedure is started if still needed when the lower layers indicate that the barring is alleviated for the access category with which the access attempt was associated

aa) the lower layers indicate that

1) access barring is applicable for all access categories except categories 0 and 2 and the access category with which the access attempt was associated is other than 0 and 2; or

2) access barring is applicable for all access categories except category 0 and the access category with which the access attempt was associated is other than 0

the UE shall proceed as specified for case a for additional UE requirements see subclause 4.5.5

b) if the payload container type IE is set to "N1 SM information" the request type IE is set to "initial request" or "MA PDU request" and registration procedure for mobility and periodic registration update is pending due to receipt by the UE of new network slicing information via the generic UE configuration update procedure with re-registration request; and an emergency PDU session exists then

1) the UE shall not send the UL NAS TRANSPORT message; and

2) the UL NAS TRANSPORT message can be sent if still necessary after a successful procedure for mobility and periodic registration update

c) transmission failure of the UL NAS TRANSPORT message with change in the current TAI

if the current TAI is not in the TAI list the UE-initiated NAS transport procedure shall be aborted and a registration procedure for mobility and periodic registration update shall be initiated the UL NAS TRANSPORT message can be sent if still necessary after a successful procedure for mobility and periodic registration update

if

1) the current TAI is still part of the TAI list;

2) the UL NAS TRANSPORT message is sent to transport a 5GSM message associated with an S-NSSAI included in the partially allowed NSSAI; and

3) the current TAI is not in the list of TAs where the S-NSSAI is allowed

then the UE-initiated NAS transport procedure shall be aborted

otherwise it is up to the UE implementation how to re-run the ongoing procedure that triggered the UE-initiated NAS transport procedure

d) transmission failure of the UL NAS TRANSPORT message indication without change in the current TAI

it is up to the UE implementation how to re-run the ongoing procedure that triggered the UE-initiated NAS transport procedure

e) void

f) timer T3447 is running

the UE shall not send the UL NAS TRANSPORT message unless

1) the payload container type IE is set to "N1 SM information" and

i) the request type IE is set to

A) "initial emergency request";

B) "existing emergency PDU session"; or

C) "modification request" and the PDU session being modified is an emergency PDU session (see error cases described in subclause 6.4.1.3 and subclause 6.3.2.3); or

ii) the request type IE is not included and the PDU session modification procedure is used to indicate a change of 3GPP PS data off UE status for a PDU session;

2) the UE is a UE configured for high priority access in selected PLMN;

3) a paging request triggered the establishment of the current NAS signalling connection; or

4) the UE in 5GMM-CONNECTED mode receives mobile terminated signalling or downlink data over the user-plane

the UL NAS TRANSPORT message can be sent if still necessary when timer T3447 expires or timer T3447 is stopped

g) the lower layers indicate that the RRC connection has been suspended

the UE shall abort the UE-initiated NAS transport procedure

h) timer T3346 is running

the UE shall not send the UL NAS TRANSPORT message unless

1) the payload container type IE is set to "N1 SM information" and

i) the request type IE is set to

A) "initial emergency request";

B) "existing emergency PDU session"; or

C) "modification request" and the PDU session being modified is an emergency PDU session; or

ii) the request type IE is not included and the PDU session modification procedure is used to indicate a change of 3GPP PS data off UE status for a PDU session; or

2) the UE is a UE configured for high priority access in selected PLMN or SNPN

the UL NAS TRANSPORT message can be sent if still necessary when timer T3346 expires

i) NAS MAC calculation indication from lower layers

if lower layers indicate to calculate an NAS MAC the UE shall calculate an NAS MAC as specified in 3GPP TS 33.501 [24] and then provide the calculated NAS MAC and 5 least significant bits of the uplink NAS COUNT used to calculate the NAS MAC to lower layers (see 3GPP TS 36.331 [25A]) the UE shall increase the uplink NAS COUNT by one after the calculation of the NAS MAC

#### 5.4.5.3 Network-initiated NAS transport procedure

##### 5.4.5.3.1 general

the purpose of the network-initiated NAS transport procedure is to provide a transport of

a) a single 5GSM message;

b) SMS;

c) an LPP message;

c1) an SLPP message;

d) an SOR transparent container;

e) a single uplink 5GSM message which was not forwarded due to routing failure;

f) a single uplink 5GSM message which was not forwarded due to congestion control;

g) a UE policy container;

h) a single uplink 5GSM message which was not forwarded because the PLMN's maximum number of PDU sessions has been reached;

h1) a single uplink 5GSM message which was not forwarded because the maximum number of PDU sessions with active user-plane resources has been reached;

h2) a single uplink 5GSM message which was not forwarded because of ongoing network slice-specific authentication and authorization procedure for the S-NSSAI that is requested;

h3) a single uplink 5GSM message which was not forwarded because the UE requested to establish an MA PDU session for LADN DNN;

h4) a single uplink 5GSM message which was not forwarded because the maximum number of UEs for a network slice has been reached;

h5) a single uplink 5GSM message which was not forwarded because the UE is marked in the UE's 5GMM context that it is not allowed to request UAS services;

h6) a single uplink 5GSM message was not forwarded because the UE not supporting S-NSSAI location validity information requested forwarding of an 5GSM message with request type IE is set to "initial request" when not in the NS-AoS of the related S-NSSAI;

i) a single uplink 5GSM message which was not forwarded due to service area restrictions;

i1) a single uplink 5GSM message which was not forwarded because the UE is registered to a PLMN via a satellite NG-RAN cell that is not allowed to operate at the present UE location;

j) a UE parameters update transparent container;

k) a location services message;

l) a CIoT user data container;

l1) a single uplink CIoT user data container or control plane user data which was not forwarded due to routing failure;

l2) a single uplink CIoT user data container which was not forwarded due to congestion control;

m) a service-level-AA container;

m1) an event notification for upper layers;

m2) a UPP-CMI container;

m3) a single UPP-CMI container which was not forwarded due to user plane positioning not authorized; or

n) multiple of the above types

from the AMF to the UE in a 5GMM message

##### 5.4.5.3.2 Network-initiated NAS transport procedure initiation

in 5GMM-CONNECTED mode the AMF initiates the NAS transport procedure by sending the DL NAS TRANSPORT message as shown in figure 5.4.5.3.2.1

in case a) in subclause 5.4.5.3.1 i.e upon reception from an SMF of a 5GSM message without an N1 SM delivery skip allowed indication for a UE or a 5GSM message with an N1 SM delivery skip allowed indication for a UE in the 5GMM-CONNECTED mode the AMF shall

a) include the PDU session information (PDU session ID) in the PDU session ID IE;

b) set the payload container type IE to "N1 SM information"; and

c) set the payload container IE to the 5GSM message

in case b) in subclause 5.4.5.3.1 i.e upon reception from an SMSF of an SMS payload the AMF shall

a) set the payload container type IE to "SMS";

b) set the payload container IE to the SMS payload; and

c) select the access type to deliver the DL NAS TRANSPORT message as follows in case the access type selection is required

1) if the UE to receive the DL NAS TRANSPORT message is registered to the network via both 3GPP access and non-3GPP access the 5GMM context of the UE indicates that SMS over NAS is allowed the UE is in MICO mode and the UE is in 5GMM-IDLE mode for 3GPP access and in 5GMM-CONNECTED mode for non-3GPP access then the AMF selects non-3GPP access otherwise the AMF selects either 3GPP access or non-3GPP access

if the delivery of the DL NAS TRANSPORT message over 3GPP access has failed the AMF may re-send the DL NAS TRANSPORT message over the non-3GPP access

if the delivery of the DL NAS TRANSPORT message over non-3GPP access has failed the AMF may re-send the DL NAS TRANSPORT message over the 3GPP access; and

2) otherwise the AMF selects 3GPP access

NOTE 1 the AMF selects an access type between 3GPP access and non-3GPP access based on operator policy

in case c) in subclause 5.4.5.3.1 i.e upon reception from an LMF of an LPP message payload the AMF shall

a) set the payload container type IE to "LTE positioning protocol (LPP) message container";

b) set the payload container IE to the LPP message payload received from the LMF;

c) set the additional information IE to an LCS correlation identifier received from the LMF from which the LPP message was received

NOTE 2 the LCS correlation identifier is assigned originally by the AMF except for LPP message transfer associated with event reporting for periodic or triggered location as described in subclause 6.3.1 of 3GPP TS 23.273 [6B] where the LMF assigns the LCS correlation identifier AMF and LMF assigned LCS correlation identifiers can be distinguished by an implementation specific convention (e.g use of a different number of octets) to enable an AMF to distinguish one from the other when received in the additional information IE in an UL NAS transport message

in case c1) in subclause 5.4.5.3.1 i.e upon reception from an LMF of an SLPP message payload the AMF shall

a) set the payload container type IE to "SLPP message container";

b) set the payload container IE to the SLPP message payload received from the LMF; and

c) set the additional information IE to an LCS correlation identifier received from the LMF from which the SLPP message was received

in case d) in subclause 5.4.5.3.1 i.e upon reception of a steering of roaming information (see 3GPP TS 23.122 [5]) from the UDM to be forwarded to the UE the AMF shall

a) set the payload container type IE to "SOR transparent container"; and

b) set the payload container IE to the steering of roaming information received from the UDM (see 3GPP TS 29.503 [20AB])

in case e) in subclause 5.4.5.3.1 i.e upon sending a single uplink 5GSM message which was not forwarded due to routing failure the AMF shall

a) include the PDU session ID in the PDU session ID IE;

b) set the payload container type IE to "N1 SM information";

c) set the payload container IE to the 5GSM message which was not forwarded;

d) set the 5GMM cause IE to the 5GMM cause #90 "payload was not forwarded" or 5GMM cause #91 "DNN not supported or not subscribed in the slice"

the AMF sets the 5GMM cause IE to the 5GMM cause #91 "DNN not supported or not subscribed in the slice" if the 5GSM message could not be forwarded since SMF selection fails because

1) the DNN is not supported in the slice identified by the S-NSSAI used by the AMF; or

2) neither the DNN provided by the UE nor the wildcard DNN are in the subscribed DNN list of the UE for the S-NSSAI used by the AMF

otherwise the AMF sets the 5GMM cause IE to the 5GMM cause #90 "payload was not forwarded"; and

e) optionally include the Back-off timer value IE if the 5GMM cause IE is set to 5GMM cause #91 "DNN not supported or not subscribed in the slice" due to the DNN is not supported in the slice

in case f) in subclause 5.4.5.3.1 i.e upon sending a single uplink 5GSM message which was not forwarded due to congestion control the AMF shall

a) include the PDU session ID in the PDU session ID IE;

b) set the payload container type IE to "N1 SM information";

c) set the payload container IE to the 5GSM message which was not forwarded;

d) set the 5GMM cause IE to the 5GMM cause #22 "Congestion" the 5GMM cause #67 "insufficient resources for specific slice and DNN" or the 5GMM cause #69 "insufficient resources for specific slice"; and

e) include the Back-off timer value IE

in case g) in subclause 5.4.5.3.1 i.e upon reception of a UE policy container from the PCF to be forwarded to the UE the AMF shall

a) set the payload container type IE to "UE policy container"; and

b) set the payload container IE to the UE policy container received from the PCF

in case h) in subclause 5.4.5.3.1 i.e upon sending a single uplink 5GSM message which was not forwarded because the PLMN's maximum number of PDU sessions has been reached the AMF shall

a) include the PDU session ID in the PDU session ID IE;

b) set the payload container type IE to "N1 SM information";

c) set the payload container IE to the 5GSM message which was not forwarded; and

d) set the 5GMM cause IE to the 5GMM cause #65 "maximum number of PDU sessions reached"

in case h1) in subclause 5.4.5.3.1 i.e upon sending a single uplink 5GSM message which was not forwarded because the maximum number of PDU sessions with active user-plane resources has been reached the AMF shall

a) include the PDU session ID in the PDU session ID IE;

b) set the payload container type IE to "N1 SM information";

c) set the payload container IE to the 5GSM message which was not forwarded; and

d) set the 5GMM cause IE to the 5GMM cause #92 "insufficient user-plane resources for the PDU session"

in case h2) in subclause 5.4.5.3.1 i.e upon sending a single uplink 5GSM message which was not forwarded because the UE requested to establish a PDU session associated with an S-NSSAI or to modify a PDU session associated with an S-NSSAI for which

a) the AMF is performing network slice-specific authentication and authorization and determined to reject the request based on local policy; or

b) the network slice-specific authentication and authorization has failed or the authorization has been revoked;

the AMF shall

a) include the PDU session ID in the PDU session ID IE;

b) set the payload container type IE to "N1 SM information";

c) set the payload container IE to the 5GSM message which was not forwarded; and

d) set the 5GMM cause IE to the 5GMM cause #90 "payload was not forwarded"

in case h3) in subclause 5.4.5.3.1 i.e upon sending a single uplink 5GSM message which was not forwarded because the UE requested to establish an MA PDU session for LADN DNN the AMF shall

a) include the PDU session ID in the PDU session ID IE;

b) set the payload container type IE to "N1 SM information";

c) set the payload container IE to the 5GSM message which was not forwarded; and

d) set the 5GMM cause IE to the 5GMM cause #90 "payload was not forwarded"

in case h4) in subclause 5.4.5.3.1 i.e upon sending a single uplink 5GSM message which was not forwarded because the maximum number of UEs for a network slice has been reached the AMF shall

a) include the PDU session ID in the PDU session ID IE;

b) set the payload container type IE to "N1 SM information";

c) set the payload container IE to the 5GSM message which was not forwarded;

d) set the 5GMM cause IE to the 5GMM cause #69 "insufficient resources for specific slice"; and

e) include the Back-off timer value IE

for case h5) in subclause 5.4.5.3.1 i.e upon sending a single uplink 5GSM message which was not forwarded because the UE is marked in the UE's 5GMM context that it is not allowed to request UAS services the AMF shall

a) include the PDU session ID in the PDU session ID IE;

b) set the payload container type IE to "N1 SM information";

c) set the payload container IE to the 5GSM message which was not forwarded; and

d) set the 5GMM cause IE to the 5GMM cause #79 "UAS services not allowed"

for case h6) in subclause 5.4.5.3.1 i.e upon sending a single uplink 5GSM message which was not forwarded because because the UE not supporting S-NSSAI location validity information requested forwarding of an 5GSM message with request type IE is set to "initial request" when not in the NS-AoS of the related S-NSSAI the AMF shall

a) include the PDU session ID in the PDU session ID IE;

b) set the payload container type IE to "N1 SM information";

c) set the payload container IE to the 5GSM message which was not forwarded;

d) set the 5GMM cause IE to the 5GMM cause #69 "insufficient resources for specific slice"; and

e) include the Back-off timer value IE

in case i) in subclause 5.4.5.3.1 i.e upon sending a single uplink 5GSM message which was not forwarded due to service area restrictions the AMF shall

a) include the PDU session ID in the PDU session ID IE;

b) set the payload container type IE to "N1 SM information";

c) set the payload container IE to the 5GSM message which was not forwarded; and

d) set the 5GMM cause IE to the 5GMM cause #28 "Restricted service area"

in case i1) in subclause 5.4.5.3.1 i.e upon sending a single uplink 5GSM message which was not forwarded because the UE is registered to a PLMN via a satellite NG-RAN cell that is not allowed to operate at the present UE location the AMF shall

a) include the PDU session ID in the PDU session ID IE;

b) set the payload container type IE to "N1 SM information";

c) set the payload container IE to the 5GSM message which was not forwarded; and

d) set the 5GMM cause IE to the 5GMM cause #78 "PLMN not allowed to operate at the present UE location"

in case j) in subclause 5.4.5.3.1 i.e upon reception of UE parameters update data (see 3GPP TS 23.502 [9]) from the UDM to be forwarded to the UE the AMF shall

a) set the payload container type IE to "UE parameters update transparent container"; and

b) set the contents of the payload container IE to the UE parameters update data (see 3GPP TS 23.502 [9]) received from the UDM

for case k) in subclause 5.4.5.3.1 upon reception from a location services application of a location services message payload the AMF shall

a) set the payload container type IE to "Location services message container"; and

b) set the payload container IE to the location services message payload

for case k) in subclause 5.4.5.3.1 upon reception from an LMF of a location services message payload the AMF shall

a) set the payload container type IE to "Location services message container";

b) set the payload container IE to the location services message payload; and

c) set the additional information IE to routing information associated with the LMF from which the location services message payload was received

NOTE 3 case k) in subclause 5.4.5.3.1 supports transport of a location services message container between a UE and an AMF and between a UE and an LMF for transport between a UE and an LMF the additional information IE is included and provides routing information for the LMF for transport between a UE and an AMF the additional information IE is not included

in case l) in subclause 5.4.5.3.1 i.e upon reception from an SMF of a user data container payload the AMF shall

a) include the PDU session ID in the PDU session ID IE;

b) set the payload container type IE to "CIoT user data container"; and

c) set the payload container IE to the user data container

for case l1) in subclause 5.4.5.3.1 i.e upon sending a single uplink CIoT user data container or control plane user data which was not forwarded due to routing failure the AMF shall

a) include the PDU session ID in the PDU session ID IE;

b) set the payload container type IE to "CIoT user data container";

c) set the payload container IE to the CIoT user data container or control plane user data which was not forwarded; and

d) set the 5GMM cause IE to the 5GMM cause #90 "payload was not forwarded"

NOTE 4 for case l1) in subclause 5.4.5.3.1 this is also applied for a single uplink CIoT user data container or control plane user data in the CONTROL PLANE SERVICE REQUEST message which was not forwarded due to routing failure

for case l2) in subclause 5.4.5.3.1 i.e upon sending a single uplink CIoT user data container which was not forwarded due to congestion control the AMF shall

a) include the PDU session ID in the PDU session ID IE;

b) set the payload container type IE to " CIoT user data container";

c) set the payload container IE to the CIoT user data container which was not forwarded;

d) set the 5GMM cause IE to the 5GMM cause #22 "Congestion" the 5GMM cause #67 "insufficient resources for specific slice and DNN" or the 5GMM cause #69 "insufficient resources for specific slice" and include the Back-off timer value IE

in case m) in subclause 5.4.5.3.1 during UUAA-MM procedure if the AMF receives the UUAA payload from the UAS-NF the AMF shall

a) include the service-level-AA payload with the value set to the payload; and

b) if a payload type associated with the payload is received include the service-level-AA payload type with the value set to the payload type

in case m1) in subclause 5.4.5.3.1 i.e if the AMF needs to send an event notification indicator for upper layers to the UE which set the "EventNotification" bit of the 5GMM capability IE in the last REGISTRATION REQUEST message to "Event notification supported" the AMF shall

a) set the payload container type IE to "Event notification"; and

b) set the payload container IE to the event notification indicator

in case m2) in subclause 5.4.5.3.1 i.e upon reception from an LMF of a UPP-CMI container the AMF shall

a) set the payload container type IE to "UPP-CMI container";

b) set the payload container IE to the UPP-CMI container received from the LMF; and

c) set the additional information IE to routing information associated with the LMF from which the UPP-CMI container was received

for case m3) in subclause 5.4.5.3.1 i.e upon sending a single UPP-CMI container which was not forwarded due to user plane positioning not authorized the AMF shall

a) set the payload container type IE to "UPP-CMI container";

b) set the payload container IE to the UPP-CMI container which was not forwarded; and

c) set the 5GMM cause IE to the 5GMM cause #94 "User plane positioning not authorized"

in case n) in subclause 5.4.5.3.1 the AMF shall

a) set the payload container type IE to "Multiple payloads";

b) set each payload container entry of the payload container IE (see subclause 9.11.3.39) as follows

i) set the payload container type field of the payload container entry to a payload container type value set in the payload container type IE as specified for cases a) to m3) above;

ii) set the payload container entry contents field of the payload container entry to the payload container contents set in the payload container IE as specified for cases a) to m3) above;

iii) set the optional IE fields if any to the optional associated information as specified for cases a) to m3) above

figure 5.4.5.3.2.1 Network-initiated NAS transport procedure

##### 5.4.5.3.3 Network-initiated NAS transport of messages accepted by the UE

upon reception of a DL NAS TRANSPORT message the UE shall stop the timer T3346 if running

upon reception of a DL NAS TRANSPORT message if the payload container type IE is set to

a) "N1 SM information" and the 5GMM cause IE is not included in the DL NAS TRANSPORT message the 5GSM message in the payload container IE and the PDU session ID are handled in the 5GSM procedures specified in clause 6;

b) "SMS" the UE shall forward the content of the payload container IE to the SMS stack entity;

c) "LTE positioning protocol (LPP) message container" the UE shall forward the payload container type the content of the payload container IE and the routing information included in the additional information IE to the upper layer location services application;

c1) "SLPP message container" the UE shall forward the payload container type the content of the payload container IE and the routing information included in the additional information IE to the upper layer location services application;

d) "SOR transparent container" and if the payload container IE

1) successfully passes the integrity check (see 3GPP TS 33.501 [24]) the ME shall store the received SOR counter as specified in annex c and proceed as follows

i) if the payload container IE indicates a list of preferred PLMN/access technology combinations is provided and the list type indicates "PLMN ID and access technology list" then the ME shall replace the highest priority entries in the "Operator controlled PLMN selector with access Technology" list stored in the ME;

ii) if the list type indicates "secured packet" then the ME shall behave as if a SMS is received with protocol identifier set to SIM data download data coding scheme set to class 2 message and SMS payload as secured packet contents of SOR transparent container IE the SMS payload is forwarded to UICC as specified in 3GPP TS 23.040 [4A];

iii) if the payload container IE includes SOR-SNPN-SI the ME shall replace SOR-SNPN-SI of the selected entry of the "list of subscriber data" or associated with the selected PLMN subscription as specified in 3GPP TS 23.122 [5] with the received SOR-SNPN-SI;

iv) if the SOR-CMCI is present in plain text and the store SOR-CMCI in ME indicator is set to "Store SOR-CMCI in ME" then the UE shall store or delete the SOR-CMCI in the non-volatile memory of the ME as described in subclause C.1; and

v) if the payload container IE includes SOR-SNPN-SI-LS the ME shall replace SOR-SNPN-SI-LS of the selected entry of the "list of subscriber data" or associated with the selected PLMN subscription as specified in 3GPP TS 23.122 [5] with the received SOR-SNPN-SI-LS;

if the ACK bit of the SOR header for SOR data type in the SOR transparent container is set to "acknowledgement requested" and the list type indicates

A) "PLMN ID and access technology list"; or

B) "secured packet" and the ME receives status bytes from the UICC indicating that the UICC has received the secured packet successfully;

then the ME shall send an acknowledgement in the payload container IE of an UL NAS TRANSPORT message with payload type IE set to "SOR transparent container" as specified in subclause 5.4.5.2.2 in the payload container IE carrying the acknowledgement the UE shall set the ME support of SOR-CMCI indicator to "SOR-CMCI supported by the ME" additionally if the UE supports access to an SNPN using credentials from a credentials holder and the UE is not operating in SNPN access operation mode the UE may set the ME support of SOR-SNPN-SI indicator to "SOR-SNPN-SI supported by the ME".Additionally if the UE supports access to an SNPN providing access for localized services in SNPN the UE shall set the ME support of SOR-SNPN-SI-LS indicator to "SOR-SNPN-SI-LS supported by the ME"

the UE shall proceed with the behaviour as specified in 3GPP TS 23.122 [5] annex C; or

2) does not successfully pass the integrity check (see 3GPP TS 33.501 [24]) then the UE shall discard the content of the payload container IE and proceed with the behaviour as specified in 3GPP TS 23.122 [5] annex c

e) void;

f) void;

g) "N1 SM information" and

1) the 5GMM cause IE is set to the 5GMM cause #22 "Congestion" the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded due to DNN based congestion control along with the 5GSM message from the payload container IE of the DL NAS TRANSPORT message and the time value from the Back-off timer value IE;

2) the 5GMM cause IE is set to the 5GMM cause #28 "Restricted service area" the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded due to service area restrictions along with the 5GSM message from the payload container IE of the DL NAS TRANSPORT message enters the state 5GMM-REGISTERED.NON-ALLOWED-SERVICE and if the DL NAS TRANSPORT message is received over 3GPP access performs the registration procedure for mobility and periodic registration update without waiting for the release of the N1 NAS signalling connection (see subclauses 5.3.5 and 5.5.1.3);

3) the 5GMM cause IE is set to the 5GMM cause #65 "maximum number of PDU sessions reached" the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded because the PLMN's maximum number of PDU sessions has been reached along with the 5GSM message from the payload container IE of the DL NAS TRANSPORT message;

4) the 5GMM cause IE is set to the 5GMM cause #67 "insufficient resources for specific slice and DNN" the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded due to S-NSSAI and DNN based congestion control along with the 5GSM message from the payload container IE of the DL NAS TRANSPORT message and the time value from the Back-off timer value IE;

5) the 5GMM cause IE is set to the 5GMM cause #69 "insufficient resources for specific slice" the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded due to S-NSSAI only based congestion control along with the 5GSM message from the payload container IE of the DL NAS TRANSPORT message and the time value from the Back-off timer value IE;

5a) the 5GMM cause IE is set to the 5GMM cause #78 "PLMN not allowed to operate at the present UE location" the UE shall consider as an abnormal case and treat it as unexpected cause and behave as specified in case g1) if this cause value is received from a non-satellite NG-RAN cell otherwise the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded because the UE is registered to a PLMN via a satellite NG-RAN cell that is not allowed to operate at the present UE location along with the 5GSM message from the payload container IE of the DL NAS TRANSPORT message

additionally if the cause is received from a satellite NG-RAN cell the UE shall not send the UL NAS TRANSPORT message to transport any of the data types listed in subclause 5.4.5.2.1 the UE shall delete last visited registered TAI and TAI list if the UE is not registering or has not registered to the same PLMN over non-3GPP access the UE shall additionally delete the list of equivalent PLMNs 5G-GUTI and ngKSI the UE shall store the PLMN identity and if it is known the current geographical location in the list of "PLMNs not allowed to operate at the present UE location" and shall start a corresponding timer instance (see subclause 4.23.2) the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform a PLMN selection according to 3GPP TS 23.122 [5];

if the message was received via satellite NG-RAN access and the UE is operating in single-registration mode the UE shall delete any 4G-GUTI last visited registered TAI TAI list and eKSI additionally the UE shall enter the state EMM-DEREGISTERED

6) the 5GMM cause IE is set to the 5GMM cause #90 "payload was not forwarded" the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded due to routing failure along with the 5GSM message from the payload container IE of the DL NAS TRANSPORT message the UE shall ignore the Back-off timer value IE if any;

7) the 5GMM cause IE is set to the 5GMM cause #91 "DNN not supported or not subscribed in the slice" the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded because the DNN is not supported or not subscribed in a slice along with the 5GSM message from the payload container IE of the DL NAS TRANSPORT message and the time value from the Back-off timer value IE if any;

8) the 5GMM cause IE is set to the 5GMM cause #92 "insufficient user-plane resources for the PDU session" the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded due to insufficient user-plane resources along with the 5GSM message from the payload container IE of the DL NAS TRANSPORT message

9) the 5GMM cause IE is set to the 5GMM cause #79 "UAS services not allowed" the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded because the UE is marked in the UE's 5GMM context that it is not allowed to request UAS services along with the 5GSM message from the payload container IE of the DL NAS TRANSPORT message

g1) "N1 SM information" and

1) the 5GMM cause IE is set to the 5GMM cause other than any of the cause values specified in bullet g) above the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded due to unexpected cause along with the 5GSM message from the payload container IE of the DL NAS TRANSPORT message;

h) "UE policy container" the UE policy container in the payload container IE is handled in the UE policy delivery procedures specified in annex D;

i) "UE parameters update transparent container" and if the payload container IE

1) successfully passes the integrity check (see 3GPP TS 33.501 [24]) the ME shall store the received UE parameter update counter as specified in annex c and proceed as follows

i) if the UE parameters update list includes a UE parameters update data set with UE parameters update data set type indicating "Routing indicator update data"

A) the ME shall behave as if an SMS is received with protocol identifier set to SIM data download data coding scheme set to class 2 message and SMS payload as secured packet contents of UE parameters update transparent container IE the SMS payload is forwarded to UICC as specified in 3GPP TS 23.040 [4A];

B) if the ACK bit of the UE parameters update header in the UE parameters update transparent container is set to "acknowledgment requested" and if the ME receives status bytes from the UICC indicating that the UICC has received the secured packet successfully the ME shall send an acknowledgement in the payload container IE of an UL NAS TRANSPORT message with payload type IE set to "UE parameters update transparent container" as specified in subclause 5.4.5.2.2; and

C) if the ME receives a REFRESH command from the UICC as specified in 3GPP TS 31.111 [22A] and if the REG bit of the UE parameters update header in the UE parameters update transparent container IE is set to "re-registration requested" and

C1) the UE is registered over 3GPP access then the UE shall wait until the emergency services over 3GPP access if any are completed enter 5GMM-IDLE mode over 3GPP access or 5GMM-CONNECTED mode with RRC inactive indication perform a de-registration procedure and then delete its 5G-GUTI if the UE is registered to different PLMN or SNPN on non-3GPP access or the UE is not registered over non-3GPP access or wait until the de-registration procedure over non-3GPP access specified in case C2) or C3) is completed before deleting its 5G-GUTI if the UE is registered to same PLMN or SNPN on non-3GPP access and then initiate a registration procedure for initial registration as specified in subclause 5.5.1.2;

C2) the UE is registered over non-3GPP access and does not have emergency services ongoing over non-3GPP access then the UE shall locally release the N1 NAS signalling connection and enter 5GMM-IDLE mode over non-3GPP access perform a de-registration procedure and then delete its 5G-GUTI if the UE is registered to different PLMN or SNPN on 3GPP access or the UE is not registered over 3GPP access or wait until the de-registration procedure over 3GPP access specified in case C1) is completed before deleting its 5G-GUTI if the UE is registered to same PLMN or SNPN on 3GPP access and then initiate a registration procedure for initial registration as specified in subclause 5.5.1.2; and

C3) the UE is registered over non-3GPP access and has an emergency services ongoing over non-3GPP access then the UE shall wait until the emergency services are completed before locally releasing the N1 NAS signalling connection and enter 5GMM-IDLE mode over non-3GPP access perform a de-registration procedure and then delete its 5G-GUTI if the UE is registered to different PLMN or SNPN on 3GPP access or if the UE is not registered over 3GPP access or wait until the de-registration procedure over 3GPP access specified in case C1) is completed before deleting its 5G-GUTI if the UE is registered to same PLMN or SNPN on 3GPP access and then initiate a registration procedure for initial registration as specified in subclause 5.5.1.2

ii) if the UE parameters update list includes a UE parameters update data set with UE parameters update data set type indicating "Default configured NSSAI update data"

A) if the ACK bit of the UE parameters update header in the UE parameters update transparent container is set to "acknowledgment requested" and if the UE parameters update list does not include a UE parameters update data set with UE parameters update data set type indicating "Routing indicator update data" the ME shall send an acknowledgement in the payload container IE of an UL NAS TRANSPORT message with payload type IE set to "UE parameters update transparent container" as specified in subclause 5.4.5.2.2

B) the ME shall replace the stored default configured NSSAI with the default configured NSSAI included in the default configured NSSAI update data in case of SNPN the ME shall replace the stored default configured NSSAI associated with the selected entry of the "list of subscriber data" or the PLMN subscription with the default configured NSSAI included in the default configured NSSAI update data; and

C) if the REG bit of the UE parameters update header in the UE parameters update transparent container is set to "re-registration requested" and the UE parameters update list does not include a UE parameters update data set with UE parameters update data set type indicating "Routing indicator update data" the UE shall wait until it enters 5GMM-IDLE mode and then the UE shall initiate a registration procedure for mobility registration update as specified in subclause 5.5.1.3

if the UE parameters update list does not include a UE parameters update data set with UE parameters update data set type indicating "Routing indicator update data" the UE used the old default configured NSSAI to create the requested NSSAI in a REGISTRATION REQUEST message because the UE does not have a configured NSSAI for the current PLMN or SNPN and the UE has an stored allowed NSSAI for the current PLMN or SNPN which contains one or more S-NSSAIs that are not included in the new default configured NSSAI the UE shall wait until it enters 5GMM-IDLE mode and then the UE shall initiate a registration procedure for mobility and periodic registration update as specified in subclause 5.5.1.3; and

iii) if the UE parameters update list includes a UE parameters update data set with UE parameters update data set type indicating "Disaster roaming information update data"

A) if the ACK bit of the UE parameters update header in the UE parameters update transparent container is set to "acknowledgment requested" and if the UE parameters update list does not include a UE parameters update data set with UE parameters update data set type indicating "Routing indicator update data" or a UE parameters update data set with UE parameters update data set type indicating "Default configured NSSAI update data" the ME shall send an acknowledgement in the payload container IE of an UL NAS TRANSPORT message with payload type IE set to "UE parameters update transparent container" as specified in subclause 5.4.5.2.2;

B) the UE shall delete the indication of whether disaster roaming is enabled in the UE stored in the ME if any and store the indication of whether disaster roaming is enabled in the UE included in the disaster roaming information update data in the ME;

C) the UE shall delete the indication of applicability of "lists of PLMN(s) to be used in disaster condition" provided by a VPLMN' stored in the ME if any and store the indication of 'applicability of "lists of PLMN(s) to be used in disaster condition" provided by a VPLMN' included in the disaster roaming information update data in the ME; and

D) if the REG bit of the UE parameters update header in the UE parameters update transparent container is set to "re-registration requested" and the UE parameters update list does not include a UE parameters update data set with UE parameters update data set type indicating "Routing indicator update data" the UE shall wait until it enters 5GMM-IDLE mode and then the UE shall initiate a registration procedure for mobility registration update as specified in subclause 5.5.1.3

iv) if the UE parameters update list includes a UE parameters update data set with UE parameters update data set type indicating "ME routing indicator update data"

A) if the ACK bit of the UE parameters update header in the UE parameters update transparent container is set to "acknowledgment requested" and the UE parameters update list does not include a UE parameters update data set with UE parameters update data set type indicating "Default configured NSSAI update data" the ME shall send an acknowledgement in the payload container IE of an UL NAS TRANSPORT message with payload type IE set to "UE parameters update transparent container" as specified in subclause 5.4.5.2.2;

B) the UE shall set or replace the routing indicator of the selected entry of the "list of subscriber data" with the routing indicator included in the ME routing indicator update data; and

C) if the REG bit of the UE parameters update header in the UE parameters update transparent container IE is set to "re-registration requested" and

C1) the UE is registered over 3GPP access and is not registered over non-3GPP access then the UE shall wait until the emergency services over 3GPP access if any are completed enter 5GMM-IDLE mode over 3GPP access or 5GMM-CONNECTED mode with RRC inactive indication perform a de-registration procedure delete its 5G-GUTI and then initiate a registration procedure for initial registration as specified in subclause 5.5.1.2;

C2) the UE is registered over non-3GPP access and is not registered over 3GPP access then the UE shall locally release the N1 NAS signalling connection and enter 5GMM-IDLE mode over non-3GPP access perform a de-registration procedure delete its 5G-GUTI and then initiate a registration procedure for initial registration as specified in subclause 5.5.1.2; or

C3) the UE is registered over 3GPP access and non-3GPP access to same SNPN then the UE shall wait until the emergency services over 3GPP access if any are completed enter 5GMM-IDLE mode over 3GPP access or 5GMM-CONNECTED mode with RRC inactive indication over 3GPP access perform a de-registration procedure over 3GPP access locally release the N1 NAS signalling connection and enter 5GMM-IDLE mode over non-3GPP access perform a de-registration procedure over non-3GPP access delete its 5G-GUTI and then initiate a registration procedure for initial registration as specified in subclause 5.5.1.2

2) does not successfully pass the integrity check (see 3GPP TS 33.501 [24]) then the UE shall discard the content of the payload container IE;

j) "Location services message container" and the 5GMM cause IE is not included in the DL NAS TRANSPORT message the UE shall forward the payload container type the content of the payload container IE and the routing information in the additional information IE if included to the upper layer location services application;

k) "CIoT user data container" and the 5GMM cause IE is not included in the DL NAS TRANSPORT message the UE shall forward the content of the payload container IE and the PDU session ID to the 5GSM sublayer;

l) "CIoT user data container" and

1) the 5GMM cause IE is set to the 5GMM cause #22 "Congestion" the UE passes to the 5GSM sublayer an indication that the CIoT user data was not forwarded due to DNN based congestion control along with the CIoT user data from the payload container IE of the DL NAS TRANSPORT message and the time value from the Back-off timer value IE;

2) the 5GMM cause IE is set to the 5GMM cause #67 "insufficient resources for specific slice and DNN" the UE passes to the 5GSM sublayer an indication that the CIoT user data was not forwarded due to S-NSSAI and DNN based congestion control along with the CIoT user data from the payload container IE of the DL NAS TRANSPORT message and the time value from the Back-off timer value IE;

3) the 5GMM cause IE is set to the 5GMM cause #69 "insufficient resources for specific slice" the UE passes to the 5GSM sublayer an indication that the CIoT user data was not forwarded due to S-NSSAI only based congestion control along with the CIoT user data from the payload container IE of the DL NAS TRANSPORT message and the time value from the Back-off timer value IE; or

4) the 5GMM cause IE is set to the 5GMM cause #90 "payload was not forwarded" the UE passes to the 5GSM sublayer an indication that the user data container was not forwarded due to routing failure along with the user data container from the payload container IE and the PDU session ID from the PDU session ID IE of the DL NAS TRANSPORT message;

m) "service-level-AA container" the UE shall forward the content of the payload container IE to the upper layers;

m1) "Event notification" the UE shall forward the received event notification indicator(s) to the upper layers (see 3GPP TS 23.216 [6A] and 3GPP TS 24.237 [14AA] for the "SRVCC handover cancelled IMS session re-establishment required" indicator);

m2) "UPP-CMI container" and the 5GMM cause IE is not included in the DL NAS TRANSPORT message the UE shall forward the payload container type the content of the payload container IE and the routing information included in the additional information IE to the upper layer location services application for user plane connection management for user plane positioning;

NOTE 2 the user plane connection establishment for user plane positioning connection management is specified in 3GPP TS 24.572 [64]

m3) "UPP-CMI container" and the 5GMM cause IE is set to the 5GMM cause #94 "User plane positioning not authorized" the UE passes to the upper layer location services application an indication that user plane positioning is not authorized by the network; or

n) "Multiple payloads" the UE shall first decode the content of the payload container IE (see subclause 9.11.3.39) to obtain the number of payload container entries and for each payload container entry the UE shall

1) decode the payload container type field;

2) decode the optional IE fields and the payload container contents field in the payload container entry; and

3) handle the content of each payload container entry the same as the content of the payload container IE and the associated optional IEs as specified in bullets a) to m3) above according to the payload container type field

### 5.4.6 5GMM status procedure

#### 5.4.6.1 general

the purpose of the 5GMM status procedure is to report at any time in the 5GMM STATUS message certain error conditions detected upon receipt of 5GMM protocol data in the AMF or in the UE the 5GMM STATUS message can be sent by both the AMF and the UE (see example in figure 5.4.6.1)

figure 5.4.6.1 5GMM status procedure

#### 5.4.6.2 5GMM status received in the UE

on receipt of a 5GMM STATUS message no state transition and no specific action shall be taken as seen from the radio interface i.e local actions are possible the local actions to be taken by UE on receipt of a 5GMM STATUS message are implementation dependent

#### 5.4.6.3 5GMM status received in the network

on receipt of a 5GMM STATUS message in the AMF no state transition and no specific action shall be taken as seen from the radio interface i.e local actions are possible the local actions to be taken by the AMF on receipt of a 5GMM STATUS message are implementation dependent

### 5.4.7 network slice-specific authentication and authorization procedure

#### 5.4.7.1 general

the purpose of the network slice-specific authentication and authorization procedure is to enable the authentication authorization and accounting server (AAA-S) via the network slice specific and SNPN authentication and authorization function (NSSAAF) to (re-)authenticate or (re-)authorize the upper layers of the UE

the network slice-specific authentication and authorization procedure can be invoked for a UE supporting network slice-specific authentication and authorization procedure and for a HPLMN S-NSSAI or an SNPN S-NSSAI (see subclauses 5.15.10 and 5.30.2.9 in 3GPP TS 23.501 [8] and subclause 4.2.9.2 of 3GPP TS 23.502 [9])

the network (re-)authenticates the UE using the EAP as specified in IETF RFC 3748 [34]

EAP has defined four types of EAP messages

a) an EAP-request message;

b) an EAP-response message;

c) an EAP-success message; and

d) an EAP-failure message

the EAP-request message is transported from the network to the UE using the NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message of the network slice-specific EAP message reliable transport procedure

the EAP-response message to the EAP-request message is transported from the UE to the network using the NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE message of the network slice-specific EAP message reliable transport procedure

if the (re-)authentication of the UE completes successfully or unsuccessfully the EAP-success message or the EAP-failure message respectively is transported from the network to the UE using the NETWORK SLICE-SPECIFIC AUTHENTICATION RESULT message of the network slice-specific result message transport procedure

there can be several rounds of exchange of an EAP-request message and a related EAP-response message for the AAA-S via the NSSAAF to complete the (re-)authentication and (re-)authorization of the request for an S-NSSAI (see example in figure 5.4.7.1.1)

the AMF shall set the authenticator retransmission timer specified in subclause 4.3 of IETF RFC 3748 [34] to infinite value

NOTE the network slice-specific authentication and authorization procedure provides a reliable transport of EAP messages and therefore retransmissions at the EAP layer of the AMF do not occur

figure 5.4.7.1.1 network slice-specific authentication and authorization procedure

#### 5.4.7.2 network slice-specific EAP message reliable transport procedure

##### 5.4.7.2.1 network slice-specific EAP message reliable transport procedure initiation

in order to initiate the network slice-specific EAP message reliable transport procedure the AMF shall create a NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message

the AMF shall set the EAP message IE of the NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message to the EAP-request message which is generated by the AMF or provided by the AAA-S via the NSSAAF

the AMF shall set the S-NSSAI IE of the NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message to the HPLMN S-NSSAI or the SNPN S-NSSAI to which the EAP-request message is related

the AMF shall send the NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message and start timer T3575 per S-NSSAI (see example in figure 5.4.7.1.1)

upon receipt of a NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message the UE shall stop timer T3346 if running the UE shall pass

a) the EAP-request message received in the EAP message IE; and

b) the HPLMN S-NSSAI or the SNPN S-NSSAI in the S-NSSAI IE;

to the upper layers apart from this action the network slice-specific authentication and authorization procedure is transparent to the 5GMM layer of the UE

##### 5.4.7.2.2 network slice-specific EAP message reliable transport procedure accepted by the UE

when the upper layers provide an EAP-response message associated with the HPLMN S-NSSAI or the SNPN S-NSSAI the UE shall create a NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE message

the UE shall set the EAP message IE of the NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE message to the EAP-response message

the UE shall set the S-NSSAI IE of the NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE message to the HPLMN S-NSSAI or the SNPN S-NSSAI associated with the EAP-response message

the UE shall send the NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE message apart from this action the network slice-specific authentication and authorization procedure is transparent to the 5GMM layer of the UE

upon receipt of a NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE message the AMF shall stop timer T3575 and

a) pass the EAP-response message received in the EAP message IE of the NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE message associated with the HPLMN S-NSSAI or the SNPN S-NSSAI in the S-NSSAI IE to the upper layers; or

b) provide the EAP-response message received in the EAP message IE of the NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE message associated with the HPLMN S-NSSAI or the SNPN S-NSSAI in the S-NSSAI IE to the AAA-S via the NSSAAF

##### 5.4.7.2.3 abnormal cases on the network side

the following abnormal cases can be identified

a) T3575 expiry

the AMF shall on the first expiry of the timer T3575 retransmit the NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message and shall reset and start timer T3575 this retransmission is repeated four times i.e on the fifth expiry of timer T3575 the AMF shall abort the network slice-specific authentication and authorization procedure for the S-NSSAI the AMF shall consider that the network slice-specific authentication and authorization procedure for the S-NSSAI is completed as a failure

b) lower layers indication of non-delivered NAS PDU due to handover

if the NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message could not be delivered due to an intra AMF handover and the target TAI is included in the TAI list then upon successful completion of the intra AMF handover the AMF shall retransmit the NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message if a failure of handover procedure is reported by the lower layer and the N1 NAS signalling connection exists the AMF shall retransmit the NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message

c) network slice-specific authentication and authorization procedure and de-registration procedure collision

if the network receives a DEREGISTRATION REQUEST message before the ongoing network slice-specific authentication and authorization procedure has been completed and the access type included in the DEREGISTRATION REQUEST message is the same as the one for which the network slice-specific authentication and authorization procedure is ongoing the network shall abort the network slice-specific authentication and authorization procedure and shall progress the UE-initiated de-registration procedure the AMF may initiate the network slice-specific authentication and authorization procedure for the S-NSSAI which is completed as a failure if available if the access type included in the DEREGISTRATION REQUEST message is different from the one for which the network slice-specific authentication and authorization procedure is ongoing the network shall proceed with both procedures

d) network slice-specific authentication and authorization procedure and service request procedure collision

if the network receives a SERVICE REQUEST message or a CONTROL PLANE SERVICE REQUEST message before the ongoing network slice-specific authentication and authorization procedure has been completed and the SERVICE REQUEST message or the CONTROL PLANE SERVICE REQUEST message includes the UE request type IE with the request type value set to "NAS signalling connection release" the network shall abort the network slice-specific authentication and authorization procedure and shall progress the service request procedure

if the network receives a SERVICE REQUEST message or a CONTROL PLANE SERVICE REQUEST message before the ongoing network slice-specific authentication and authorization procedure has been completed and the SERVICE REQUEST message or the CONTROL PLANE SERVICE REQUEST message does not include UE request type IE with the request type value set to "NAS signalling connection release" both procedures shall be progressed

e) network slice-specific authentication and authorization procedure and registration procedure for mobility and periodic registration update collision

if the network receives a REGISTRATION REQUEST message before the ongoing network slice-specific authentication and authorization procedure has been completed and the REGISTRATION REQUEST message includes the unavailability information IE without start of the unavailability period or the request type IE with the request type value set to "NAS signalling connection release" the network shall abort the network slice-specific authentication and authorization procedure and shall progress the registration procedure for mobility and periodic registration update procedure

if the network receives a REGISTRATION REQUEST message before the ongoing network slice-specific authentication and authorization procedure has been completed and the REGISTRATION REQUEST message includes neither the unavailability information IE nor the request type IE with the request type value set to "NAS signalling connection release" both procedures shall be progressed

if the network receives a REGISTRATION REQUEST message before the ongoing network slice-specific authentication and authorization procedure has been completed and the REGISTRATION REQUEST message includes the unavailability information IE with the start of the unavailability period both the procedures shall be progressed

##### 5.4.7.2.4 abnormal cases in the UE

the following abnormal cases can be identified

a) transmission failure of the NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE message with change in the current TAI

if the current TAI is not in the TAI list the network slice-specific authentication and authorization procedure shall be aborted and

1) if the UE is in 5GMM-REGISTERED state a registration procedure for mobility and periodic registration update indicating "mobility registration updating" in the 5GS registration type IE of the REGISTRATION REQUEST message shall be initiated; and

otherwise a registration procedure for initial registration shall be initiated

b) transmission failure of NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE message indication without change in the current TAI

it is up to the UE implementation how to re-run the ongoing procedure that triggered the network slice-specific authentication and authorization procedure

c) network slice-specific authentication and authorization procedure and de-registration procedure collision

if the UE receives NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message after sending a DEREGISTRATION REQUEST message and the access type included in the DEREGISTRATION REQUEST message is the same as the access in which the NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message is received then the UE shall ignore the NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message and proceed with the de-registration procedure otherwise the UE shall proceed with both procedures

d) network slice-specific authentication and authorization procedure and service request procedure collision

if the SERVICE REQUEST message or the CONTROL PLANE SERVICE REQUEST message includes the UE request type IE with the request type value set to "NAS signalling connection release" and the UE receives a NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message before the ongoing service request procedure has been completed the UE shall ignore the NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message and proceed with the service request procedure

if the SERVICE REQUEST message or the CONTROL PLANE SERVICE REQUEST message does not include the UE request type IE with the request type value set to "NAS signalling connection release" and the UE receives a NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message before the ongoing service request procedure has been completed the UE shall proceed with both procedures

e) network slice-specific authentication and authorization procedure and registration procedure for mobility and periodic registration update collision

if the REGISTRATION REQUEST message includes the unavailability information IE without start of the unavailability period and the UE receives a NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message before the ongoing registration procedure for mobility and periodic registration update has been completed the UE shall ignore the NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message and proceed with the registration procedure for mobility and periodic registration update procedure

if the REGISTRATION REQUEST message does not include the unavailability information IE and the UE receives a NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message before the ongoing registration procedure for mobility and periodic registration update has been completed the UE shall proceed with both procedures

if the REGISTRATION REQUEST message includes the unavailability information IE with the start of the unavailability period and the UE receives a NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message before the ongoing registration procedure for mobility and periodic registration update has been completed the UE shall proceed with both the procedures

#### 5.4.7.3 network slice-specific EAP result message transport procedure

##### 5.4.7.3.1 network slice-specific EAP result message transport procedure initiation

in order to initiate the network slice-specific EAP result message transport procedure the AMF shall create a NETWORK SLICE-SPECIFIC AUTHENTICATION RESULT message

the AMF shall set the EAP message IE of the NETWORK SLICE-SPECIFIC AUTHENTICATION RESULT message to the EAP-success or EAP-failure message provided by the AAA-S via the NSSAAF

the AMF shall set the S-NSSAI IE of the NETWORK SLICE-SPECIFIC AUTHENTICATION RESULT message to the HPLMN S-NSSAI or the SNPN S-NSSAI to which the EAP-success or EAP-failure message is related

the AMF shall send the NETWORK SLICE-SPECIFIC AUTHENTICATION RESULT message the AMF shall retain the authentication result for the UE and the HPLMN S-NSSAI or the SNPN S-NSSAI while the UE is registered to the PLMN (see subclause 5.15.10 in 3GPP TS 23.501 [8])

upon receipt of a NETWORK SLICE-SPECIFIC AUTHENTICATION RESULT message the UE shall pass

a) the EAP-success or EAP-failure message received in the EAP message IE; and

b) the HPLMN S-NSSAI or the SNPN S-NSSAI in the S-NSSAI IE;

to the upper layers apart from this action the network slice-specific authentication and authorization procedure is transparent to the 5GMM layer of the UE

## 5.5 5GMM specific procedures

### 5.5.1 registration procedure

#### 5.5.1.1 general

the registration procedure is always initiated by the UE and used for initial registration as specified in subclause 5.5.1.2.2 or mobility and periodic registration update as specified in subclause 5.5.1.3.2

when the UE needs to initiate registration over both 3GPP access and non-3GPP access in the same PLMN (e.g the 3GPP access and the selected N3IWF are located in the same PLMN) the UE

a) in 5GMM-REGISTERED-INITIATED over 3GPP access shall not initiate registration over non-3GPP access; or

b) in 5GMM-REGISTERED-INITIATED over non-3GPP access shall not initiate registration over 3GPP access

NOTE 1 to which access (i.e 3GPP access or non-3GPP access) the UE initiates registration first is up to UE implementation

when the UE is registered with a PLMN over a non-3GPP access the AMF and the UE maintain

a) registration state and state machine over non-3GPP access;

b) 5G NAS security context;

c) 5G-GUTI;

d) registration area for non-3GPP access which is associated with a single TAI; and

e) non-3GPP de-registration timer in the UE and non-3GPP implicit de-registration timer in the AMF

a registration attempt counter is used to limit the number of subsequently rejected registration attempts the registration attempt counter shall be incremented as specified in subclause 5.5.1.2.7 or subclause 5.5.1.3.7 depending on the value of the registration attempt counter specific actions shall be performed the registration attempt counter shall be reset when

- the UE is powered on;

- a USIM is inserted;

- a registration procedure is successfully completed;

- an EPS attach combined EPS attach procedure a normal or periodic tracking area updating or a combined tracking area updating procedure is successfully completed in S1 mode and the UE is operating in single-registration mode in this case the UE shall reset the registration attempt counter for 3GPP access;

NOTE 2 the registration attempt counter for non-3GPP access is not impacted by the EPS attach and the combined EPS attach procedure

- a registration procedure is rejected with cause #11 #12 #13 #15 #27 #31 #62 #72 #73 #74 #75 #76 #77 or #78;

- a registration procedure is rejected with cause #3 #6 or #7 the REGISTRATION REJECT message is received without integrity protection and the counter for "SIM/USIM considered invalid for GPRS services" events has a value less than a UE implementation-specific maximum value

- a network initiated de-registration procedure is completed with cause #11 #12 #13 #15 #27; #62 #72 #74 #75 #76 #77 or #78; or

- a new PLMN or SNPN is selected

additionally the registration attempt counter shall be reset when the UE is in substate 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION or 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE and

- the current TAI is changed;

- timer T3502 expires; or

- timer T3346 is started

when the registration attempt counter is reset the UE shall stop timer T3519 if running and delete any stored SUCI

the lower layers indicate to NAS whether the network supports emergency services for the UE in limited service state (see 3GPP TS 38.331 [30]) this information is taken into account when deciding whether to initiate an initial registration for emergency services

#### 5.5.1.2 registration procedure for initial registration

##### 5.5.1.2.1 general

this procedure can be used by a UE for initial registration for 5GS services

when the UE initiates the registration procedure for initial registration the UE shall indicate "initial registration" in the 5GS registration type IE when the UE initiates the registration procedure for emergency services the UE shall indicate "emergency registration" in the 5GS registration type IE when the UE initiates the initial registration for onboarding services in SNPN the UE shall indicate "SNPN onboarding registration" in the 5GS registration type IE when the UE initiates the initial registration procedure for disaster roaming services the UE shall indicate "disaster roaming initial registration" in the 5GS registration type IE

if the MUSIM UE initiates the registration procedure for initial registration and indicates "emergency registration" in the 5GS registration type IE in the REGISTRATION REQUEST message the network shall not indicate the support of

a) the N1 NAS signalling connection release;

b) the paging indication for voice services;

c) the reject paging request; or

d) the paging restriction;

in the REGISTRATION ACCEPT message

##### 5.5.1.2.2 initial registration initiation

the UE in state 5GMM-DEREGISTERED shall initiate the registration procedure for initial registration by sending a REGISTRATION REQUEST message to the AMF

a) when the UE performs initial registration for 5GS services;

b) when the UE performs initial registration for emergency services;

c) when the UE performs initial registration for SMS over NAS;

d) when the UE moves from GERAN to NG-RAN coverage or the UE moves from a UTRAN to NG-RAN coverage and the following applies

1) the UE initiated a GPRS attach or routing area updating procedure while in A/Gb mode or iu mode; or

2) the UE has performed 5G-SRVCC from NG-RAN to UTRAN as specified in 3GPP TS 23.216 [6A]

and since then the UE did not perform a successful EPS attach or tracking area updating procedure in S1 mode or registration procedure in N1 mode;

e) when the UE performs initial registration for onboarding services in SNPN;

f) when the UE performs initial registration for disaster roaming services; and

g) when the UE performs initial registration to come out of unavailability period and resume normal services;

with the following clarifications to initial registration for emergency services

a) the UE shall not initiate an initial registration for emergency services over the current access if the UE is already registered for emergency services over the non-current access unless the initial registration has to be initiated to perform handover of an existing emergency PDU session from the non-current access to the current access; and

NOTE 1 transfer of an existing emergency PDU session between 3GPP access and non-3GPP access is needed e.g if the UE determines that the current access is no longer available

b) the UE can only initiate an initial registration for emergency services over non-3GPP access if it cannot register for emergency services over 3GPP access

the UE initiates the registration procedure for initial registration by sending a REGISTRATION REQUEST message to the AMF starting timer T3510 if timer T3502 is currently running the UE shall stop timer T3502 if timer T3511 is currently running the UE shall stop timer T3511

during initial registration the UE handles the 5GS mobile identity IE in the following order

a) if

1) the UE

i) was previously registered in S1 mode before entering state EMM-DEREGISTERED; and

ii) has received an "interworking without N26 interface not supported" indication from the network; and

2) EPS security context and a valid native 4G-GUTI are available;

then the UE shall create a 5G-GUTI mapped from the valid native 4G-GUTI as specified in 3GPP TS 23.003 [4] and indicate the mapped 5G-GUTI in the 5GS mobile identity IE the UE shall include the UE status IE with the EMM registration status set to "UE is not in EMM-REGISTERED state" and shall include an ATTACH REQUEST message as specified in 3GPP TS 24.301 [15] in the EPS NAS message container IE

additionally if the UE holds a valid 5G-GUTI the UE shall include the 5G-GUTI in the additional GUTI IE in the REGISTRATION REQUEST message in the following order

1) a valid 5G-GUTI that was previously assigned by the same PLMN with which the UE is performing the registration if available;

2) a valid 5G-GUTI that was previously assigned by an equivalent PLMN if available; and

3) a valid 5G-GUTI that was previously assigned by any other PLMN if available;

b) if

1) the UE is registering with a PLMN and the UE holds a valid 5G-GUTI that was previously assigned over 3GPP access or non-3GPP access by the same PLMN with which the UE is performing the registration the UE shall indicate the 5G-GUTI in the 5GS mobile identity IE; or

2) the UE is registering with a SNPN the UE holds a valid 5G-GUTI that was previously assigned over 3GPP access or non-3GPP access by the same SNPN with which the UE is performing the registration and the UE is not initiating the initial registration for onboarding services in SNPN the UE shall indicate the 5G-GUTI in the 5GS mobile identity IE;

c) if

1) the UE is registering with a PLMN and the UE holds a valid 5G-GUTI that was previously assigned over 3GPP access or non-3GPP access by an equivalent PLMN the UE shall indicate the 5G-GUTI in the 5GS mobile identity IE; or

2) the UE is registering with an SNPN the UE holds a valid 5G-GUTI that was previously assigned over 3GPP access or non-3GPP access by an equivalent SNPN identified by a globally unique SNPN identity and the UE is not initiating the initial registration for onboarding services in SNPN the UE shall indicate the 5G-GUTI in the 5GS mobile identity IE and shall additionally include the NID of the equivalent SNPN in the NID IE;

d) if

1) the UE is registering with a PLMN and the UE holds a valid 5G-GUTI that was previously assigned over 3GPP access or non-3GPP access by any other PLMN the UE shall indicate the 5G-GUTI in the 5GS mobile identity IE; or

2) the UE is registering with an SNPN the UE holds a valid 5G-GUTI that was previously assigned over 3GPP access or non-3GPP access by any other SNPN identified by a globally unique SNPN identity and the UE is not initiating the initial registration for onboarding services in SNPN the UE shall indicate the 5G-GUTI in the 5GS mobile identity IE and shall additionally include the NID of the other SNPN in the NID IE;

e) if a SUCI other than an onboarding SUCI is available and the UE is not initiating the initial registration for onboarding services in SNPN the UE shall include the SUCI other than an onboarding SUCI in the 5GS mobile identity IE;

f) if the UE does not hold a valid 5G-GUTI or SUCI other than an onboarding SUCI and is initiating the initial registration for emergency services the PEI shall be included in the 5GS mobile identity IE; and

g) if the UE is initiating the initial registration for onboarding services in SNPN an onboarding SUCI shall be included in the 5GS mobile identity IE

NOTE 2 the AMF in ON-SNPN uses the onboarding SUCI as specified in 3GPP TS 23.501 [8]

if the SUCI is included in the 5GS mobile identity IE and the timer T3519 is not running the UE shall start timer T3519 and store the value of the SUCI sent in the REGISTRATION REQUEST message the UE shall include the stored SUCI in the REGISTRATION REQUEST message while timer T3519 is running

if the UE is operating in the dual-registration mode and it is in EMM state EMM-REGISTERED the UE shall include the UE status IE with the EMM registration status set to "UE is in EMM-REGISTERED state"

NOTE 3 inclusion of the UE status IE with this setting corresponds to the indication that the UE is "moving from EPC" as specified in 3GPP TS 23.502 [9]

NOTE 4 the value of the 5GMM registration status included by the UE in the UE status IE is not used by the AMF

if the last visited registered TAI is available the UE shall include the last visited registered TAI in the REGISTRATION REQUEST message

NOTE 5 the AMF can use the last visited registered TAI included in the REGISTRATION REQUEST message if available in the procedure of slice-based N3IWF selection as specified in 3GPP TS 23.502 [9] when the registration procedure is performed over non-3gpp access

if the UE requests the use of SMS over NAS the UE shall include the 5GS update type IE in the REGISTRATION REQUEST message with the SMS requested bit set to "SMS over NAS supported" when the 5GS update type IE is included in the REGISTRATION REQUEST for reasons other than requesting the use of SMS over NAS and the UE does not need to register for SMS over NAS the UE shall set the SMS requested bit of the 5GS update type IE to "SMS over NAS not supported" in the REGISTRATION REQUEST message

if the UE supports MICO mode and requests the use of MICO mode then the UE shall include the MICO indication IE in the REGISTRATION REQUEST message if the UE requests to use an active time value it shall include the active time value in the T3324 IE in the REGISTRATION REQUEST message if the UE includes the T3324 IE it may also request a particular T3512 value by including the requested T3512 IE in the REGISTRATION REQUEST message additionally if the UE supports strictly periodic registration timer the UE shall set the strictly periodic registration timer indication bit of the MICO indication IE in the REGISTRATION REQUEST message to "strictly periodic registration timer supported"

if the UE needs to use the UE specific DRX parameters the UE shall include the requested DRX parameters IE in the REGISTRATION REQUEST message

if the UE is in NB-N1 mode and if the UE needs to use the UE specific DRX parameters for NB-N1 mode the UE shall include the requested NB-N1 mode DRX parameters IE in the REGISTRATION REQUEST message

if the UE supports eDRX and requests the use of eDRX the UE shall include the requested extended DRX parameters IE in the REGISTRATION REQUEST message

if the UE needs to request LADN information for specific LADN DNN(s) or indicates a request for LADN information as specified in 3GPP TS 23.501 [8] the UE shall include the LADN indication IE in the REGISTRATION REQUEST message and

a) request specific LADN DNNs by including a LADN DNN value in the LADN indication IE for each LADN DNN for which the UE requests LADN information; or

b) to indicate a request for LADN information by not including any LADN DNN value in the LADN indication IE

the UE shall include the requested NSSAI containing the S-NSSAI(s) corresponding to the slice(s) to which the UE intends to register with and shall include the mapped S-NSSAI(s) for the requested NSSAI if available in the REGISTRATION REQUEST message if the UE has allowed NSSAI or configured NSSAI or both for the current PLMN or SNPN the requested NSSAI shall be either

a) the configured NSSAI for the current PLMN or SNPN or a subset thereof as described below;

b) the allowed NSSAI for the current PLMN or SNPN or a subset thereof as described below; or

c) the allowed NSSAI for the current PLMN or SNPN or a subset thereof as described below plus the configured NSSAI for the current PLMN or SNPN or a subset thereof as described below

if both the S-NSSAI to be replaced and the alternative S-NSSAI are included in the configured NSSAI and the UE needs to request the S-NSSAI to be replaced the UE shall include the S-NSSAI to be replaced in the requested NSSAI

if the UE supports the S-NSSAI time validity information S-NSSAI time validity information is available for an S-NSSAI and the S-NSSAI time validity information indicates that the S-NSSAI is not available the UE shall not include the S-NSSAI in the requested NSSAI IE of the REGISTRATION REQUEST message if the UE has S-NSSAI time validity information over the other access in the same PLMN and the S-NSSAI time validity information indicates that the S-NSSAI is not available the UE shall not include the S-NSSAI in the requested NSSAI IE of the REGISTRATION REQUEST message for the current access type

if the UE has neither allowed NSSAI for the current PLMN or SNPN nor configured NSSAI for the current PLMN or SNPN and has a default configured NSSAI the UE shall

a) include the S-NSSAI(s) in the requested NSSAI IE of the REGISTRATION REQUEST message using the default configured NSSAI; and

b) include the network slicing indication IE with the default configured NSSAI indication bit set to "Requested NSSAI created from default configured NSSAI" in the REGISTRATION REQUEST message

if the UE has no allowed NSSAI for the current PLMN or SNPN no configured NSSAI for the current PLMN or SNPN and no default configured NSSAI the UE shall not include a requested NSSAI in the REGISTRATION REQUEST message

if all the S-NSSAI(s) corresponding to the slice(s) to which the UE intends to register are included in the pending NSSAI the UE shall not include a requested NSSAI in the REGISTRATION REQUEST message

the subset of configured NSSAI provided in the requested NSSAI consists of one or more S-NSSAIs in the configured NSSAI applicable to the current PLMN or SNPN where any included S-NSSAI is

a) neither in the rejected NSSAI nor associated to an S-NSSAI in the rejected NSSAI if the UE is inside the NS-AoS of an S-NSSAI in the rejected NSSAI with a rejection cause value set to "S-NSSAI not available in the current registration area" the S-NSSAI may be included in the requested NSSAI; or

b) in the partially rejected NSSAI and the current TAI is not in the list of TAs for which the S-NSSAI is rejected if the UE is inside the NS-AoS of an S-NSSAI in the partially rejected NSSAI and the current TAI is in the list of TAs for which the S-NSSAI is rejected the S-NSSAI may be included in the requested NSSAI

in addition if the NSSRG information is available the subset of configured NSSAI provided in the requested NSSAI shall be associated with at least one common NSSRG value the UE may also include in the requested NSSAI the S-NSSAI(s) which were added to configured NSSAI in S1 mode and for which the associated NSSRG information is not available if the UE is in 5GMM-REGISTERED state over the other access and has already an allowed NSSAI for the other access in the same PLMN or in different PLMNs all the S-NSSAI(s) in the requested NSSAI for the current access shall share at least an NSSRG value common to all the S-NSSAI(s) of the allowed NSSAI for the other access if the UE is simultaneously performing the registration procedure on the other access in different PLMNs the UE shall include S-NSSAIs that share at least a common NSSRG value across all access types if the UE has pending NSSAI which the UE is still interested in using then S-NSSAIs in the pending NSSAI and requested NSSAI shall be associated with at least one common NSSRG value

NOTE 6 if the UE has stored mapped S-NSSAI(s) for the rejected NSSAI and one or more S-NSSAIs in the stored mapped S-NSSAI(s) for the configured NSSAI are not included in the stored mapped S-NSSAI(s) for the rejected NSSAI then a S-NSSAI in the configured NSSAI associated to one or more of these mapped S-NSSAI(s) for the configured NSSAI are available to be included in the requested NSSAI together with their mapped S-NSSAI

NOTE 7 if one or more mapped S-NSSAIs in the stored mapped S-NSSAI(s) for the configured NSSAI are not included in the stored rejected NSSAI for the failed or revoked NSSAA a S-NSSAI in the configured NSSAI associated to one or more of these mapped S-NSSAI(s) for the configured NSSAI are available to be included in the registration request together with their mapped S-NSSAI

NOTE 8 there is no need to consider the case that the UE is simultaneously performing the registration procedure on the other access in the same PLMN due to that the UE is not allowed to initiate the registration procedure over one access when the registration over the other access to the same PLMN is going on

the subset of allowed NSSAI provided in the requested NSSAI consists of one or more S-NSSAIs in the allowed NSSAI for the current PLMN

NOTE 9 how the UE selects the subset of configured NSSAI or allowed NSSAI to be provided in the requested NSSAI is implementation specific the UE can take preferences indicated by the upper layers (e.g policies like URSP applications) and UE local configuration into account

NOTE 10 the number of S-NSSAI(s) included in the requested NSSAI cannot exceed eight

if the UE initiates an initial registration for onboarding services in SNPN the UE shall not include the requested NSSAI IE in the REGISTRATION REQUEST message

if the UE supports NSAG the UE shall set the NSAG bit to "NSAG supported" in the 5GMM capability IE of the REGISTRATION REQUEST message if the UE supports sending of REGISTRATION COMPLETE message for acknowledging the reception of NSAG information IE in the REGISTRATION ACCEPT message the UE shall set the RCMAN bit to "Sending of REGISTRATION COMPLETE message for NSAG information supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE initiates an initial registration for emergency services or needs to prolong the established NAS signalling connection after the completion of the initial registration procedure (e.g due to uplink signalling pending) the UE shall set the Follow-on request indicator to "Follow-on request pending"

NOTE 11 the UE does not have to set the Follow-on request indicator to 1 even if the UE has to request resources for V2X communication over PC5 reference point 5G ProSe direct discovery over PC5 5G ProSe direct communication over PC5 or A2X communication over PC5 reference point

if the UE supports S1 mode and the UE has not disabled its E-UTRA capability and the 5GS registration type IE in the REGISTRATION REQUEST message is not set to "disaster roaming initial registration" the UE shall

- set the S1 mode bit to "S1 mode supported" in the 5GMM capability IE of the REGISTRATION REQUEST message;

- include the S1 UE network capability IE in the REGISTRATION REQUEST message; additionally if the UE supports EPS-UPIP the UE shall set the EPS-UPIP bit to "EPS-UPIP supported" in the S1 UE network capability IE in the REGISTRATION REQUEST message; and

- if the UE supports sending an ATTACH REQUEST message containing a PDN CONNECTIVITY REQUEST message with request type set to "handover" to transfer a PDU session from N1 mode to S1 mode set the HO attach bit to "attach request message containing PDN connectivity request with request type set to handover to transfer PDU session from N1 mode to S1 mode supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports the LTE positioning protocol (LPP) in N1 mode as specified in 3GPP TS 37.355 [26] the UE shall set the LPP bit to "LPP in N1 mode supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports the location services (LCS) notification mechanisms in N1 mode as specified in 3GPP TS 23.273 [6B] the UE shall set the 5G-LCS bit to "LCS notification mechanisms supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports the user plane positioning using LCS-UPP as specified in 3GPP TS 23.273 [6B] the UE shall set the LCS-UPP bit to "LCS-UPP user plane positioning supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports the user plane positioning using SUPL as described in 3GPP TS 38.305 [67] and 3GPP TS 23.271 [68] the UE shall set the SUPL bit to "SUPL user plane positioning supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports network verified UE location over satellite NG-RAN as specified in 3GPP TS 23.501 [8] the UE shall set the NVL-SATNR bit to "Network verified UE location over satellite NG-RAN supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE is in NB-N1 mode then the UE shall set the control plane CIoT 5GS optimization bit to "Control plane CIoT 5GS optimization supported" in the 5GMM capability IE of the REGISTRATION REQUEST message if the UE is capable of NB-S1 mode then the UE shall set the control plane CIoT EPS optimization bit to "Control plane CIoT EPS optimization supported" in the S1 UE network capability IE of the REGISTRATION REQUEST message

if the UE supports N3 data transfer and multiple user-plane resources in NB-N1 mode (see 3GPP TS 36.306 [25D] 3GPP TS 36.331 [25A]) then the UE shall set the multiple user-plane resources support bit to "Multiple user-plane resources supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports 5G-SRVCC from NG-RAN to UTRAN as specified in 3GPP TS 23.216 [6A] the UE shall

- set the 5G-SRVCC from NG-RAN to UTRAN capability bit to "5G-SRVCC from NG-RAN to UTRAN supported" in the 5GMM capability IE of the REGISTRATION REQUEST message; and

- include the mobile station classmark 2 IE and the supported codecs IE in the REGISTRATION REQUEST message

if the UE supports service gap control then the UE shall set the SGC bit to "service gap control supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports the restriction on use of enhanced coverage the UE shall set the RestrictEC bit to "Restriction on use of enhanced coverage supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports network slice-specific authentication and authorization the UE shall set the NSSAA bit to "network slice-specific authentication and authorization supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports CAG feature the UE shall set the CAG bit to "CAG Supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports extended CAG information list the UE shall set the Ex-CAG bit to "Extended CAG information list supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports enhanced CAG information the UE shall set the ECI bit to "enhanced CAG information supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports network slice replacement the UE shall set the NSR bit to "network slice replacement supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports sending of REGISTRATION COMPLETE message for acknowledging the reception of negotiated PEIPS assistance information IE in the REGISTRATION ACCEPT message the UE shall set the RCMP bit to "Sending of REGISTRATION COMPLETE message for negotiated PEIPS assistance information supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

when the UE is not in NB-N1 mode if the UE supports RACS the UE shall

a) set the RACS bit to "RACS supported" in the 5GMM capability IE of the REGISTRATION REQUEST message;

b) if the UE has an applicable network-assigned UE radio capability ID for the current UE radio configuration in the selected PLMN or SNPN include the applicable network-assigned UE radio capability ID in the UE radio capability ID IE of the REGISTRATION REQUEST message; and

c) if the UE

1) does not have an applicable network-assigned UE radio capability ID for the current UE radio configuration in the selected PLMN or SNPN; and

2) has an applicable manufacturer-assigned UE radio capability ID for the current UE radio configuration

include the applicable manufacturer-assigned UE radio capability ID in the UE radio capability ID IE of the REGISTRATION REQUEST message

if the UE has one or more stored UE policy sections

- identified by a UPSI with the PLMN ID part indicating the HPLMN or the selected PLMN; or

- identified by a UPSI with the PLMN ID part indicating the PLMN ID part of the SNPN identity of the selected SNPN and associated with the NID of the selected SNPN;

then the UE shall set the payload container type IE to "UE policy container" and include the UE STATE INDICATION message (see annex D) in the payload container IE of the REGISTRATION REQUEST message

if the UE does not have any stored UE policy section

- identified by a UPSI with the PLMN ID part indicating the HPLMN or the selected PLMN; or

- identified by a UPSI with the PLMN ID part indicating the PLMN ID part of the SNPN identity of the selected SNPN and associated with the NID of the selected SNPN;

and the UE needs to send a UE policy container to the network then the UE shall set the payload container type IE to "UE policy container" and include the UE STATE INDICATION message (see annex D) in the payload container IE of the REGISTRATION REQUEST message

NOTE 12 in this version of the protocol the UE can only include the payload container IE in the REGISTRATION REQUEST message to carry a payload of type "UE policy container"

if the UE does not have a valid 5G NAS security context the UE shall send the REGISTRATION REQUEST message without including the NAS message container IE the UE shall include the entire REGISTRATION REQUEST message (i.e containing cleartext IEs and non-cleartext IEs if any) in the NAS message container IE that is sent as part of the SECURITY MODE COMPLETE message as described in subclauses 4.4.6 and 5.4.2.3

if the UE has a valid 5G NAS security context and the UE needs to send non-cleartext IEs the UE shall send a REGISTRATION REQUEST message including the NAS message container IE as described in subclause 4.4.6 if the UE does not need to send non-cleartext IEs the UE shall send a REGISTRATION REQUEST message without including the NAS message container IE

if the UE supports ciphered broadcast assistance data and needs to obtain new ciphering keys the UE shall include the additional information requested IE with the CipherKey bit set to "ciphering keys for ciphered broadcast assistance data requested" in the REGISTRATION REQUEST message

the UE shall set the WUSA bit to "WUS assistance information reception supported" in the 5GMM capability IE if the UE supports WUS assistance information the UE may include its UE paging probability information in the requested WUS assistance information IE if the UE has set the WUSA bit to "WUS assistance information reception supported" in the 5GMM capability IE and the UE is not performing the initial registration for emergency services

the UE shall set the NR-PSSI bit to "NR paging subgrouping supported" in the 5GMM capability IE if the UE supports PEIPS assistance information and the 5GS registration type IE in the REGISTRATION REQUEST message is not set to "emergency registration" the UE may include its UE paging probability information in the requested PEIPS assistance information IE if the UE has set the NR-PSSI bit to "NR paging subgrouping supported" in the 5GMM capability IE

if the REGISTRATION REQUEST message includes a NAS message container IE the AMF shall process the REGISTRATION REQUEST message that is obtained from the NAS message container IE as described in subclause 4.4.6

if the UE supports V2X as specified in 3GPP TS 24.587 [19B] the UE shall set the V2X bit to "V2X supported" in the 5GMM capability IE of the REGISTRATION REQUEST message if the UE supports V2X communication over E-UTRA-PC5 as specified in 3GPP TS 24.587 [19B] the UE shall set the V2XCEPC5 bit to "V2X communication over E-UTRA-PC5 supported" in the 5GMM capability IE of the REGISTRATION REQUEST message if the UE supports V2X communication over NR-PC5 as specified in 3GPP TS 24.587 [19B] the UE shall set the V2XCNPC5 bit to "V2X communication over NR-PC5 supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

the UE shall set the ER-NSSAI bit to "Extended rejected NSSAI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports the NSSRG then the UE shall set the NSSRG bit to "NSSRG supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the W-AGF acting on behalf of an N5GC device initiates an initial registration as specified in 3GPP TS 23.316 [6D] the W-AGF acting on behalf of the N5GC device shall include the N5GC indication IE with the N5GC device indication bit set to "N5GC device registration is requested" in the REGISTRATION REQUEST message

if the 5G-RG acting on behalf of an AUN3 device initiates an initial registration as specified in 3GPP TS 23.316 [6D] the 5G-RG acting on behalf of an AUN3 device shall include the AUN3 indication IE with the AUN3 device indication bit set to "AUN3 device registration is requested" in the REGISTRATION REQUEST message

if the UE supports UAS services the UE shall set the UAS bit to "UAS services supported" in the 5GMM capability IE of the REGISTRATION REQUEST message if the UE supports A2X over E-UTRA-PC5 as specified in 3GPP TS 24.577 [60] the UE shall set the A2XEPC5 bit to "A2X over E-UTRA-PC5 supported" in the 5GMM capability IE of the REGISTRATION REQUEST message if the UE supports A2X over NR-PC5 as specified in 3GPP TS 24.577 [60] the UE shall set the A2XNPC5 bit to "A2X over NR-PC5 supported" in the 5GMM capability IE of the REGISTRATION REQUEST message if the UE supports A2X over uu as specified in 3GPP TS 24.577 [60] the UE shall set the A2X-Uu bit to "A2X over uu supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

when the UE supporting UAS services initiates an initial registration for UAS services the UE shall include the service-level device ID in the Service-level-AA container IE of the REGISTRATION REQUEST message and set the value to the CAA-level UAV ID the UE shall include the service-level-AA server address in the Service-level-AA container IE of the REGISTRATION REQUEST message and set the value to the USS address if it is provided by the upper layers the UE shall include the service-level-AA payload in the Service-level-AA container IE of the REGISTRATION REQUEST message and shall set the service-level-AA payload type if the service-level-AA payload is provided by upper layers

NOTE 13 the service-level-AA payload can be of type "C2 authorization payload" the C2 authorization payload can include one or both of an indication of the request for direct C2 communication and pairing information for direct C2 communication

if the UE supports 5G ProSe direct discovery as specified in 3GPP TS 24.554 [19E] the UE shall set the 5G ProSe-dd bit to "5G ProSe direct discovery supported" in the 5GMM capability IE of the REGISTRATION REQUEST message if the UE supports 5G ProSe direct communication as specified in 3GPP TS 24.554 [19E] the UE shall set the 5G ProSe-dc bit to "5G ProSe direct communication supported" in the 5GMM capability IE of the REGISTRATION REQUEST message if the UE supports acting as 5G ProSe layer-2 UE-to-network relay UE as specified in 3GPP TS 24.554 [19E] the UE shall set the 5G ProSe-l2relay bit to "Acting as a 5G ProSe layer-2 UE-to-network relay UE supported" in the 5GMM capability IE of the REGISTRATION REQUEST message if the UE supports acting as 5G ProSe layer-3 UE-to-network relay UE as specified in 3GPP TS 24.554 [19E] the UE shall set the 5G ProSe-l3relay bit to "Acting as a 5G ProSe layer-3 UE-to-network relay UE supported" in the 5GMM capability IE of the REGISTRATION REQUEST message if the UE supports acting as 5G ProSe layer-2 UE-to-network remote UE as specified in 3GPP TS 24.554 [19E] the UE shall set the 5G ProSe-l2rmt bit to "Acting as a 5G ProSe layer-2 UE-to-network remote UE supported" in the 5GMM capability IE of the REGISTRATION REQUEST message if the UE supports acting as 5G ProSe layer-3 UE-to-network remote UE as specified in 3GPP TS 24.554 [19E] the UE shall set the 5G ProSe-l3rmt bit to "Acting as a 5G ProSe layer-3 UE-to-network remote UE supported" in the 5GMM capability IE of the REGISTRATION REQUEST message if the UE supports acting as 5G ProSe layer-2 UE-to-UE relay UE as specified in 3GPP TS 24.554 [19E] the UE shall set the 5G ProSe-l2U2U relay bit to "Acting as a 5G ProSe layer-2 UE-to-UE relay UE supported" in the 5GMM capability IE of the REGISTRATION REQUEST message if the UE supports acting as 5G ProSe layer-3 UE-to-UE relay UE as specified in 3GPP TS 24.554 [19E] the UE shall set the 5G ProSe-l3U2U relay bit to "Acting as a 5G ProSe layer-3 UE-to-UE relay UE supported" in the 5GMM capability IE of the REGISTRATION REQUEST message if the UE supports acting as 5G ProSe layer-2 end UE as specified in 3GPP TS 24.554 [19E] the UE shall set the 5G ProSe-l2end bit to "Acting as a 5G ProSe layer-2 end UE supported" in the 5GMM capability IE of the REGISTRATION REQUEST message if the UE supports acting as 5G ProSe layer-3 end UE as specified in 3GPP TS 24.554 [19E] the UE shall set the 5G ProSe-l3end bit to "Acting as a 5G ProSe layer-3 end UE supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

Editor’s note [WID:5G\_ProSe\_Ph3 CR:6552] it is FFS how to enhance the 5G ProSe capability for multi-hop relays

if the MUSIM UE supports the N1 NAS signalling connection release then the UE shall set the N1 NAS signalling connection release bit to "N1 NAS signalling connection release supported" in the 5GMM capability IE of the REGISTRATION REQUEST message otherwise the UE shall not set the N1 NAS signalling connection release bit to "N1 NAS signalling connection release supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the MUSIM UE supports the paging indication for voice services then the UE shall set the paging indication for voice services bit to "paging indication for voice services supported" in the 5GMM capability IE of the REGISTRATION REQUEST message otherwise the UE shall not set the paging indication for voice services bit to "paging indication for voice services supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the MUSIM UE supports the reject paging request then the UE shall set the reject paging request bit to "reject paging request supported" in the 5GMM capability IE of the REGISTRATION REQUEST message otherwise the UE shall not set the reject paging request bit to "reject paging request supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the MUSIM UE sets

- the reject paging request bit to "reject paging request supported";

- the N1 NAS signalling connection release bit to "N1 NAS signalling connection release supported"; or

- both of them;

and supports the paging restriction then the UE shall set the paging restriction bit to "paging restriction supported" in the 5GMM capability IE of the REGISTRATION REQUEST message otherwise the UE shall not set the paging restriction bit to "paging restriction supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports MINT the UE shall set the MINT bit to "MINT supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports slice-based N3IWF selection the UE shall set the SBNS bit to "Slice-based N3IWF selection supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports slice-based TNGF selection the UE shall set the SBTS bit to "Slice-based TNGF selection supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE initiates the registration procedure for disaster roaming services the UE has determined the UE determined PLMN with disaster condition as specified in 3GPP TS 23.122 [5] and

a) the UE determined PLMN with disaster condition is the HPLMN and

1) the additional GUTI IE is included in the REGISTRATION REQUEST message and does not contain a valid 5G-GUTI that was previously assigned by the HPLMN; or

2) the additional GUTI IE is not included in the REGISTRATION REQUEST message and the 5GS mobile identity IE contains neither the SUCI nor a valid 5G-GUTI that was previously assigned by the HPLMN; or

b) the UE determined PLMN with disaster condition is not the HPLMN and

1) the additional GUTI IE is included in the REGISTRATION REQUEST message and does not contain a valid 5G-GUTI that was previously assigned by the UE determined PLMN with disaster condition; or

2) the additional GUTI IE is not included in the REGISTRATION REQUEST message and the 5GS mobile identity IE does not contain a valid 5G-GUTI that was previously assigned by the UE determined PLMN with disaster condition;

the UE shall include in the REGISTRATION REQUEST message the UE determined PLMN with disaster condition IE indicating the UE determined PLMN with disaster condition

NOTE 14 if the UE initiates the registration procedure for disaster roaming services and the UE determined PLMN with disaster condition cannot be determined when an NG-RAN cell of the PLMN broadcasts the disaster related indication as specified in 3GPP TS 23.122 [5] the UE does not include in the REGISTRATION REQUEST message the UE determined PLMN with disaster condition IE but includes the additional GUTI IE or the 5GS mobile identity IE or both as specified in subclauses 5.5.1.2.2

if the UE supports event notification the UE shall set the EventNotification bit to "Event notification supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports access to an SNPN using credentials from a credentials holder and

a) the UE is in its HPLMN or EHPLMN or the subscribed SNPN; or

b) the UE is in a non-subscribed SNPN and supports equivalent SNPNs;

the UE shall set the SSNPNSI bit to "SOR-SNPN-SI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports equivalent SNPNs the UE shall set the ESI bit to "equivalent SNPNs supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports the unavailability period the UE shall set the UN-PER bit to "unavailability period supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports the reconnection to the network due to RAN timing synchronization status change the UE shall set the reconnection to the network due to RAN timing synchronization status change (RANtiming) bit to "Reconnection to the network due to RAN timing synchronization status change supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports LADN per DNN and S-NSSAI the UE shall set the LADN-DS bit to "LADN per DNN and S-NSSAI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports MPS indicator update via the UE configuration update procedure the UE shall set the MPSIU bit to "MPS indicator update supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports MCS indicator update via the UE configuration update procedure the UE shall set the MCSIU bit to "MCS indicator update supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports ranging and sidelink positioning as specified in 3GPP TS 24.514 [62] and supports

a) V2X communication over PC5 as specified in 3GPP TS 24.587 [19B];

b) 5G ProSe direct discovery and 5G ProSe direct communication as specified in 3GPP TS 24.554 [19E]; or

c) both a) and b)

the UE shall set

a) the RSLP bit to "Ranging and sidelink positioning supported" if the UE supports ranging and sidelink positioning as target UE or SL reference UE or both;

b) the RSLPL bit to "Ranging and sidelink positioning for located UE supported" if the UE supports ranging and sidelink positioning as located UE;

c) the RSLPS bit to "Ranging and sidelink positioning for SL positioning server UE supported" if the UE supports ranging and sidelink positioning as SL positioning server UE; or

d) any combination of a) b) and c) in the 5GMM capability IE of the REGISTRATION REQUEST message;

and in addition

a) if the UE supports ranging and sidelink positioning with V2X capable UE the UE shall set the RSLPVU bit to "Ranging and sidelink positioning with V2X capable UE supported" in the 5GMM capability IE of the REGISTRATION REQUEST message; and

b) if the UE supports ranging and sidelink positioning with 5G ProSe capable UE the UE shall set the RSLPPU bit to "Ranging and sidelink positioning with 5G ProSe capable UE supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports the partial network slice the UE shall set the PNS bit to "Partial network slice supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports network slice usage control the UE shall set the NSUC bit to "Network slice usage control supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports the S-NSSAI time validity information the UE shall set the TempNS bit to "S-NSSAI time validity information supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports the S-NSSAI location validity information the UE shall set the SLVI bit to "S-NSSAI location validity information supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports RAT utilization control the UE shall set the RATUC bit to "RAT utilization control supported" in the 5GMM capability IE of the REGISTRATION REQUEST message over 3GPP access

figure 5.5.1.2.2.1 registration procedure for initial registration

##### 5.5.1.2.3 5GMM common procedure initiation

the network may initiate 5GMM common procedures e.g the identification authentication and security procedures during the registration procedure depending on the information received in the REGISTRATION REQUEST message

if two NAS security mode control procedures are needed to signal an entire unciphered REGISTRATION REQUEST message followed by signalling of selected EPS NAS security algorithms both NAS security mode control procedures should be initiated as part of 5GMM common procedures of the ongoing registration procedure (see subclause 5.4.2.4)

during a registration procedure with 5GS registration type IE set to "emergency registration" if the AMF is configured to support emergency registration for unauthenticated SUCIs the AMF may choose to skip the authentication procedure even if no 5G NAS security context is available and proceed directly to the execution of the security mode control procedure

##### 5.5.1.2.4 initial registration accepted by the network

during a registration procedure with 5GS registration type IE set to "emergency registration" the AMF shall not check for mobility and access restrictions regional restrictions or subscription restrictions or CAG restrictions when processing the REGISTRATION REQUEST message

if the initial registration request is accepted by the network the AMF shall send a REGISTRATION ACCEPT message to the UE

NOTE 0 if the AMF receives the initial registration request over non-3GPP access and detects that the N3IWF used by the UE is compatible with only part of the allowed NSSAI and the UE has not indicated its support for slice-based N3IWF selection in the REGISTRATION REQUEST message the AMF accepts the initial registration request

NOTE 0A if the AMF receives the initial registration request over non-3GPP access and detects that the TNGF used by the UE is compatible with only part of the allowed NSSAI and the UE has not indicated its support for slice-based TNGF selection in the REGISTRATION REQUEST message the AMF accepts the initial registration request

for each of the information elements 5GMM capability S1 UE network capability and UE security capability the AMF shall store all octets received from the UE in the REGISTRATION REQUEST message up to the maximum length defined for the respective information element

NOTE 1 this information is forwarded to the new AMF during inter-AMF handover or to the new MME during inter-system handover to S1 mode

the AMF shall assign and include a TAI list as a registration area the UE is registered to in the REGISTRATION ACCEPT message the AMF shall not assign a TAI list containing both tracking areas in NB-N1 mode and tracking areas not in NB-N1 mode the UE upon receiving a REGISTRATION ACCEPT message shall delete its old TAI list and store the received TAI list if the REGISTRATION REQUEST message was received over non-3GPP access the AMF shall include a single TAI in the TAI list

NOTE 2 for non-3GPP access the operator can allocate a TAI per N3IWF TNGF TWIF or W-AGF each N3IWF TNGF TWIF or W-AGF is locally configured with a TAI each N3IWF TNGF TWIF or W-AGF can be configured with its own TAI value or with the same TAI value as other N3IWFs TNGFs TWIFs or W-AGFs

NOTE 3 when assigning the TAI list the AMF can take into account the eNodeB's capability of support of CIoT 5GS optimization

the AMF may include service area restrictions in the service area list IE in the REGISTRATION ACCEPT message the UE upon receiving a REGISTRATION ACCEPT message with the service area restrictions shall act as described in subclause 5.3.5

the AMF may also include a list of equivalent PLMNs in the REGISTRATION ACCEPT message each entry in the list contains a PLMN code (MCC+MNC) the UE shall store the list as provided by the network and if the initial registration procedure is not for emergency services the UE shall remove from the list any PLMN code that is already in the forbidden PLMN list as specified in subclause 5.3.13A in addition the UE shall add to the stored list the PLMN code of the registered PLMN that sent the list the UE shall replace the stored list on each receipt of the REGISTRATION ACCEPT message if the REGISTRATION ACCEPT message does not contain a list then the UE shall delete the stored list the AMF of a PLMN shall not include a list of equivalent SNPNs

if the ESI bit of the 5GMM capability IE of the REGISTRATION REQUEST message is set to "equivalent SNPNs supported" the AMF of a SNPN may include a list of equivalent SNPNs in the REGISTRATION ACCEPT message if the initial registration request is for onboarding services in SNPN the AMF shall not include a list of equivalent SNPNs in the REGISTRATION ACCEPT message each entry in the list contains an SNPN identity the UE shall store the list as provided by the network if the initial registration procedure is not for emergency services and is not the initial registration for onboarding services in SNPN the UE shall remove from the list any SNPN identity that is already in

- the "permanently forbidden SNPNs" list or the "temporarily forbidden SNPNs" list if the SNPN is not an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]); or

- the "permanently forbidden SNPNs for access for localized services in SNPN" list or the "temporarily forbidden SNPNs for access for localized services in SNPN" list if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5])

the UE shall add to the stored list the SNPN identity of the registered SNPN that sent the list the UE shall replace the stored list on each receipt of the REGISTRATION ACCEPT message if the REGISTRATION ACCEPT message does not contain a list then the UE shall delete the stored list the AMF of an SNPN shall not include a list of equivalent PLMNs

NOTE 3A if N1 mode was disabled for an SNPN due to reception of 5GMM cause #27 or #62 the UE implementation ensures that it does not register to this SNPN due to being part of the list of "equivalent SNPNs" received while registered in another SNPN

if the initial registration procedure is not for emergency services the UE is not registered for disaster roaming services and if the PLMN identity of the registered PLMN is a member of the forbidden PLMN list as specified in subclause 5.3.13A any such PLMN identity shall be deleted from the corresponding list(s)

if the service area list IE is not included in the REGISTRATION ACCEPT message any tracking area in the registered PLMN and its equivalent PLMN(s) in the registration area or in the registered SNPN is considered as an allowed tracking area as described in subclause 5.3.5

if the REGISTRATION REQUEST message contains the LADN indication IE based on the LADN indication IE UE subscription information UE location and local configuration about LADN and

- if the LADN indication IE includes requested LADN DNNs the UE subscribed DNN list includes the requested LADN DNNs or the wildcard DNN and the LADN service area of the requested LADN DNN has an intersection with the current registration area the AMF shall determine the requested LADN DNNs included in the LADN indication IE as LADN DNNs for the UE;

- if no requested LADN DNNs included in the LADN indication IE and the wildcard DNN is included in the UE subscribed DNN list the AMF shall determine the LADN DNN(s) configured in the AMF whose LADN service area has an intersection with the current registration area as LADN DNNs for the UE; or

- if no requested LADN DNNs included in the LADN indication IE and the wildcard DNN is not included in the UE subscribed DNN list or if the UE subscribed DNN list does not include any of the DNN's in the LADN indication IE the AMF shall determine the LADN DNN(s) included in the UE subscribed DNN list whose LADN service area has an intersection with the current registration area as LADN DNNs for the UE

if the LADN indication IE is not included in the REGISTRATION REQUEST message the AMF shall determine the LADN DNN(s) included in the UE subscribed DNN list whose service area has an intersection with the current registration area as LADN DNNs for the UE except for the wildcard DNN included in the UE subscribed DNN list

if the UE supports WUS assistance information and the AMF supports and accepts the use of WUS assistance information for the UE then the AMF shall determine the negotiated UE paging probability information for the UE store it in the 5GMM context of the UE and if the UE is not performing the initial registration for emergency services the AMF shall include it in the negotiated WUS assistance information IE in the REGISTRATION ACCEPT message the AMF may consider the UE paging probability information received in the requested WUS assistance information IE when determining the negotiated UE paging probability information for the UE

NOTE 4 besides the UE paging probability information requested by the UE the AMF can take local configuration or previous statistical information for the UE into account when determining the negotiated UE paging probability information for the UE

if the UE sets the NR-PSSI bit to "NR paging subgrouping supported" in the 5GMM capability IE in the REGISTRATION REQUEST message and the AMF supports and accepts the use of PEIPS assistance information for the UE then the AMF shall determine the paging subgroup ID for the UE store it in the 5GMM context of the UE and shall include it in the negotiated PEIPS assistance information IE in the REGISTRATION ACCEPT message or in the updated PEIPS assistance information IE in the CONFIGURATION UPDATE COMMAND message as part of the registration procedure the AMF may consider the UE paging probability information received in the requested PEIPS assistance information IE when determining the paging subgroup ID for the UE

NOTE 5 besides the UE paging probability information when provided by the UE the AMF can also take local configuration whether the UE is likely to receive IMS voice over PS session calls UE mobility pattern or previous statistical information for the UE or information provided by the NG-RAN into account when determining the paging subgroup ID for the UE

if the UE set the UN-PER bit to "unavailability period supported" in the 5GMM capability IE in the REGISTRATION REQUEST message and the AMF supports and accepts the use of unavailability period for the UE then the AMF shall set the UN-PER bit to "unavailability period supported" in the 5GS network feature support IE in the REGISTRATION ACCEPT message furthermore if the AMF is able to determine an unavailability period duration for the UE based on satellite coverage availability information (see 3GPP TS 23.401 [7]) and the UE is registered over a satellite NG-RAN access the AMF shall store the determined unavailability period duration and provide the determined unavailability period duration to the UE by including the unavailability period duration in the unavailability configuration IE in the REGISTRATION ACCEPT message if the AMF is able to determine the start of unavailability period based on satellite coverage availability information (see 3GPP TS 23.401 [7]) the AMF shall store the determined start of unavailability period and provide the determined start of unavailability period to the UE by including the start of unavailability period in the unavailability configuration IE in the REGISTRATION ACCEPT message the AMF may determine the periodic registration update timer value based on the network determined unavailability period duration a network determined start of the unavailability period or a discontinuous coverage maximum time offset value or any combination of them

the AMF shall include the LADN information which consists of the determined LADN DNNs for the UE and LADN service area(s) available in the current registration area in the LADN information IE of the REGISTRATION ACCEPT message

if the UE has set the LADN-DS bit to "LADN per DNN and S-NSSAI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message and the extended LADN information is available for the UE the AMF shall include the extended LADN information which consists of the determined LADN DNNs for the UE the S-NSSAIs associated with the determined LADN DNNs for the UE and in the allowed NSSAI or partially allowed NSSAI and LADN service area(s) available in the current registration area in the extended LADN information IE in the registration accept type 6 IE container IE of the REGISTRATION ACCEPT message

NOTE 5A0 the AMF allocates the LADN service area and the TAI list associated with the S-NSSAI in the partially allowed NSSAI independently if applicable

if

a) the UE does not support LADN per DNN and S-NSSAI;

b) the UE is subscribed to the LADN DNN for a single S-NSSAI only; and

c) the AMF has the extended LADN information but no LADN information;

the AMF may decide to provide the LADN service area for that LADN DNN of the extended LADN information as the LADN information and include the LADN information in the LADN information IE of the REGISTRATION ACCEPT message

NOTE 5A if the LADN service area is configured per DNN and S-NSSAI in order to serve the UEs that do not support LADN per DNN and S-NSSAI it is recommended that the LADN DNN is only served by a single S-NSSAI

NOTE 5B for the case when the UE is subscribed to the LADN DNN for multiple S-NSSAIs the AMF can treat this as no extended LADN information is available

if the UE does not support LADN per DNN and S-NSSAI and the AMF has neither the LADN information nor the extended LADN information the AMF shall not provide any LADN information to the UE

the UE upon receiving the REGISTRATION ACCEPT message with the LADN information shall store the received LADN information the UE upon receiving the REGISTRATION ACCEPT message with the extended LADN information in the registration accept type 6 IE container IE shall store the received extended LADN information if there exists one or more LADN DNNs which are included in the LADN indication IE of the REGISTRATION REQUEST message and are not included in the LADN information IE and extended LADN information IE in the registration accept type 6 IE container IE of the REGISTRATION ACCEPT message the UE considers such LADN DNNs as not available in the current registration area

the 5G-GUTI reallocation shall be part of the initial registration procedure during the initial registration procedure if the AMF has not allocated a new 5G-GUTI by the generic UE configuration update procedure the AMF shall include in the REGISTRATION ACCEPT message the new assigned 5G-GUTI together with the assigned TAI list

if the UE has set the CAG bit to "CAG supported" in the 5GMM capability IE of the REGISTRATION REQUEST message and the AMF needs to update the "CAG information list" stored in the UE the AMF shall include the CAG information list IE or the extended CAG information list IE in the REGISTRATION ACCEPT message

NOTE 6 the "CAG information list" can be provided by the AMF and include no entry if no "CAG information list" exists in the subscription

NOTE 7 if the UE supports extended CAG information list the CAG information list can be included either in the CAG information list IE or extended CAG information list IE

if the UE does not support extended CAG information list the CAG information list shall not be included in the extended CAG information list IE

if a 5G-GUTI or the SOR transparent container IE is included in the REGISTRATION ACCEPT message the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3

if the Operator-defined access category definitions IE the extended emergency number list IE the CAG information list IE or the extended CAG information list IE are included in the REGISTRATION ACCEPT message the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3

if the UE has set the RCMAP bit to "Sending of REGISTRATION COMPLETE message for negotiated PEIPS assistance information supported" in the 5GMM capability IE of the REGISTRATION REQUEST message and if the negotiated PEIPS assistance information IE is included in the REGISTRATION ACCEPT message the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3

if the UE is not in NB-N1 mode and the UE has set the RACS bit to "RACS supported" in the 5GMM capability IE of the REGISTRATION REQUEST message the AMF may include either a UE radio capability ID IE or a UE radio capability ID deletion indication IE in the REGISTRATION ACCEPT message if the UE radio capability ID IE or the UE radio capability ID deletion indication IE is included in the REGISTRATION ACCEPT message the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3

the AMF shall include the MICO indication IE in the REGISTRATION ACCEPT message only if the MICO indication IE was included in the REGISTRATION REQUEST message the AMF supports and accepts the use of MICO mode if the AMF supports and accepts the use of MICO mode the AMF may indicate "all PLMN registration area allocated" in the MICO indication IE in the REGISTRATION ACCEPT message if "all PLMN registration area allocated" is indicated in the MICO indication IE the AMF shall not assign and include the TAI list in the REGISTRATION ACCEPT message if the REGISTRATION ACCEPT message included an MICO indication IE indicating "all PLMN registration area allocated" the UE shall treat all TAIs in the current PLMN as a registration area and delete its old TAI list if "strictly periodic registration timer supported" is indicated in the MICO indication IE in the REGISTRATION REQUEST message the AMF may indicate "strictly periodic registration timer supported" in the MICO indication IE in the REGISTRATION ACCEPT message

the AMF shall include an active time value in the T3324 IE in the REGISTRATION ACCEPT message if the UE requested an active time value in the REGISTRATION REQUEST message and the AMF accepts the use of MICO mode and the use of active time

if the AMF supports and accepts the use of MICO and the UE included the requested T3512 value IE in the REGISTRATION REQUEST message then the AMF shall take into account the T3512 value requested when providing the T3512 value IE in the REGISTRATION ACCEPT message

NOTE 7A the T3512 value assigned to the UE by AMF can be different from the T3512 value requested by the UE AMF can take several factors into account when assigning the T3512 value e.g local configuration expected UE behaviour UE requested T3512 value UE subscription data network policies

the AMF shall include the T3512 value IE in the REGISTRATION ACCEPT message only if the REGISTRATION REQUEST message was sent over the 3GPP access

the AMF shall include the non-3GPP de-registration timer value IE in the REGISTRATION ACCEPT message only if the REGISTRATION REQUEST message was sent over the non-3GPP access

if the UE requests "control plane CIoT 5GS optimization" in the 5GS update type IE indicates support of control plane CIoT 5GS optimization in the 5GMM capability IE and the AMF decides to accept the requested CIoT 5GS optimization and the registration request the AMF shall indicate "control plane CIoT 5GS optimization supported" in the 5GS network feature support IE of the REGISTRATION ACCEPT message

the AMF may include the T3447 value IE set to the service gap time value in the REGISTRATION ACCEPT message if

- the UE has indicated support for service gap control in the REGISTRATION REQUEST message; and

- a service gap time value is available in the 5GMM context

if there is a running T3447 timer in the AMF and the Follow-on request indicator is set to "Follow-on request pending" in the REGISTRATION REQUEST message the AMF shall ignore the flag and proceed as if the flag was not received except for the following cases

a) the UE is configured for high priority access in the selected PLMN; or

b) the 5GS registration type IE in the REGISTRATION REQUEST message is set to "emergency registration"

if the UE has indicated support for the control plane CIoT 5GS optimizations and the AMF decides to activate the congestion control for transport of user data via the control plane then the AMF shall include the T3448 value IE in the REGISTRATION ACCEPT message

if

- the UE in NB-N1 mode is using control plane CIoT 5GS optimization; and

- the network is configured to provide the truncated 5G-S-TMSI configuration for control plane CIoT 5GS optimizations;

the AMF shall include the truncated 5G-S-TMSI configuration IE in the REGISTRATION ACCEPT message and set the "Truncated AMF set ID value" and the "Truncated AMF pointer value" in the truncated 5G-S-TMSI configuration IE based on network policies the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3

if the UE has included the service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE of the REGISTRATION REQUEST message and if

- the UE has a valid aerial UE subscription information;

- the UUAA procedure is to be performed during the registration procedure according to operator policy;

- there is no valid successful UUAA result for the UE in the UE 5GMM context; and

- the REGISTRATION REQUEST message was not received over non-3GPP access

then the AMF shall initiate the UUAA-MM procedure with the UAS-NF as specified in 3GPP TS 23.256 [6AB] and shall include a service-level-AA pending indication in the Service-level-AA container IE of the REGISTRATION ACCEPT message the AMF shall store in the UE 5GMM context that a UUAA procedure is pending the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3 if the REGISTRATION REQUEST message was received over non-3GPP access the AMF shall not initiate UUAA-MM procedure

if the UE has included the service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE of the REGISTRATION REQUEST message and if

- the UE has a valid aerial UE subscription information;

- the UUAA procedure is to be performed during the registration procedure according to operator policy; and

- there is a valid successful UUAA result for the UE in the UE 5GMM context

then the AMF shall include a service-level-AA response in the Service-level-AA container IE of the REGISTRATION ACCEPT message and set the SLAR field in the service-level-AA response to "Service level authentication and authorization was successful"

if the AMF determines that the UUAA-MM procedure needs to be performed for a UE the AMF has not received the service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE of the REGISTRATION REQUEST message from the UE and the AMF decides to accept the UE to be registered for other services than UAS services based on the user's subscription data and the operator policy the AMF shall accept the initial registration request and shall mark in the UE's 5GMM context that the UE is not allowed to request UAS services

if the UE supports MINT the AMF may include the list of PLMNs to be used in disaster condition IE in the REGISTRATION ACCEPT message

if the UE supports MINT the AMF may include the disaster roaming wait range IE in the REGISTRATION ACCEPT message

if the UE supports MINT the AMF may include the disaster return wait range IE in the REGISTRATION ACCEPT message

NOTE 8 the AMF can determine the contents of the "list of PLMN(s) to be used in disaster condition" the value of the disaster roaming wait range and the value of the disaster return wait range based on the network local configuration

if the AMF received the list of TAIs from the satellite NG-RAN as described in 3GPP TS 23.501 [8] and determines that by UE subscription and operator's preferences any but not all TAIs in the received list of TAIs is forbidden for roaming or for regional provision of service the AMF shall include the TAI(s) in

a) the forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" IE; or

b) the forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service" IE; or

c) both;

in the REGISTRATION ACCEPT message

NOTE 9 void

if the UE has set the reconnection to the network due to RAN timing synchronization status change (RANtiming) bit to "Reconnection to the network due to RAN timing synchronization status change supported" in the 5GMM capability IE of the REGISTRATION REQUEST message the AMF may include the RAN timing synchronization IE with the RecReq bit set to "Reconnection requested" in the REGISTRATION ACCEPT message

if the AMF receives the initial registration request along with the mobile IAB-indication over N2 reference point (see TS 38.413 [31]) from UE and the UE is authorized to operate as an MBSR based on the subscription information and local policy (see 3GPP TS 23.501 [8]) the AMF shall include the feature authorization indication IE in the REGISTRATION ACCEPT message and shall set the MBSRAI field to "authorized to operate as MBSR" if the AMF receives the initial registration request along with the mobile IAB-indication over N2 reference point (see TS 38.413 [31]) from UE and the UE is not authorized to operate as an MBSR based on the subscription information and local policy but can operate as a UE the AMF shall include the feature authorization indication IE in the REGISTRATION ACCEPT message and shall set the MBSRAI field to "not authorized to operate as MBSR but allowed to operate as a UE"

if the UE supports user plane positioning using LCS-UPP SUPL or both the AMF shall set the LCS-UPP bit the SUPL bit or both in the 5GS network feature support IE of the REGISTRATION ACCEPT message as specified in 3GPP TS 24.572 [64]

upon receipt of the REGISTRATION ACCEPT message the UE shall reset the registration attempt counter enter state 5GMM-REGISTERED and set the 5GS update status to 5U1 UPDATED

if the UE receives the REGISTRATION ACCEPT message from a PLMN then the UE shall reset the PLMN-specific attempt counter for that PLMN for the specific access type for which the message was received the UE shall also reset the PLMN-specific N1 mode attempt counter for that PLMN for the specific access type for which the message was received if the message was received via 3GPP access the UE shall reset the counter for "SIM/USIM considered invalid for GPRS services" events and the counter for "SIM/USIM considered invalid for non-GPRS services" events if any if the message was received via non-3GPP access the UE shall reset the counter for "USIM considered invalid for 5GS services over non-3GPP" events

if the UE receives the REGISTRATION ACCEPT message from an SNPN then the UE shall reset the SNPN-specific attempt counter for the current SNPN for the specific access type for which the message was received if the message was received via 3GPP access the UE shall reset the counter for "the entry for the current SNPN considered invalid for 3GPP access" events if the message was received via non-3GPP access the UE shall reset the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events

if the REGISTRATION ACCEPT message included a T3512 value IE the UE shall use the value in the T3512 value IE as periodic registration update timer (T3512)

if the REGISTRATION ACCEPT message include a T3324 value IE the UE shall use the value in the T3324 value IE as active timer (T3324)

if the REGISTRATION ACCEPT message included a non-3GPP de-registration timer value IE the UE shall use the value in non-3GPP de-registration timer value IE as non-3GPP de-registration timer

if the REGISTRATION ACCEPT message contains

a) the network slicing indication IE with the network slicing subscription change indication set to "Network slicing subscription changed";

b) a configured NSSAI IE with a new configured NSSAI for the current PLMN or SNPN and optionally the mapped S-NSSAI(s) for the configured NSSAI for the current PLMN or SNPN;

c) an NSSRG information IE with a new NSSRG information;

d) an alternative NSSAI IE with a new alternative NSSAI;

e) an S-NSSAI location validity information in the registration accept type 6 IE container IE with a new S-NSSAI location validity information;

f) an S-NSSAI time validity information IE with a new S-NSSAI time validity information; or

g) an On-demand NSSAI IE with a new on-demand NSSAI or an updated slice deregistration inactivity timer value

the UE shall return a REGISTRATION COMPLETE message to the AMF to acknowledge the successful update of the network slicing information if the UE has set the RCMAN bit to "Sending of REGISTRATION COMPLETE message for NSAG information supported" in the 5GMM capability IE of the REGISTRATION REQUEST message and if REGISTRATION ACCEPT message contains the NSAG information IE the UE shall return REGISTRATION COMPLETE message to the AMF to acknowledge the reception of the NSAG information IE

NOTE 9A when the UE receives the NSSRG information IE the UE may provide the NSSRG information to lower layers for the purpose of NSAG-aware cell reselection

if the REGISTRATION ACCEPT message contains the CAG information list IE or the extended CAG information list IE and the UE had set the CAG bit to "CAG supported" in the 5GMM capability IE of the REGISTRATION REQUEST message the UE shall

a) replace the "CAG information list" stored in the UE with the received CAG information list IE or the extended CAG information list IE when received in the HPLMN or EHPLMN;

NOTE 10 when the UE receives the CAG information list IE or the extended CAG information list IE in the HPLMN whose PLMN code is derived from the IMSI the EHPLMN list is present and is not empty and the HPLMN is not present in the EHPLMN list the UE behaves as if it receives the CAG information list IE or the extended CAG information list IE in a VPLMN

b) replace the serving VPLMN's entry of the "CAG information list" stored in the UE with the serving VPLMN's entry of the received CAG information list IE or the extended CAG information list IE when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN; or

NOTE 11 when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN entries of a PLMN other than the serving VPLMN if any in the received CAG information list IE or the extended CAG information list IE are ignored

c) remove the serving VPLMN's entry of the "CAG information list" stored in the UE when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN and the CAG information list IE or the extended CAG information list IE does not contain the serving VPLMN's entry

the UE shall store the "CAG information list" received in the CAG information list IE or the extended CAG information list IE as specified in annex c

if the received "CAG information list" includes an entry containing the identity of the registered PLMN the UE shall operate as follows

a) if the UE receives the REGISTRATION ACCEPT message via a CAG cell none of the CAG-ID(s) supported by the current CAG cell is authorized based on the "Allowed CAG list" of the entry for the registered PLMN in the received "CAG information list" and

1) the entry for the registered PLMN in the received "CAG information list" does not include an "indication that the UE is only allowed to access 5GS via CAG cells" then the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C] with the updated "CAG information list"; or

2) the entry for the registered PLMN in the received "CAG information list" includes an "indication that the UE is only allowed to access 5GS via CAG cells" and

i) if one or more CAG-ID(s) are authorized based on the "Allowed CAG list" of the entry for the registered PLMN in the received "CAG information list" the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] with the updated "CAG information list"; or

ii) if no CAG-ID is authorized based on the "Allowed CAG list" of the entry for the registered PLMN in the received "CAG information list" the UE has not set the 5GS registration type IE in the REGISTRATION REQUEST message to "emergency registration" and the initial registration was not initiated to perform handover of an existing emergency PDU session from the non-current access to the current access then the UE shall enter the state 5GMM-REGISTERED.PLMN-SEARCH and shall apply the PLMN selection process defined in 3GPP TS 23.122 [5] with the updated "CAG information list"; or

b) if the UE receives the REGISTRATION ACCEPT message via a non-CAG cell and the entry for the registered PLMN in the received "CAG information list" includes an "indication that the UE is only allowed to access 5GS via CAG cells" and

1) if one or more CAG-ID(s) are authorized based on the "allowed CAG list" for the registered PLMN in the received "CAG information list" the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] with the updated "CAG information list"; or

2) if no CAG-ID is authorized based on the "Allowed CAG list" of the entry for the registered PLMN in the received "CAG information list" the UE has not set the 5GS registration type IE in the REGISTRATION REQUEST message to "emergency registration" and the initial registration was not initiated to perform handover of an existing emergency PDU session from the non-current access to the current access then the UE shall enter the state 5GMM-REGISTERED.PLMN-SEARCH and shall apply the PLMN selection process defined in 3GPP TS 23.122 [5] with the updated "CAG information list"

if the received "CAG information list" does not include an entry containing the identity of the registered PLMN and the UE receives the REGISTRATION ACCEPT message via a CAG cell the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C] with the updated "CAG information list"

if the REGISTRATION ACCEPT message contains the Operator-defined access category definitions IE the extended emergency number list IE ,the CAG information list IE or the extended CAG information list IE the UE shall return a REGISTRATION COMPLETE message to the AMF to acknowledge reception of the operator-defined access category definitions the extended local emergency numbers list or the "CAG information list"

if the UE has set the RCMAP bit to "Sending of REGISTRATION COMPLETE message for negotiated PEIPS parameters supported" in the 5GMM capability IE of the REGISTRATION REQUEST message and if REGISTRATION ACCEPT message contains the negotiated PEIPS assistance information IE the UE shall return REGISTRATION COMPLETE message to the AMF to acknowledge the reception of the negotiated PEIPS assistance information IE

if the REGISTRATION ACCEPT message contains the UE radio capability ID IE or the UE radio capability ID deletion indication IE the UE shall return a REGISTRATION COMPLETE message to the AMF to acknowledge reception of the UE radio capability ID IE or the UE radio capability ID deletion indication IE

upon receiving a REGISTRATION COMPLETE message the AMF shall stop timer T3550 and change to state 5GMM-REGISTERED the 5G-GUTI if sent in the REGISTRATION ACCEPT message shall be considered as valid the PEIPS assistance information if sent in the REGISTRATION ACCEPT message shall be considered as valid and the UE radio capability ID if sent in the REGISTRATION ACCEPT shall be considered as valid

if the 5GS update type IE was included in the REGISTRATION REQUEST message with the SMS requested bit set to "SMS over NAS supported" and SMSF selection is successful then the AMF shall send the REGISTRATION ACCEPT message after the SMSF has confirmed that the activation of the SMS service was successful when sending the REGISTRATION ACCEPT message the AMF shall

a) set the SMS allowed bit of the 5GS registration result IE to "SMS over NAS allowed" in the REGISTRATION ACCEPT message if the UE has set the SMS requested bit of the 5GS update type IE to "SMS over NAS supported" in the REGISTRATION REQUEST message and the network allows the use of SMS over NAS for the UE; and

b) store the SMSF address and the value of the SMS allowed bit of the 5GS registration result IE in the UE 5GMM context and consider the UE available for SMS over NAS

if

a) the SMSF selection in the AMF is not successful;

b) the SMS activation via the SMSF is not successful;

c) the AMF does not allow the use of SMS over NAS;

d) the SMS requested bit of the 5GS update type IE was set to "SMS over NAS not supported" in the REGISTRATION REQUEST message; or

e) the 5GS update type IE was not included in the REGISTRATION REQUEST message;

then the AMF shall set the SMS allowed bit of the 5GS registration result IE to "SMS over NAS not allowed" in the REGISTRATION ACCEPT message

when the UE receives the REGISTRATION ACCEPT message if the UE is also registered over another access to the same PLMN the UE considers the value indicated by the SMS allowed bit of the 5GS registration result IE as applicable for both accesses over which the UE is registered

the AMF shall include the 5GS registration result IE in the REGISTRATION ACCEPT message if the 5GS registration result value in the 5GS registration result IE indicates

a) "3GPP access" the UE

- shall consider itself as being registered to 3GPP access; and

- if in 5GMM-REGISTERED state over non-3GPP access and on the same PLMN or SNPN as 3GPP access shall enter state 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION over non-3GPP access and set the 5GS update status to 5U2 NOT UPDATED over non-3GPP access; or

b) "Non-3GPP access" the UE

- shall consider itself as being registered to non-3GPP access; and

- if in the 5GMM-REGISTERED state over 3GPP access and is on the same PLMN or SNPN as non-3GPP access shall enter the state 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION over 3GPP access and set the 5GS update status to 5U2 NOT UPDATED over 3GPP access; or

c) "3GPP access and non-3GPP access" the UE shall consider itself as being registered to both 3GPP access and non-3GPP access

in roaming scenarios the AMF shall provide mapped S-NSSAI(s) for the configured NSSAI the allowed NSSAI the partially allowed NSSAI the rejected NSSAI (if extended rejected NSSAI IE is used) the partially rejected NSSAI the pending NSSAI or NSSRG information when included in the REGISTRATION ACCEPT message

the AMF shall include the allowed NSSAI for the current PLMN or SNPN and shall include the mapped S-NSSAI(s) for the allowed NSSAI contained in the requested NSSAI from the UE if available in the REGISTRATION ACCEPT message if the UE included the requested NSSAI in the REGISTRATION REQUEST message and the AMF allows one or more S-NSSAIs in the requested NSSAI additionally if the AMF allows one or more subscribed S-NSSAIs for the UE the AMF may include the allowed subscribed S-NSSAI(s) in the allowed NSSAI in the REGISTRATION ACCEPT message

the AMF may also include rejected NSSAI in the REGISTRATION ACCEPT message if the initial registration request is not for onboarding services in SNPN if the UE has set the ER-NSSAI bit to "Extended rejected NSSAI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message the rejected NSSAI shall be included in the extended rejected NSSAI IE in the REGISTRATION ACCEPT message; otherwise the rejected NSSAI shall be included in the rejected NSSAI IE in the REGISTRATION ACCEPT message if the initial registration request is for onboarding services in SNPN the AMF shall not include rejected NSSAI in the REGISTRATION ACCEPT message

if the UE has indicated the support for partial network slice and the AMF determines one or more S-NSSAI(s) in the requested NSSAI are to be included in the partially rejected NSSAI as specified in subclause 4.6.2.11 the AMF shall include the partially rejected NSSAI IE in the registration accept type 6 IE container IE of the REGISTRATION ACCEPT message

if the UE receives the partially rejected NSSAI IE in the registration accept type 6 IE container IE of the REGISTRATION ACCEPT message the UE shall store the partially rejected NSSAI as specified in subclause 4.6.2.2

if the UE has set the ER-NSSAI bit to "Extended rejected NSSAI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message the rejected NSSAI contains S-NSSAI(s) which was included in the requested NSSAI but rejected by the network associated with rejection cause(s); otherwise the rejected NSSAI contains S-NSSAI(s) which was included in the requested NSSAI but rejected by the network associated with rejection cause(s) with the following restrictions

a) rejected NSSAI for the current PLMN or SNPN shall not include an S-NSSAI for the current PLMN or SNPN which is associated to multiple mapped S-NSSAIs and some of these but not all mapped S-NSSAIs are not allowed; and

b) rejected NSSAI for the current registration area shall not include an S-NSSAI for the current PLMN or SNPN which is associated to multiple mapped S-NSSAIs and some of these but not all mapped S-NSSAIs are not allowed

NOTE 12 the UE that does not support extended rejected NSSAI can avoid requesting an S-NSSAI associated with a mapped S-NSSAI which was included in the previous requested NSSAI but neither in the allowed NSSAI nor in the rejected NSSAI in the consequent registration procedures

if the UE indicated the support for network slice-specific authentication and authorization and if the requested NSSAI IE includes one or more S-NSSAIs subject to network slice-specific authentication and authorization the AMF shall in the REGISTRATION ACCEPT message include

a) the allowed NSSAI containing the S-NSSAI(s) or the mapped S-NSSAI(s) if any

1) which are not subject to network slice-specific authentication and authorization and are allowed by the AMF; or

2) for which the network slice-specific authentication and authorization has been successfully performed;

aa) the partially allowed NSSAI containing the S-NSSAI(s) or the mapped S-NSSAI(s) if any

1) which are not subject to network slice-specific authentication and authorization and are allowed by the AMF; or

2) for which the network slice-specific authentication and authorization has been successfully performed;

b) optionally the rejected NSSAI;

ba) optionally the partially rejected NSSAI;

c) pending NSSAI containing one or more S-NSSAIs for which network slice-specific authentication and authorization (except for re-NSSAA) will be performed or is ongoing and one or more S-NSSAIs from the pending NSSAI which the AMF provided to the UE during the previous registration procedure for which network slice-specific authentication and authorization will be performed or is ongoing if any; and

d) the "NSSAA to be performed" indicator in the 5GS registration result IE set to indicate that the network slice-specific authentication and authorization procedure will be performed by the network if the allowed NSSAI is not included in the REGISTRATION ACCEPT message

if the initial registration request is not for onboarding services in SNPN the UE indicated the support for network slice-specific authentication and authorization and

a) the UE did not include the requested NSSAI in the REGISTRATION REQUEST message or none of the S-NSSAIs in the requested NSSAI in the REGISTRATION REQUEST message are allowed;

b) all default S-NSSAIs are subject to network slice-specific authentication and authorization; and

c) the network slice-specific authentication and authorization procedure has not been successfully performed for any of the default S-NSSAIs

the AMF shall in the REGISTRATION ACCEPT message include

a) the "NSSAA to be performed" indicator in the 5GS registration result IE to indicate that the network slice-specific authentication and authorization procedure will be performed by the network;

b) pending NSSAI containing one or more default S-NSSAIs for which network slice-specific authentication and authorization will be performed or is ongoing and one or more S-NSSAIs from the pending NSSAI which the AMF provided to the UE during the previous registration procedure for which network slice-specific authentication and authorization will be performed or is ongoing (if any);

c) optionally the rejected NSSAI; and

e) optionally the partially rejected NSSAI

if the initial registration request is not for onboarding services in SNPN the UE indicated the support for network slice-specific authentication and authorization and

a) the UE did not include the requested NSSAI in the REGISTRATION REQUEST message or none of the S-NSSAIs in the requested NSSAI in the REGISTRATION REQUEST message are allowed; and

b) one or more default S-NSSAIs are not subject to network slice-specific authentication and authorization or the network slice-specific authentication and authorization procedure has been successfully performed for one or more default S-NSSAIs;

the AMF shall in the REGISTRATION ACCEPT message include

a) pending NSSAI containing one or more default S-NSSAIs for which network slice-specific authentication and authorization will be performed or is ongoing (if any) and one or more S-NSSAIs from the pending NSSAI which the AMF provided to the UE during the previous registration procedure for which network slice-specific authentication and authorization will be performed or is ongoing (if any);

b) allowed NSSAI containing S-NSSAI(s) for the current PLMN each of which corresponds to a default S-NSSAI which are not subject to network slice-specific authentication and authorization or for which the network slice-specific authentication and authorization has been successfully performed;

c) allowed NSSAI containing one or more default S-NSSAIs as the mapped S-NSSAI(s) for the allowed NSSAI in roaming scenarios which are not subject to network slice-specific authentication and authorization or for which the network slice-specific authentication and authorization has been successfully performed; and

d) optionally the rejected NSSAI

if the UE did not include the requested NSSAI in the REGISTRATION REQUEST message or none of the S-NSSAIs in the requested NSSAI in the REGISTRATION REQUEST message are allowed the allowed NSSAI shall not contain default S-NSSAI(s) that are subject to NSAC if the subscription information includes the NSSRG information the S-NSSAIs of the allowed NSSAI shall be associated with at least one common NSSRG value

when the REGISTRATION ACCEPT message includes a pending NSSAI the pending NSSAI shall contain all S-NSSAIs for which network slice-specific authentication and authorization (except for re-NSSAA) will be performed or is ongoing from the requested NSSAI of the REGISTRATION REQUEST message that was received over the 3GPP access non-3GPP access or both the 3GPP access and non-3GPP access

if the UE supports extended rejected NSSAI and the AMF determines that maximum number of UEs reached for one or more S-NSSAI(s) in the requested NSSAI as specified in subclause 4.6.2.5 the AMF shall include the rejected NSSAI containing one or more S-NSSAIs with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" in the extended rejected NSSAI IE in the REGISTRATION ACCEPT message in addition the AMF may include a back-off timer value for each S-NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" included in the extended rejected NSSAI IE of the REGISTRATION ACCEPT message to avoid that large numbers of UEs simultaneously initiate deferred requests the network should select the value for the backoff timer for each S-NSSAI for the informed UEs so that timeouts are not synchronised

if the UE does not indicate support for extended rejected NSSAI and the maximum number of UEs has been reached the AMF should include the rejected NSSAI containing one or more S-NSSAIs with the rejection cause "S-NSSAI not available in the current registration area" in the rejected NSSAI IE and should not include these S-NSSAIs in the allowed NSSAI in the REGISTRATION ACCEPT message

NOTE 13 based on network policies the AMF can include the S-NSSAI(s) for which the maximum number of UEs has been reached in the rejected NSSAI with rejection causes other than "S-NSSAI not available in the current registration area"

if the UE indicates support for network slice usage control and the AMF determines to provide on-demand NSSAI the AMF shall include the On-demand NSSAI IE in the REGISTRATION ACCEPT message in addition the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3

if the AMF has a new configured NSSAI for the current PLMN or SNPN the AMF shall include the configured NSSAI for the current PLMN or SNPN in the REGISTRATION ACCEPT message

NOTE 13A a new configured NSSAI can be available at the AMF following an indication that the subscription data for network slicing has changed

the AMF may include a new configured NSSAI for the current PLMN or SNPN in the REGISTRATION ACCEPT message if

a) the REGISTRATION REQUEST message did not include the requested NSSAI and the initial registration request is not for onboarding services in SNPN;

b) the REGISTRATION REQUEST message included the requested NSSAI containing an S-NSSAI that is not valid in the serving PLMN or SNPN;

c) the REGISTRATION REQUEST message included the requested NSSAI containing S-NSSAI(s) with incorrect mapped S-NSSAI(s);

d) the REGISTRATION REQUEST message included the network slicing indication IE with the default configured NSSAI indication bit set to "Requested NSSAI created from default configured NSSAI";

e) the S-NSSAIs of the requested NSSAI in the REGISTRATION REQUEST message are not associated with any common NSSRG value except for the case that the AMF based on the indication received from the UDM as specified in 3GPP TS 23.501 [8] has provided all subscribed S-NSSAIs in the configured NSSAI to a UE who does not support NSSRG; or

NOTE 14 if the S-NSSAIs of the requested NSSAI in the REGISTRATION REQUEST message are not associated with any common NSSRG value it is possible that at least one of the S-NSSAIs is not included in any of new allowed NSSAI new (extended) rejected NSSAI (if applicable) and new pending NSSAI (if applicable)

f) the UE is in 5GMM-REGISTERED state over the other access and the S-NSSAIs of the requested NSSAI in the REGISTRATION REQUEST message over the current access and the allowed NSSAI over the other access are not associated with any common NSSRG value

the AMF may include a new configured NSSAI for the current PLMN or SNPN in the REGISTRATION ACCEPT message if the REGISTRATION REQUEST message includes a requested NSSAI containing an S-NSSAI and the S-NSSAI time validity information if available indicates that the S-NSSAI is not available (see 3GPP TS 23.501 [8]) in this case if the TempNS bit of the 5GMM capability IE in the REGISTRATION REQUEST message is set to

a) "S-NSSAI time validity information supported" and the S-NSSAI time validity information indicates that the S-NSSAI will

1) become available again then the AMF shall also send S-NSSAI time validity information; or

2) not become available again then the AMF shall not include the S-NSSAI in the new configured NSSAI; or

b) "S-NSSAI time validity information not supported" and the AMF sends a new configured NSSAI then the AMF shall not include the S-NSSAI in the new configured NSSAI

if a new configured NSSAI for the current PLMN is included in the REGISTRATION ACCEPT message the subscription information includes the NSSRG information and the NSSRG bit in the 5GMM capability IE of the REGISTRATION REQUEST message is set to

a) "NSSRG supported" then the AMF shall include the NSSRG information in the REGISTRATION ACCEPT message; or

b) "NSSRG not supported" then the configured NSSAI shall include one or more S-NSSAIs each of which is associated with all the NSSRG value(s) of the default S-NSSAI(s) or the configured NSSAI shall include based on the indication received from the UDM as specified in 3GPP TS 23.501 [8] all subscribed S-NSSAIs even if these S-NSSAIs do not share any common NSSRG value

if the AMF needs to update the NSSRG information and the UE has set the NSSRG bit to "NSSRG supported" in the 5GMM capability IE of the REGISTRATION REQUEST message then the AMF shall include the new NSSRG information in the REGISTRATION ACCEPT message in addition the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3

if the UE supports S-NSSAI time validity information and the AMF needs to update the S-NSSAI time validity information then the AMF shall include the S-NSSAI time validity information IE in the REGISTRATION ACCEPT message in addition the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3

if the UE supports S-NSSAI location validity information and the AMF needs to update the S-NSSAI location validity information then the AMF shall include the new S-NSSAI location validity information in the registration accept type 6 IE container IE of the REGISTRATION ACCEPT message in addition the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3

if the UE has set the NSAG bit to "NSAG supported" in the 5GMM capability IE of the REGISTRATION REQUEST message over 3GPP access the AMF may include the NSAG information IE in the REGISTRATION ACCEPT message up to 4 NSAG entries are allowed to be associated with a TAI list in the NSAG information IE if the UE has set the RCMAN bit to "Sending of REGISTRATION COMPLETE message for NSAG information supported" in the 5GMM capability IE of the REGISTRATION REQUEST message and if the NSAG information IE is included in the REGISTRATION ACCEPT message the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3

NOTE 14A how the AMF selects NSAG entries to be included in the NSAG information IE is implementation specific e.g take the NSAG priority and the current registration area into account

NOTE 14B if the NSAG for the PLMN and its equivalent PLMN(s) have different associations with S-NSSAIs then the AMF includes a TAI list for the NSAG entry in the NSAG information IE

if the UE receives the NSAG information IE in the REGISTRATION ACCEPT message the UE shall store the NSAG information as specified in subclause 4.6.2.2

if the UE supports network slice replacement and the AMF determines to provide the mapping information between the S-NSSAI to be replaced and the alternative S-NSSAI to the UE then the AMF shall include the alternative NSSAI IE the allowed NSSAI IE including the alternative S-NSSAI if not included in the current allowed NSSAI and the configured NSSAI IE including the alternative S-NSSAI if not included in the current configured NSSAI in the REGISTRATION ACCEPT message if the AMF determines that the replaced S-NSSAI is available then the AMF shall provide the updated alternative NSSAI excluding the replaced S-NSSAI and the corresponding alternative S-NSSAI in the alternative NSSAI IE in the REGISTRATION ACCEPT message if the AMF determines that all the replaced S-NSSAI(s) are available then the AMF shall provide the alternative NSSAI IE with length of alternative NSSAI contents set to 0 in the REGISTRATION ACCEPT message in addition the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3 if the AMF determines that the replaced S-NSSAI is not supported due to the UE moving outside of NS-AoS of the S-NSSAI while the alternative S-NSSAI is available then the AMF shall provide the updated allowed NSSAI and partially allowed NSSAI if available excluding the replaced S-NSSAI if included in the allowed NSSAI or partially allowed NSSAI in the REGISTRATION ACCEPT message

if the UE receives the alternative NSSAI IE in the REGISTRATION ACCEPT message the UE shall store the alternative NSSAI as specified in subclause 4.6.2.2

if the UE has indicated the support for partial network slice and the AMF determines one or more S-NSSAI(s) in the requested NSSAI are to be included in the partially allowed NSSAI as specified in subclause 4.6.2.11 the AMF shall include the partially allowed NSSAI IE in the registration accept type 6 IE container IE of the REGISTRATION ACCEPT message

if the UE receives the partially allowed NSSAI IE in the registration accept type 6 IE container IE of the REGISTRATION ACCEPT message the UE shall store the partially allowed NSSAI as specified in subclause 4.6.2.2

if the UE requests ciphering keys for ciphered broadcast assistance data in the REGISTRATION REQUEST message and the AMF has valid ciphering key data applicable to the UE's subscription and current tracking area then the AMF shall include the ciphering key data in the ciphering key data IE of the REGISTRATION ACCEPT message

the AMF shall include the network slicing indication IE with the network slicing subscription change indication set to "Network slicing subscription changed" in the REGISTRATION ACCEPT message if the UDM has indicated that the subscription data for network slicing has changed in this case the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3

the UE that has indicated the support for network slice-specific authentication and authorization receiving the pending NSSAI in the REGISTRATION ACCEPT message shall store the S-NSSAI(s) in the pending NSSAI as specified in subclause 4.6.2.2 if the registration area contains TAIs belonging to different PLMNs which are equivalent PLMNs the UE shall store the received pending NSSAI for each of the equivalent PLMNs as specified in subclause 4.6.2.2 if the pending NSSAI is not included in the REGISTRATION ACCEPT message and the "NSSAA to be performed" indicator is not set to "Network slice-specific authentication and authorization is to be performed" in the 5GS registration result IE of the REGISTRATION ACCEPT message then the UE shall delete the pending NSSAI for the current PLMN and its equivalent PLMN(s) or SNPN if existing as specified in subclause 4.6.2.2

the UE receiving the rejected NSSAI in the REGISTRATION ACCEPT message takes the following actions based on the rejection cause in the rejected S-NSSAI(s)

"S-NSSAI not available in the current PLMN or SNPN"

the UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current PLMN or SNPN as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current PLMN or SNPN over any access until switching off the UE the UICC containing the USIM is removed the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated or the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2

"S-NSSAI not available in the current registration area"

the UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current registration area as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current registration area over the current until switching off the UE the UE moving out of the current registration area the UICC containing the USIM is removed the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated or the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2

"S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization"

the UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the failed or revoked NSSAA as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN or SNPN over any access until switching off the UE the UICC containing the USIM is removed the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated or the rejected S-NSSAI(s) are removed as described in subclause 4.6.1 and 4.6.2.2

"S-NSSAI not available due to maximum number of UEs reached"

unless the back-off timer value received along with the S-NSSAI is zero the UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the maximum number of UEs reached as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN or SNPN over the current access until switching off the UE the UICC containing the USIM is removed the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated or the rejected S-NSSAI(s) are removed as described in subclauses 4.6.1 and 4.6.2.2

NOTE 15 if the back-off timer value received along with the S-NSSAI in the rejected NSSAI for the maximum number of UEs reached is zero as specified in subclause 10.5.7.4a of 3GPP TS 24.008 [12] the UE does not consider the S-NSSAI as the rejected S-NSSAI

if there is one or more S-NSSAIs in the rejected NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" then for each S-NSSAI the UE shall behave as follows

a) stop the timer T3526 associated with the S-NSSAI if running;

b) start the timer T3526 with

1) the back-off timer value received along with the S-NSSAI if a back-off timer value is received along with the S-NSSAI that is neither zero nor deactivated; or

2) an implementation specific back-off timer value if no back-off timer value is received along with the S-NSSAI; and

c) remove the S-NSSAI from the rejected NSSAI for the maximum number of UEs reached when the timer T3526 associated with the S-NSSAI expires

if the UE sets the NSSAA bit in the 5GMM capability IE to "Network slice-specific authentication and authorization not supported" and

a) if the requested NSSAI IE only includes the S-NSSAI(s) subject to network slice-specific authentication and authorization and one or more default S-NSSAIs (containing one or more S-NSSAIs each of which may be associated with a new S-NSSAI) which are not subject to network slice-specific authentication and authorization are available the AMF shall in the REGISTRATION ACCEPT message include

1) the allowed NSSAI or the partially allowed NSSAI containing S-NSSAI(s) for the current PLMN or SNPN each of which corresponds to a default S-NSSAI which are not subject to network slice-specific authentication and authorization;

2) the allowed NSSAI or the partially allowed NSSAI containing the default S-NSSAIs as the mapped S-NSSAI(s) for the allowed NSSAI in roaming scenarios which are not subject to network slice-specific authentication and authorization; and

3) the rejected NSSAI containing the S-NSSAI(s) subject to network slice specific authentication and authorization with the rejection cause indicating "S-NSSAI not available in the current PLMN or SNPN" except if the UE has not set the ER-NSSAI bit to "Extended rejected NSSAI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message and the S-NSSAI(s) is associated to multiple mapped S-NSSAIs and some of these but not all mapped S-NSSAIs are subject to NSSAA; or

b) if the requested NSSAI IE includes one or more S-NSSAIs subject to network slice-specific authentication and authorization the AMF shall in the REGISTRATION ACCEPT message include

1) the allowed NSSAI or the partially allowed NSSAI containing the S-NSSAI(s) or the mapped S-NSSAI(s) which are not subject to network slice-specific authentication and authorization; and

2) the rejected NSSAI containing

i) the S-NSSAI(s) subject to network slice specific authentication and authorization with the rejection cause indicating "S-NSSAI not available in the current PLMN or SNPN" except if the UE has not set the ER-NSSAI bit to "Extended rejected NSSAI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message and the S-NSSAI is associated to multiple mapped S-NSSAIs and some of these but not all mapped S-NSSAIs are subject to NSSAA; and

ii) the S-NSSAI(s) which was included in the requested NSSAI but rejected by the network associated with the rejection cause indicating "S-NSSAI not available in the current PLMN or SNPN" or the rejection cause indicating "S-NSSAI not available in the current registration area" if any

if the UE does not indicate support for network slice-specific authentication and authorization the initial registration request is not for onboarding services in SNPN and if

a) the UE did not include the requested NSSAI in the REGISTRATION REQUEST message; or

b) none of the S-NSSAIs in the requested NSSAI in the REGISTRATION REQUEST message are allowed;

and one or more default S-NSSAIs (containing one or more S-NSSAIs each of which may be associated with a new S-NSSAI) which are not subject to network slice-specific authentication and authorization are available the AMF shall

a) put the allowed S-NSSAI(s) for the current PLMN or SNPN each of which corresponds to a default S-NSSAI and not subject to network slice-specific authentication and authorization in the allowed NSSAI of the REGISTRATION ACCEPT message;

b) put the default S-NSSAIs and not subject to network slice-specific authentication and authorization as the mapped S-NSSAI(s) for the allowed NSSAI in roaming scenarios in the allowed NSSAI of the REGISTRATION ACCEPT message; and

c) determine a registration area such that all S-NSSAIs of the allowed NSSAI are available in the registration area

if the REGISTRATION ACCEPT message contains the network slicing indication IE with the network slicing subscription change indication set to "Network slicing subscription changed" the UE shall delete the network slicing information and the NSSAI inclusion mode for each and every PLMN or SNPN except for the current PLMN or SNPN as specified in subclause 4.6.2.2 and remove all tracking areas from the list of "5GS forbidden tracking areas for roaming" which were added due to rejection of S-NSSAI due to "S-NSSAI not available in the current registration area"

if the REGISTRATION ACCEPT message contains the allowed NSSAI then the UE shall store the included allowed NSSAI together with the PLMN identity of the registered PLMN or the SNPN identity of the registered SNPN and the registration area as specified in subclause 4.6.2.2 if the registration area contains TAIs belonging to different PLMNs which are equivalent PLMNs the UE shall store the received allowed NSSAI in each of allowed NSSAIs which are associated with each of the PLMNs

if the REGISTRATION ACCEPT message contains a configured NSSAI IE with a new configured NSSAI for the current PLMN or SNPN and optionally the mapped S-NSSAI(s) for the configured NSSAI for the current PLMN or SNPN the UE shall store the contents of the configured NSSAI IE as specified in subclause 4.6.2.2 in addition if the REGISTRATION ACCEPT message contains

a) an NSSRG information IE the UE shall store the contents of the NSSRG information IE as specified in subclause 4.6.2.2 if the UE receives a new configured NSSAI in the REGISTRATION ACCEPT message and no NSSRG information IE the UE shall delete any stored NSSRG information if any as specified in subclause 4.6.2.2;

b) an S-NSSAI location validity information in the registration accept type 6 IE container IE the UE shall store the contents of the S-NSSAI location validity information as specified in subclause 4.6.2.2 if the UE receives a configured NSSAI IE in the REGISTRATION ACCEPT message and no S-NSSAI location validity information the UE shall delete any stored S-NSSAI location validity information as specified in subclause 4.6.2.2;

c) an S-NSSAI time validity information IE the UE shall store the contents of the S-NSSAI time validity information IE as specified in subclause 4.6.2.2 if the UE receives a configured NSSAI IE in the REGISTRATION ACCEPT message and no S-NSSAI time validity information IE the UE shall delete any stored S-NSSAI time validity information as specified in subclause 4.6.2.2; or

d) an On-demand NSSAI IE the UE shall store the contents of the On-demand NSSAI IE as specified in subclause 4.6.2.2 if the UE receives a configured NSSAI IE in the REGISTRATION ACCEPT message and no On-demand NSSAI IE the UE shall delete any stored on-demand NSSAI as specified in subclause 4.6.2.2 the UE shall stop slice deregistration inactivity timer if running for the S-NSSAI which is deleted from the on-demand NSSAI

if the REGISTRATION ACCEPT message

a) includes the 5GS registration result IE with the "NSSAA to be performed" indicator set to "Network slice-specific authentication and authorization is to be performed";

b) includes a pending NSSAI;

c) does not include an allowed NSSAI; and

d) does not include an partially allowed NSSAI

the UE shall delete the stored allowed NSSAI if any as specified in subclause 4.6.2.2 and the UE

a) shall not initiate a 5GSM procedure except for emergency services ; and

b) shall not initiate a service request procedure except for cases f) i) m) and o) in subclause 5.6.1.1;

c) shall not initiate an NAS transport procedure except for sending SMS an LPP message a UPP-CMI container an SLPP message a location service message an SOR transparent container a UE policy container a UE parameters update transparent container or a CIoT user data container;

until the UE receives an allowed NSSAI a partially allowed NSSAI or both

if the UE included S1 mode supported indication in the REGISTRATION REQUEST message the AMF supporting interworking with EPS shall set the IWK N26 bit to either

a) "interworking without N26 interface not supported" if the AMF supports N26 interface; or

b) "interworking without N26 interface supported" if the AMF does not support N26 interface

in the 5GS network feature support IE in the REGISTRATION ACCEPT message

the UE supporting S1 mode shall operate in the mode for interworking with EPS as follows

a) if the IWK N26 bit in the 5GS network feature support IE is set to "interworking without N26 interface not supported" the UE shall operate in single-registration mode;

b) if the IWK N26 bit in the 5GS network feature support IE is set to "interworking without N26 interface supported" and the UE supports dual-registration mode the UE may operate in dual-registration mode; or

NOTE 16 the registration mode used by the UE is implementation dependent

c) if the IWK N26 bit in the 5GS network feature support IE is set to "interworking without N26 interface supported" and the UE only supports single-registration mode the UE shall operate in single-registration mode

the UE shall store the received interworking without N26 interface indicator for interworking with EPS as specified in subclause C.1 and treat it as valid in the entire PLMN and its equivalent PLMN(s)

the network informs the UE about the support of specific features such as IMS voice over PS session location services (5G-LCS) emergency services emergency services fallback ATSSS and non-3GPP access path switching in the 5GS network feature support information element in a UE with IMS voice over PS session capability the IMS voice over PS session indicator the emergency services support indicator and the emergency services fallback indicator shall be provided to the upper layers the upper layers take the IMS voice over PS session indicator into account when selecting the access domain for voice sessions or calls in a UE with LCS capability location services indicator (5G-LCS) shall be provided to the upper layers when initiating an emergency call the upper layers also take the IMS voice over PS session indicator the emergency services support indicator and the emergency services fallback indicator into account for the access domain selection in a UE with the capability for ATSSS the network support for ATSSS shall be provided to the upper layers if the UE receives the 5GS network feature support IE with the ATSSS support indicator set to "ATSSS not supported" the UE shall perform a local release of the MA PDU session if any in a UE that supports non-3GPP access path switching the network support for non-3GPP access path switching shall be provided to the upper layers if the UE receives the 5GS network feature support IE with the NAPS bit set to "non-3GPP access path switching not supported" the UE shall not perform the registration procedure for mobility registration update for non-3GPP access path switching

NOTE 17 if the UE is registered to different PLMNs over 3GPP and non-3GPP accesses the UE uses the capability received over non-3GPP access to determine whether to initiate the registration procedure for mobility registration update for non-3GPP path switching

the AMF shall set the EMF bit in the 5GS network feature support IE to

a) "Emergency services fallback supported in NR connected to 5GCN and E-UTRA connected to 5GCN" if the network supports the emergency services fallback procedure when the UE is in an NR cell connected to 5GCN or an E-UTRA cell connected to 5GCN;

b) "Emergency services fallback supported in NR connected to 5GCN only" if the network supports the emergency services fallback procedure when the UE is in an NR cell connected to 5GCN and does not support the emergency services fallback procedure when the UE is in an E-UTRA cell connected to 5GCN;

c) "Emergency services fallback supported in E-UTRA connected to 5GCN only" if the network supports the emergency services fallback procedure when the UE is in an E-UTRA cell connected to 5GCN and does not support the emergency services fallback procedure when the UE is in an NR cell connected to 5GCN; or

d) "Emergency services fallback not supported" if network does not support the emergency services fallback procedure when the UE is in any cell connected to 5GCN

NOTE 18 if the emergency services are supported in neither the EPS nor the 5GS homogeneously based on operator policy the AMF will set the EMF bit in the 5GS network feature support IE to "Emergency services fallback not supported"

NOTE 19 even though the AMF's support of emergency services fallback is indicated per RAT the UE's support of emergency services fallback is not per RAT i.e the UE's support of emergency services fallback is the same for both NR connected to 5GCN and E-UTRA connected to 5GCN

access identity 1 is only applicable while the UE is in N1 mode access identity 2 is only applicable while the UE is in N1 mode

when the UE is registered to the same PLMN or SNPN over 3GPP and non-3GPP access the UE and the AMF maintain one MPS indicator and one MCS indicator that are common to both 3GPP and non-3GPP access when the UE is registered to different PLMNs or SNPNs over 3GPP access and non-3GPP access the UE maintains two MPS indicators and two MCS indicators separately for different accesses i.e. an MPS indicator and an MCS indicator for the 3GPP access and another MPS indicator and an MCS indicator for the non-3GPP access for both 3GPP and non-3GPP access the access identity is determined according to subclause 4.5.2

- if the UE is not operating in SNPN access operation mode

a) the network informs the UE that the use of access identity 1 is valid in the RPLMN or equivalent PLMN by setting the MPS indicator bit of the 5GS network feature support IE to "Access identity 1 valid" in the REGISTRATION ACCEPT message based on operator policy the AMF sets the MPS indicator bit in the REGISTRATION ACCEPT message based on the MPS priority information in the user's subscription context obtained from the UDM;

b) upon receiving a REGISTRATION ACCEPT message with the MPS indicator bit set to "Access identity 1 valid"

- via 3GPP access; or

- via non-3GPP access if the UE is registered to the same PLMN over 3GPP access and non-3GPP access;

the UE shall act as a UE with access identity 1 configured for MPS as described in subclause 4.5.2 in all NG-RAN of the registered PLMN and its equivalent PLMNs the MPS indicator bit in the 5GS network feature support IE provided in the REGISTRATION ACCEPT message is valid in all NG-RAN of the registered PLMN and its equivalent PLMNs until the UE receives a REGISTRATION ACCEPT message or a CONFIGURATION UPDATE COMMAND message with the MPS indicator bit set to "Access identity 1 not valid"

- via 3GPP access; or

- via non-3GPP access if the UE is registered to the same PLMN over 3GPP access and non-3GPP access; or

until the UE selects a non-equivalent PLMN over 3GPP access;

b1) upon receiving a REGISTRATION ACCEPT message with the MPS indicator bit set to "Access identity 1 valid"

- via non-3GPP access; or

- via 3GPP access if the UE is registered to the same PLMN over 3GPP access and non-3GPP access;

the UE shall act as a UE with access identity 1 configured for MPS as described in subclause 4.5.2 in non-3GPP access of the registered PLMN and its equivalent PLMNs the MPS indicator bit in the 5GS network feature support IE provided in the REGISTRATION ACCEPT message is valid in non-3GPP access of the registered PLMN and its equivalent PLMNs until the UE receives a REGISTRATION ACCEPT message or a CONFIGURATION UPDATE COMMAND message with the MPS indicator bit set to "Access identity 1 not valid"

- via non-3GPP access; or

- via 3GPP access if the UE is registered to the same PLMN over 3GPP access and non-3GPP access; or

until the UE selects a non-equivalent PLMN over non-3GPP access;

c) the network informs the UE that the use of access identity 2 is valid in the RPLMN or equivalent PLMN by setting the MCS indicator bit of the 5GS network feature support IE to "Access identity 2 valid" in the REGISTRATION ACCEPT message based on operator policy the AMF sets the MCS indicator bit in the REGISTRATION ACCEPT message based on the MCS priority information in the user's subscription context obtained from the UDM;

d) upon receiving a REGISTRATION ACCEPT message with the MCS indicator bit set to "Access identity 2 valid"

- via 3GPP access; or

- via non-3GPP access if the UE is registered to the same PLMN over 3GPP access and non-3GPP access;

the UE shall act as a UE with access identity 2 configured for MCS as described in subclause 4.5.2 in all NG-RAN of the registered PLMN and its equivalent PLMNs the MCS indicator bit in the 5GS network feature support IE provided in the REGISTRATION ACCEPT message is valid in all NG-RAN of the registered PLMN and its equivalent PLMNs until the UE receives a REGISTRATION ACCEPT message or a CONFIGURATION UPDATE COMMAND message with the MCS indicator bit set to "Access identity 2 not valid"

- via 3GPP access; or

- via non-3GPP access if the UE is registered to the same PLMN over 3GPP access and non-3GPP access; or

until the UE selects a non-equivalent PLMN over 3GPP access; and

d1) upon receiving a REGISTRATION ACCEPT message with the MCS indicator bit set to "Access identity 2 valid"

- via non-3GPP access; or

- via 3GPP access if the UE is registered to the same PLMN over 3GPP access and non-3GPP access;

the UE shall act as a UE with access identity 2 configured for MCS as described in subclause 4.5.2 in non-3GPP access of the registered PLMN and its equivalent PLMNs the MCS indicator bit in the 5GS network feature support IE provided in the REGISTRATION ACCEPT message is valid in non-3GPP access of the registered PLMN and its equivalent PLMNs until the UE receives a REGISTRATION ACCEPT message or a CONFIGURATION UPDATE COMMAND message with the MCS indicator bit set to "Access identity 2 not valid"

- via non-3GPP access; or

- via 3GPP access if the UE is registered to the same PLMN over 3GPP access and non-3GPP access; or

until the UE selects a non-equivalent PLMN over non-3GPP access; or

- if the UE is operating in SNPN access operation mode

a) the network informs the UE that the use of access identity 1 is valid in the RSNPN or equivalent SNPN by setting the MPS indicator bit of the 5GS network feature support IE to "Access identity 1 valid" in the REGISTRATION ACCEPT message based on operator policy the AMF sets the MPS indicator bit in the REGISTRATION ACCEPT message based on the MPS priority information in the user's subscription context obtained from the UDM;

b) upon receiving a REGISTRATION ACCEPT message with the MPS indicator bit set to "Access identity 1 valid"

- via 3GPP access; or

- via non-3GPP access if the UE is registered to the same SNPN over 3GPP access and non-3GPP access;

the UE shall act as a UE with access identity 1 configured for MPS as described in subclause 4.5.2A in all NG-RAN of the registered SNPN and its equivalent SNPNs the MPS indicator bit in the 5GS network feature support IE provided in the REGISTRATION ACCEPT message is valid in all NG-RAN of the registered SNPN and its equivalent SNPNs until the UE receives a REGISTRATION ACCEPT message or a CONFIGURATION UPDATE COMMAND message with the MPS indicator bit set to "Access identity 1 not valid"

- via 3GPP access; or

- via non-3GPP access if the UE is registered to the same SNPN over 3GPP access and non-3GPP access; or

until the UE selects a non-equivalent SNPN over 3GPP access;

b1) upon receiving a REGISTRATION ACCEPT message with the MPS indicator bit set to "Access identity 1 valid"

- via non-3GPP access; or

- via 3GPP access if the UE is registered to the same SNPN over 3GPP access and non-3GPP access;

the UE shall act as a UE with access identity 1 configured for MPS as described in subclause 4.5.2A in non-3GPP access of the registered SNPN and its equivalent SNPNs the MPS indicator bit in the 5GS network feature support IE provided in the REGISTRATION ACCEPT message is valid in non-3GPP access of the registered SNPN and its equivalent SNPNs until the UE receives a REGISTRATION ACCEPT message or a CONFIGURATION UPDATE COMMAND message with the MPS indicator bit set to "Access identity 1 not valid";

- via non-3GPP access; or

- via 3GPP access if the UE is registered to the same SNPN over 3GPP access and non-3GPP access; or

until the UE selects a non-equivalent SNPN over non-3GPP access;

c) the network informs the UE that the use of access identity 2 is valid in the RSNPN or equivalent SNPN by setting the MCS indicator bit of the 5GS network feature support IE to "Access identity 2 valid" in the REGISTRATION ACCEPT message based on operator policy the AMF sets the MCS indicator bit in the REGISTRATION ACCEPT message based on the MCS priority information in the user's subscription context obtained from the UDM;

d) upon receiving a REGISTRATION ACCEPT message with the MCS indicator bit set to "Access identity 2 valid"

- via 3GPP access; or

- via non-3GPP access if the UE is registered to the same SNPN over 3GPP access and non-3GPP access;

the UE shall act as a UE with access identity 2 configured for MCS as described in subclause 4.5.2A in all NG-RAN of the registered SNPN and its equivalent SNPNs the MCS indicator bit in the 5GS network feature support IE provided in the REGISTRATION ACCEPT message is valid in all NG-RAN of the registered SNPN and its equivalent SNPNs until the UE receives a REGISTRATION ACCEPT message or a CONFIGURATION UPDATE COMMAND message with the MCS indicator bit set to "Access identity 2 not valid"

- via 3GPP access; or

- via non-3GPP access if the UE is registered to the same SNPN over 3GPP access and non-3GPP access; or

until the UE selects a non-equivalent SNPN over 3GPP access; and

d1) upon receiving a REGISTRATION ACCEPT message with the MCS indicator bit set to "Access identity 2 valid"

- via non-3GPP access; or

- via 3GPP access if the UE is registered to the same SNPN over 3GPP access and non-3GPP access;

the UE shall act as a UE with access identity 2 configured for MCS as described in subclause 4.5.2A in non-3GPP access of the registered SNPN and its equivalent SNPNs the MCS indicator bit in the 5GS network feature support IE provided in the REGISTRATION ACCEPT message is valid in non-3GPP access of the registered SNPN and its equivalent SNPNs until the UE receives a REGISTRATION ACCEPT message or a CONFIGURATION UPDATE COMMAND message with the MCS indicator bit set to "Access identity 2 not valid"

- via non-3GPP access; or

- via 3GPP access if the UE is registered to the same SNPN over 3GPP access and non-3GPP access; or

until the UE selects a non-equivalent SNPN over non-3GPP access

if the UE indicates support for restriction on use of enhanced coverage in the REGISTRATION REQUEST message and

a) in WB-N1 mode the AMF decides to restrict the use of CE mode b for the UE then the AMF shall set the RestrictEC bit to "CE mode b is restricted";

b) in WB-N1 mode the AMF decides to restrict the use of both CE mode a and CE mode b for the UE then the AMF shall set the RestrictEC bit to " both CE mode a and CE mode b are restricted"; or

c) in NB-N1 mode the AMF decides to restrict the use of enhanced coverage for the UE then the AMF shall set the RestrictEC bit to "Use of enhanced coverage is restricted"

in the 5GS network feature support IE in the REGISTRATION ACCEPT message

if the UE indicates support of the N1 NAS signalling connection release in the REGISTRATION REQUEST message and the network decides to accept the N1 NAS signalling connection release then the AMF shall set the N1 NAS signalling connection release bit to "N1 NAS signalling connection release supported" in the 5GS network feature support IE of the REGISTRATION ACCEPT message

if the UE indicates support of the paging indication for voice services in the REGISTRATION REQUEST message and the network decides to accept the paging indication for voice services then the AMF shall set the paging indication for voice services bit to "paging indication for voice services supported" in the 5GS network feature support IE of the REGISTRATION ACCEPT message upon receipt of REGISTRATION ACCEPT message with the paging indication for voice services bit set to "paging indication for voice services supported" the UE NAS layer informs the lower layers that paging indication for voice services is supported otherwise the UE NAS layer informs the lower layers that paging indication for voice services is not supported

if the UE indicates support of the reject paging request in the REGISTRATION REQUEST message and the network decides to accept the reject paging request then the AMF shall set the reject paging request bit to "reject paging request supported" in the 5GS network feature support IE of the REGISTRATION ACCEPT message

if the UE indicates support of the paging restriction in the REGISTRATION REQUEST message and the AMF sets

- the reject paging request bit to "reject paging request supported";

- the N1 NAS signalling connection release bit to "N1 NAS signalling connection release supported"; or

- both of them;

in the 5GS network feature support IE of the REGISTRATION ACCEPT message and the network decides to accept the paging restriction then the AMF shall set the paging restriction bit to "paging restriction supported" in the 5GS network feature support IE of the REGISTRATION ACCEPT message

if the UE indicates support of ranging and sidelink positioning in the REGISTRATION REQUEST message and the network supports and accepts the use of ranging and sidelink positioning the AMF shall set the ranging and sidelink positioning support bit to "Ranging and sidelink positioning supported" in the 5GS network feature support IE of the REGISTRATION ACCEPT message

if the UE has set the Follow-on request indicator to "Follow-on request pending" in the REGISTRATION REQUEST message or the network has downlink signalling pending the AMF shall not immediately release the NAS signalling connection after the completion of the registration procedure

if the UE is authorized to use V2X communication over PC5 reference point based on

a) at least one of the following bits in the 5GMM capability IE of the REGISTRATION REQUEST message set by the UE or already stored in the 5GMM context in the AMF during the previous registration procedure as follows

1) the V2XCEPC5 bit to "V2X communication over E-UTRA-PC5 supported"; or

2) the V2XCNPC5 bit to "V2X communication over NR-PC5 supported"; and

b) the user's subscription context obtained from the UDM as defined in 3GPP TS 23.287 [6C];

the AMF should not immediately release the NAS signalling connection after the completion of the registration procedure

if the UE is authorized to use A2X communication over PC5 reference point based on

a) at least one of the following bits in the 5GMM capability IE of the REGISTRATION REQUEST message set by the UE or already stored in the 5GMM context in the AMF during the previous registration procedure as follows

1) the A2XEPC5 bit to "A2X over E-UTRA-PC5 supported"; or

2) the A2XNPC5 bit to "A2X over NR-PC5 supported"; and

b) the user's subscription context obtained from the UDM as defined in 3GPP TS 23.256 [6C];

the AMF should not immediately release the NAS signalling connection after the completion of the registration procedure

if the UE is authorized to use 5G ProSe services based on

a) at least one of the following bits in the 5GMM capability IE of the REGISTRATION REQUEST message set by the UE or already stored in the 5GMM context in the AMF during the previous registration procedure as follows

1) the 5G ProSe direct discovery bit to "5G ProSe direct discovery supported"; or

2) the 5G ProSe direct communication bit to "5G ProSe direct communication supported"; and

b) the user's subscription context obtained from the UDM as defined in 3GPP TS 23.304 [6E];

the AMF should not immediately release the NAS signalling connection after the completion of the registration procedure

if the requested DRX parameters IE was included in the REGISTRATION REQUEST message the AMF shall include the negotiated DRX parameters IE in the REGISTRATION ACCEPT message and replace any stored negotiated DRX parameter and use it for the downlink transfer of signalling and user data the AMF may set the negotiated DRX parameters IE based on the received requested DRX parameters IE and operator policy if available

if the requested NB-N1 mode DRX parameters IE was included in the REGISTRATION REQUEST message the AMF shall include the negotiated NB-N1 mode DRX parameters IE in the REGISTRATION ACCEPT message and replace any stored negotiated NB-N1 mode DRX parameters and use it for the downlink transfer of signalling and user data in NB-N1 mode the AMF may set the negotiated NB-N1 mode DRX parameters IE based on the received requested NB-N1 mode DRX parameters IE and operator policy if available

the AMF shall include the negotiated extended DRX parameters IE in the REGISTRATION ACCEPT message only if the requested extended DRX parameters IE was included in the REGISTRATION REQUEST message and the AMF supports and accepts the use of eDRX the AMF may set the negotiated extended DRX parameters IE based on the received requested extended DRX parameters IE operator policy information from NG-RAN and the user's subscription context obtained from the UDM if available

if

a) the UE's USIM is configured with indication that the UE is to receive the SOR transparent container IE the SOR transparent container IE included in the REGISTRATION ACCEPT message does not successfully pass the integrity check (see 3GPP TS 33.501 [24]); and

b) if the UE attempts obtaining service on another PLMNs as specified in 3GPP TS 23.122 [5] annex C;

then the UE shall locally release the established N1 NAS signalling connection after sending a REGISTRATION COMPLETE message

if

a) the UE's USIM is configured with indication that the UE is to receive the SOR transparent container IE the SOR transparent container IE is not included in the REGISTRATION ACCEPT message; and

b) the UE attempts obtaining service on another PLMNs as specified in 3GPP TS 23.122 [5] annex C;

then the UE shall locally release the established N1 NAS signalling connection

if

a) the UE operates in SNPN access operation mode;

b) the ME is configured to indicate that the UE shall expect to receive the steering of roaming information during initial registration procedure for the selected entry of the "list of subscriber data" or the selected PLMN subscription;

c) the SOR transparent container IE included in the REGISTRATION ACCEPT message does not successfully pass the integrity check (see 3GPP TS 33.501 [24]); and

d) the UE attempts obtaining service on another SNPN as specified in 3GPP TS 23.122 [5] annex C;

then the UE shall locally release the established N1 NAS signalling connection after sending a REGISTRATION COMPLETE message

if

a) the UE operates in SNPN access operation mode;

b) the ME is configured to indicate that the UE shall expect to receive the steering of roaming information during initial registration procedure for the selected entry of the "list of subscriber data" or the selected PLMN subscription;

c) the SOR transparent container IE is not included in the REGISTRATION ACCEPT message; and

d) the UE attempts obtaining service on another SNPN as specified in 3GPP TS 23.122 [5] annex C;

then the UE shall locally release the established N1 NAS signalling connection

if the REGISTRATION ACCEPT message includes the SOR transparent container IE and the SOR transparent container IE successfully passes the integrity check (see 3GPP TS 33.501 [24]) the ME shall store the received SOR counter as specified in annex c and proceed as follows

a) the UE shall proceed with the behaviour as specified in 3GPP TS 23.122 [5] annex C; and

b) if the registration procedure is performed over 3GPP access and the UE attempts obtaining service on another PLMNs or SNPNs as specified in 3GPP TS 23.122 [5] annex c then the UE may locally release the established N1 NAS signalling connection after sending a REGISTRATION COMPLETE message otherwise the UE shall send a REGISTRATION COMPLETE message and not release the current N1 NAS signalling connection locally if an acknowledgement is requested in the SOR transparent container IE of the REGISTRATION ACCEPT message the UE acknowledgement is included in the SOR transparent container IE of the REGISTRATION COMPLETE message in the SOR transparent container IE carrying the acknowledgement the UE shall set the ME support of SOR-CMCI indicator to "SOR-CMCI supported by the ME" additionally if the UE supports access to an SNPN using credentials from a credentials holder and the UE is not operating in SNPN access operation mode the UE may set the ME support of SOR-SNPN-SI indicator to "SOR-SNPN-SI supported by the ME" additionally if the UE supports access to an SNPN providing access for localized services in SNPN the UE shall set the ME support of SOR-SNPN-SI-LS indicator to "SOR-SNPN-SI-LS supported by the ME"

if the SOR transparent container IE successfully passes the integrity check (see 3GPP TS 33.501 [24]) and

a) the list type indicates

1) "PLMN ID and access technology list" and the SOR transparent container IE indicates a list of preferred PLMN/access technology combinations is provided then the ME shall replace the highest priority entries in the "Operator controlled PLMN selector with access Technology" list stored in the ME and shall proceed with the behaviour as specified in 3GPP TS 23.122 [5] annex C; or

2) "secured packet" then the ME shall behave as if a SMS is received with protocol identifier set to SIM data download data coding scheme set to class 2 message and SMS payload as secured packet contents of SOR transparent container IE the SMS payload is forwarded to UICC as specified in 3GPP TS 23.040 [4A] and the ME shall proceed with the behaviour as specified in 3GPP TS 23.122 [5] annex C; or

b) the list type indicates "PLMN ID and access technology list" and the SOR transparent container IE indicates "HPLMN indication that 'no change of the "Operator controlled PLMN selector with access Technology" list stored in the UE is needed and thus no list of preferred PLMN/access technology combinations is provided'" the UE operates in SNPN access operation mode and the SOR transparent container IE includes SOR-SNPN-SI the ME shall replace SOR-SNPN-SI of the selected entry of the "list of subscriber data" or associated with the selected PLMN subscription as specified in 3GPP TS 23.122 [5] with the received SOR-SNPN-SI additionally if the SOR transparent container IE includes SOR-SNPN-SI-LS the ME shall replace SOR-SNPN-SI-LS of the selected entry of the "list of subscriber data" or associated with the selected PLMN subscription as specified in 3GPP TS 23.122 [5] with the received SOR-SNPN-SI-LS

if the SOR-CMCI is present and the store SOR-CMCI in ME indicator is set to "Store SOR-CMCI in ME" then the UE shall store or delete the SOR-CMCI in the non-volatile memory of the ME as described in subclause C.1

the UE shall proceed with the behaviour as specified in 3GPP TS 23.122 [5] annex c

if the SOR transparent container IE does not pass the integrity check successfully then the UE shall discard the content of the SOR transparent container IE

if required by operator policy the AMF shall include the NSSAI inclusion mode IE in the REGISTRATION ACCEPT message (see table 4.6.2.3.1 of subclause 4.6.2.3) upon receipt of the REGISTRATION ACCEPT message

a) if the message includes the NSSAI inclusion mode IE the UE shall operate in the NSSAI inclusion mode indicated in the NSSAI inclusion mode IE over the current access within the current PLMN and its equivalent PLMN(s) if any or the current SNPN ,in the current registration area; or

b) otherwise

1) if the UE has NSSAI inclusion mode for the current PLMN or SNPN and access type stored in the UE the UE shall operate in the stored NSSAI inclusion mode;

2) if the UE does not have NSSAI inclusion mode for the current PLMN or SNPN and the access type stored in the UE and if the UE is performing the registration procedure over

i) 3GPP access the UE shall operate in NSSAI inclusion mode d in the current PLMN or SNPN and the current access type;

ii) untrusted non-3GPP access the UE shall operate in NSSAI inclusion mode b in the current PLMN and the current access type; or

iii) trusted non-3GPP access the UE shall operate in NSSAI inclusion mode d in the current PLMN and the current access type; or

3) if the 5G-RG does not have NSSAI inclusion mode for the current PLMN and wireline access stored in the 5G-RG and the 5G-RG is performing the registration procedure over wireline access the 5G-RG shall operate in NSSAI inclusion mode b in the current PLMN and the current access type

the AMF may include operator-defined access category definitions in the REGISTRATION ACCEPT message

if the UE receives Operator-defined access category definitions IE in the REGISTRATION ACCEPT message and the Operator-defined access category definitions IE contains one or more operator-defined access category definitions the UE shall delete any operator-defined access category definitions stored for the RPLMN and shall store the received operator-defined access category definitions for the RPLMN if the UE receives the Operator-defined access category definitions IE in the REGISTRATION ACCEPT message and the Operator-defined access category definitions IE contains no operator-defined access category definitions the UE shall delete any operator-defined access category definitions stored for the RPLMN if the REGISTRATION ACCEPT message does not contain the Operator-defined access category definitions IE the UE shall not delete the operator-defined access category definitions stored for the RPLMN

if the UE has indicated support for service gap control in the REGISTRATION REQUEST message and

- the REGISTRATION ACCEPT message contains the T3447 value IE then the UE shall store the new T3447 value erase any previous stored T3447 value if exists and use the new T3447 value with the timer T3447 next time it is started; or

- the REGISTRATION ACCEPT message does not contain the T3447 value IE then the UE shall erase any previous stored T3447 value if exists and stop the timer T3447 if running

if the T3448 value IE is present in the received REGISTRATION ACCEPT message and the value indicates that this timer is neither zero nor deactivated the UE shall

a) stop timer T3448 if it is running; and

b) start timer T3448 with the value provided in the T3448 value IE

if the UE is using 5GS services with control plane CIoT 5GS optimization the T3448 value IE is present in the REGISTRATION ACCEPT message and the value indicates that this timer is either zero or deactivated the UE shall ignore the T3448 value IE and proceed as if the T3448 value IE was not present

if the REGISTRATION ACCEPT message contains the truncated 5G-S-TMSI configuration IE then the UE shall store the included truncated 5G-S-TMSI configuration and return a REGISTRATION COMPLETE message to the AMF to acknowledge reception of the truncated 5G-S-TMSI configuration

NOTE 20 the UE provides the truncated 5G-S-TMSI configuration to the lower layers

if the UE is not in NB-N1 mode the UE has set the RACS bit to "RACS supported" in the 5GMM capability IE of the REGISTRATION REQUEST message and the REGISTRATION ACCEPT message includes

a) a UE radio capability ID deletion indication IE set to "Network-assigned UE radio capability IDs deletion requested" the UE shall delete any network-assigned UE radio capability IDs associated with the RPLMN or RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the selected entry of the "list of subscriber data" or the selected PLMN subscription stored at the UE then the UE shall after the completion of the ongoing registration procedure initiate a registration procedure for mobility and periodic registration update as specified in subclause 5.5.1.3.2 over the existing N1 NAS signalling connection; or

b) a UE radio capability ID IE the UE shall store the UE radio capability ID as specified in annex c

if the UE has included the service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE of the REGISTRATION REQUEST message and the REGISTRATION ACCEPT message contains the service-level-AA pending indication in the Service-level-AA container IE the UE shall return a REGISTRATION COMPLETE message to the AMF to acknowledge reception of the service-level-AA pending indication and the UE shall not attempt to perform another registration procedure for UAS services until the UUAA-MM procedure is completed or to establish a PDU session for USS communication or a PDU session for C2 communication until the UUAA-MM procedure is completed successfully

if the UE has included the service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE of the REGISTRATION REQUEST message and the REGISTRATION ACCEPT message does not contain the service-level-AA pending indication in the Service-level-AA container IE the UE shall consider the UUAA-MM procedure is not triggered

if the REGISTRATION REQUEST message includes the 5GS registration type IE set to "SNPN onboarding registration" or the network determines that the UE's subscription only allows for configuration of SNPN subscription parameters in PLMN via the user plane the AMF may start an implementation specific timer for onboarding services when the network considers that the UE is in 5GMM-REGISTERED (i.e the network receives the REGISTRATION COMPLETE message from UE)

NOTE 21 if the AMF considers that the UE is in 5GMM-IDLE when the implementation specific timer for onboarding services expires and the network considers that the UE is still in state 5GMM-REGISTERED the AMF can locally de-register the UE; or if the UE is in 5GMM-CONNECTED the AMF can initiate the network-initiated de-registration procedure (see subclause 5.5.2.3)

NOTE 22 the value of the implementation specific timer for onboarding services needs to be large enough to allow a UE to complete the configuration of one or more entries of the "list of subscriber data" taking into consideration that configuration of SNPN subscription parameters in PLMN via the user plane or onboarding services in SNPN involves third party entities outside of the operator's network

if the UE receives the list of PLMNs to be used in disaster condition IE in the REGISTRATION ACCEPT message and the UE supports MINT the UE shall delete the "list of PLMN(s) to be used in disaster condition" stored in the ME together with the PLMN ID of the RPLMN if any and may store the "list of PLMN(s) to be used in disaster condition" included in the list of PLMNs to be used in disaster condition IE in the ME together with the PLMN ID of the RPLMN

if the UE receives the disaster roaming wait range IE in the REGISTRATION ACCEPT message and the UE supports MINT the UE shall delete the disaster roaming wait range stored in the ME if any and store the disaster roaming wait range included in the disaster roaming wait range IE in the ME

if the UE receives the disaster return wait range IE in the REGISTRATION ACCEPT message and the UE supports MINT the UE shall delete the disaster return wait range stored in the ME if any and store the disaster return wait range included in the disaster return wait range IE in the ME

if the 5GS registration type IE in the REGISTRATION REQUEST message is set to "disaster roaming initial registration" and

a) the UE determined PLMN with disaster condition IE is included in the REGISTRATION REQUEST message the AMF shall determine the PLMN with disaster condition in the UE determined PLMN with disaster condition IE;

b) the UE determined PLMN with disaster condition IE is not included in the REGISTRATION REQUEST message and the additional GUTI IE is included in the REGISTRATION REQUEST message and contains 5G-GUTI of a PLMN of the country of the PLMN providing disaster roaming services the AMF shall determine the PLMN with disaster condition in the PLMN identity of the 5G-GUTI;

c) the UE determined PLMN with disaster condition IE and the additional GUTI IE are not included in the REGISTRATION REQUEST message and

1) the 5GS mobile identity IE contains 5G-GUTI of a PLMN of the country of the PLMN providing disaster roaming services the AMF shall determine the PLMN with disaster condition in the PLMN identity of the 5G-GUTI; or

2) the 5GS mobile identity IE contains SUCI of a PLMN of the country of the PLMN providing disaster roaming services the AMF shall determine the PLMN with disaster condition in the PLMN identity of the SUCI; or

d) the UE determined PLMN with disaster condition IE is not included in the REGISTRATION REQUEST message NG-RAN of the PLMN providing disaster roaming services broadcasts disaster roaming indication and

1) the additional GUTI IE is included in the REGISTRATION REQUEST message and contains 5G-GUTI of a PLMN of a country other than the country of the PLMN providing disaster roaming services; or

2) the additional GUTI IE is not included and the 5GS mobile identity IE contains 5G-GUTI or SUCI of a PLMN of a country other than the country of the PLMN providing disaster roaming services;

the AMF shall determine the PLMN with disaster condition based on the disaster roaming agreement arrangement between mobile network operators

NOTE 23 the disaster roaming agreement arrangement between mobile network operators is out scope of 3GPP

if the AMF determines that a disaster condition applies to the PLMN with disaster condition and the UE is allowed to be registered for disaster roaming services the AMF shall set the disaster roaming registration result value bit in the 5GS registration result IE to "no additional information" in the REGISTRATION ACCEPT message if the AMF determines that the UE can be registered to the PLMN for normal service the AMF shall set the disaster roaming registration result value bit in the 5GS registration result IE to "request for registration for disaster roaming services accepted as registration not for disaster roaming services" in the REGISTRATION ACCEPT message

if the UE indicates "disaster roaming initial registration" in the 5GS registration type IE in the REGISTRATION REQUEST message and the 5GS registration result IE value in the REGISTRATION ACCEPT message is set to

a) "request for registration for disaster roaming service accepted as registration not for disaster roaming service" the UE shall consider itself registered for normal service if the PLMN identity of the registered PLMN is a member of the forbidden PLMN list as specified in subclause 5.3.13A any such PLMN identity shall be deleted from the corresponding list(s) if UE supports S1 mode the UE shall initiate the registration procedure for mobility and periodic registration update and indicate that S1 mode is supported as described in subclause 5.5.1.3.2; or

b) "no additional information" the UE shall consider itself registered for disaster roaming services

if the UE receives the forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" IE in the REGISTRATION ACCEPT message the UE shall store the TAI(s) belonging to the serving PLMN or equivalent PLMN(s) and ignore the TAI(s) which do not belong to the serving PLMN or equivalent PLMN(s) included in the IE if not already stored into the list of "5GS forbidden tracking areas for roaming"

if the UE receives the forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service" IE in the REGISTRATION ACCEPT message the UE shall store the TAI(s) belonging to the serving PLMN or equivalent PLMN(s) and ignore the TAI(s) which do not belong to the serving PLMN or equivalent PLMN(s) included in the IE if not already stored into the list of "5GS forbidden tracking areas for regional provision of service"

if the UE supporting the reconnection to the network due to RAN timing synchronization status change receives the RAN timing synchronization IE with the RecReq bit set to "Reconnection requested" in the REGISTRATION ACCEPT message the UE shall operate as specified in subclauses 5.3.1.4 5.5.1.3.2 and 5.6.1.1

if the UE supports discontinuous coverage and is registered over a satellite NG-RAN access the AMF may for discontinuous coverage include the discontinuous coverage maximum time offset IE in the REGISTRATION ACCEPT message

if the UE receives the discontinuous coverage maximum time offset IE in the REGISTRATION ACCEPT message the UE shall replace any previously received discontinuous coverage maximum time offset value on the same satellite NG-RAN RAT type and PLMN with the latest received timer value

if the UE receives the unavailability configuration IE in the REGISTRATION ACCEPT message the UE shall consider that the corresponding unavailability type is "unavailability due to discontinuous coverage" a UE that does not implement this unavailability type may ignore the unavailability configuration IE provided by the AMF if the EUPR bit is set to "UE does not need to report end of unavailability period" the UE is not required to initiate the registration procedure for mobility registration update when the unavailability period duration has ended

if the UE receives the unavailability configuration IE with a value of the unavailability period duration in the REGISTRATION ACCEPT then the UE may either

a) delete a UE determined value and start using the received unavailability period duration value; or

b) use a UE determined value.If the UE receives the unavailability configuration IE with a value of the start of the unavailability period in the REGISTRATION ACCEPT message then the UE may either

a) delete a UE determined value and start using the received start of the unavailability period value; or

b) use a UE determined value

NOTE 24 the UE can consider the received value from the network when determining the value for unavailability period duration and the start of the unavailability period

if the UE operating as MBSR receives the MBSRAI field of the feature authorization indication IE in the REGISTRATION ACCEPT message the UE NAS layer informs the lower layers of the status of MBSR authorization as specified in subclause 5.35A.4 of 3GPP TS 23.501 [8]

if the UE indicates support of the RAT utilization control in the REGISTRATION REQUEST message over 3GPP access and the network decides to apply the RAT utilization control the AMF shall include the RAT utilization control IE in the REGISTRATION ACCEPT message in the RAT utilization control IE the AMF shall not indicate that the access technology of the NG-RAN cell on which the REGISTRATION REQUEST message was received is restricted if the REGISTRATION ACCEPT message received over 3GPP access contains the RAT utilization control IE the UE shall store the received RAT utilization control information together with the PLMN identity of the current PLMN in the list of "PLMNs with associated RAT restrictions" and replace the previously stored one associated with the current PLMN if any with the newly received RAT utilization control information otherwise if the REGISTRATION ACCEPT message does not contain the RAT utilization control IE the UE shall delete the stored RAT utilization control information associated with the current PLMN if any

##### 5.5.1.2.5 initial registration not accepted by the network

if the initial registration request cannot be accepted by the network the AMF shall send a REGISTRATION REJECT message to the UE including an appropriate 5GMM cause value

if the initial registration request is rejected due to general NAS level mobility management congestion control the network shall set the 5GMM cause value to #22 "congestion" and assign a value for back-off timer T3346

if the initial registration request is rejected due to general NAS level mobility management congestion control for an SNPN providing access for localized services in SNPN the network may set an appropriate cause value other than 5GMM cause value to #22 "congestion" and does not assign a value for back-off timer T3346

in NB-N1 mode if the registration request is rejected due to operator determined barring (see 3GPP TS 29.503 [20AB]) the network shall set the 5GMM cause value to #22 "congestion" and assign a value for back-off timer T3346

if the REGISTRATION REJECT message with 5GMM cause #76 or #78 was received without integrity protection then the UE shall discard the message if the REGISTRATION REJECT message with 5GMM cause #62 was received without integrity protected the behaviour of the UE is specified in subclause 5.3.20.2

based on operator policy if the initial registration request is rejected due to core network redirection for CIoT optimizations the network shall set the 5GMM cause value to #31 "Redirection to EPC required"

NOTE 1 the network can take into account the UE's S1 mode capability the EPS CIoT network behaviour supported by the UE or the EPS CIoT network behaviour supported by the EPC to determine the rejection with the 5GMM cause value #31 "Redirection to EPC required"

if the initial registration request is rejected because

a) all the S-NSSAI(s) included in the requested NSSAI are rejected; and

b) the UE set the NSSAA bit in the 5GMM capability IE to

1) "Network slice-specific authentication and authorization supported" and

i) void;

ii) all default S-NSSAIs are not allowed; or

iii) network slice-specific authentication and authorization has failed or been revoked for all default S-NSSAIs and based on network local policy the network decides not to initiate the network slice-specific re-authentication and re-authorization procedures for any default S-NSSAI requested by the UE; or

2) "Network slice-specific authentication and authorization not supported" and all default S-NSSAIs are either not allowed or are subject to network slice-specific authentication and authorization;

i) void

ii) void

the network shall set the 5GMM cause value of the REGISTRATION REJECT message to #62 "No network slices available"

if the 5GMM cause value is set to #62 "No network slices available" the network shall include in the rejected NSSAI of the REGISTRATION REJECT message all the S-NSSAI(s) which were included in the requested NSSAI

if the UE has set the ER-NSSAI bit to "Extended rejected NSSAI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message the rejected S-NSSAI(s) shall be included in the extended rejected NSSAI IE of the REGISTRATION REJECT message otherwise the rejected S-NSSAI(s) shall be included in the rejected NSSAI IE of the REGISTRATION REJECT message

in roaming scenarios if the extended rejected NSSAI IE is included in the REGISTRATION REJECT message the AMF shall provide mapped S-NSSAI(s) for the rejected NSSAI

if the UE supports extended rejected NSSAI and the AMF determines that maximum number of UEs reached for one or more S-NSSAIs in the requested NSSAI as specified in subclause 4.6.2.5 the AMF shall include the rejected NSSAI containing one or more S-NSSAIs with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" in the extended rejected NSSAI IE in the REGISTRATION REJECT message in addition the AMF may include a back-off timer value for each S-NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" in the extended rejected NSSAI IE of the REGISTRATION REJECT message

if the AMF receives the initial registration request along with the authenticated indication over N2 reference point on non-3GPP access and does not receive the indication that authentication by the home network is not required over N12 reference point or the 5G-RG acting on behalf of an AUN3 device is not allowed to access 5GS as specified in 3GPP TS 23.316 [6D] the network shall set the 5GMM cause value to #72 "Non-3GPP access to 5GCN not allowed"

if the initial registration request from a UE supporting CAG is rejected due to CAG restrictions the network shall set the 5GMM cause value to #76 "Not authorized for this CAG or authorized for CAG cells only" and should include the "CAG information list" in the CAG information list IE or the extended CAG information list IE in the REGISTRATION REJECT message

NOTE 2 the network cannot be certain that "CAG information list" stored in the UE is updated as result of sending of the REGISTRATION REJECT message with the CAG information list IE or the extended CAG information list IE as the REGISTRATION REJECT message is not necessarily delivered to the UE (e.g due to abnormal radio conditions)

NOTE 3 the "CAG information list" can be provided by the AMF and include no entry if no "CAG information list" exists in the subscription

NOTE 4 if the UE supports extended CAG information list the CAG information list can be included either in the CAG information list IE or extended CAG information list IE

NOTE 4A it is unexpected for network to send REGISTRATION REJECT message to the UE with 5GMM cause value #76 in non-CAG cell and not indicate "Indication that the UE is only allowed to access 5GS via CAG cells" for the serving PLMN in the extended CAG information list or the CAG information list

if the UE does not support extended CAG information list the CAG information list shall not be included in the extended CAG information list IE

if the initial registration request from a UE not supporting CAG is rejected due to CAG restrictions the network shall operate as described in bullet j) of subclause 5.5.1.2.8

if the UE's initial registration request is via a satellite NG-RAN cell and the network using the user location information provided by the NG-RAN see 3GPP TS 38.413 [31] is able to determine that the UE is in a location where the network is not allowed to operate the network shall set the 5GMM cause value in the REGISTRATION REJECT message to #78 "PLMN not allowed to operate at the present UE location"

NOTE 5 when the UE is accessing network for emergency services it is up to operator and regulatory policies whether the network needs to determine if the UE is in a location where network is not allowed to operate

NOTE 5A while location determination is ongoing to ensure that operator and regulatory policies are met the AMF can perform DNN-based or S-NSSAI based congestion control as specified in subclauses 5.3.10 and 5.3.11 to prevent the UE from accessing network

if the AMF receives the initial registration request including the service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE and the AMF determines that the UE is not allowed to use UAS services via 5GS based on the user's subscription data and the operator policy the AMF shall return a REGISTRATION REJECT message with 5GMM cause #79 “UAS services not allowed”

if the UE initiates the registration procedure for disaster roaming services and the AMF determines that it does not support providing disaster roaming services for the determined PLMN with disaster condition to the UE then the AMF shall send a REGISTRATION REJECT message with 5GMM cause #80 “Disaster roaming for the determined PLMN with disaster condition not allowed”

if the AMF receives the initial registration request over non-3GPP access and detects that the N3IWF used by the UE is not compatible with the allowed NSSAI and the UE has indicated its support for slice-based N3IWF selection in the REGISTRATION REQUEST message the AMF may send a REGISTRATION REJECT message with 5GMM cause #81 “Selected N3IWF is not compatible with the allowed NSSAI” and may provide information for a suitable N3IWF in the REGISTRATION REJECT message indicating the suitable N3IWF that is compatible with the requested NSSAI

if the AMF receives the initial registration request over non-3GPP access and detects that the TNGF used by the UE is not compatible with the allowed NSSAI and the UE has indicated its support for slice-based TNGF selection in the REGISTRATION REQUEST message the AMF may send a REGISTRATION REJECT message with 5GMM cause #82 “Selected TNGF is not compatible with the allowed NSSAI” and may provide information for a suitable TNAN in the TNAN information IE in the REGISTRATION REJECT message indicating the suitable TNGF that is compatible with the requested NSSAI

if the AMF received multiple TAIs from the satellite NG-RAN as described in 3GPP TS 23.501 [8] and determines that by UE subscription and operator's preferences all of the received TAIs are forbidden for roaming or for regional provision of service the AMF shall include the TAI(s) in

a) the forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" IE; or

b) the forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service" IE; or

c) both;

in the REGISTRATION REJECT message

regardless of the 5GMM cause value received in the REGISTRATION REJECT message via satellite NG-RAN

- if the UE receives the forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" IE in the REGISTRATION REJECT message the UE shall store the TAI(s) belonging to the serving PLMN or equivalent PLMN(s) and ignore the TAI(s) which do not belong to the serving PLMN or equivalent PLMN(s) included in the IE if not already stored into the list of "5GS forbidden tracking areas for roaming"; and

- if the UE receives the forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service" IE in the REGISTRATION REJECT message the UE shall store the TAI(s) belonging to the serving PLMN or equivalent PLMN(s) and ignore the TAI(s) which do not belong to the serving PLMN or equivalent PLMN(s) included in the IE if not already stored into the list of "5GS forbidden tracking areas for regional provision of service"

if

a) the UE indicates support of the RAT utilization control in the REGISTRATION REQUEST message over 3GPP access;

b) the network decides to apply the RAT utilization control based on the operator policy; and

c) the secure exchange of NAS messages via a NAS signalling connection is established between the UE and the AMF;

the AMF shall send the integrity protected REGISTRATION REJECT message with the 5GMM cause value set to #15 "No suitable cells in tracking area" and include the RAT utilization control IE in the RAT utilization control IE the AMF shall indicate that the access technology of the NG-RAN cell on which the REGISTRATION REQUEST message was received is restricted

NOTE 5B other restricted access technologies can be indicated in the RAT utilization control IE if any

furthermore the UE shall take the following actions depending on the 5GMM cause value received in the REGISTRATION REJECT message

#3 (Illegal UE); or

#6 (Illegal ME)

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list and ngKSI

in case of PLMN the UE shall consider the USIM as invalid for 5GS services until switching off the UICC containing the USIM is removed or the timer T3245 expires as described in subclause 5.3.19A.1;

in case of SNPN if the UE is not performing initial registration for onboarding services in SNPN and the UE does not support access to an SNPN using credentials from a credentials holder and does not support equivalent SNPNs the UE shall consider the selected entry of the "list of subscriber data" with the SNPN identity of the current SNPN as invalid until the UE is switched off the entry is updated or the timer T3245 expires as described in subclause 5.3.19A.2 in case of SNPN if the UE is not performing initial registration for onboarding services in SNPN and the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the UE shall consider the selected entry of the "list of subscriber data" as invalid for 3GPP access until the UE is switched off the entry is updated or the timer T3245 expires as described in subclause 5.3.19A.2 additionally if EAP based primary authentication and key agreement procedure using EAP-AKA' or 5G AKA based primary authentication and key agreement procedure was performed in the current SNPN the UE shall consider the USIM as invalid for the current SNPN until switching off the UICC containing the USIM is removed or the timer T3245 expires as described in subclause 5.3.19A.2

if the UE is not performing initial registration for onboarding services in SNPN the UE shall delete the list of equivalent PLMNs (if any) or the list of equivalent SNPNs (if any) and enter the state 5GMM-DEREGISTERED.NO-SUPI if the message has been successfully integrity checked by the NAS then the UE shall

1) set the counter for "SIM/USIM considered invalid for GPRS services" events and the counter for "USIM considered invalid for 5GS services over non-3GPP access" events in case of PLMN if the UE maintains these counters; or

2) set the counter for "the entry for the current SNPN considered invalid for 3GPP access" events and the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events in case of SNPN if the UE maintains these counters;

to a UE implementation-specific maximum value

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall handle the EMM parameters EMM state EPS update status 4G-GUTI last visited registered TAI TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the EPS attach request procedure is rejected with the EMM cause with the same value the USIM shall be considered as invalid also for non-EPS services until switching off the UICC containing the USIM is removed or the timer T3245 expires as described in subclause 5.3.7a in 3GPP TS 24.301 [15] if the message has been successfully integrity checked by the NAS and the UE maintains a counter for "SIM/USIM considered invalid for non-GPRS services" then the UE shall set this counter to a UE implementation-specific maximum value

if the UE is performing initial registration for onboarding services in SNPN the UE shall reset the registration attempt counter store the SNPN identity in the "permanently forbidden SNPNs for onboarding services in SNPN" list enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection or an SNPN selection for onboarding services according to 3GPP TS 23.122 [5] if the message has been successfully integrity checked by the NAS the UE shall set the SNPN-specific attempt counter for the current SNPN to the UE implementation-specific maximum value

if the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access the UE shall in addition handle 5GMM parameters and 5GMM state for this access as described for this 5GMM cause value

#7 (5GS services not allowed)

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list and ngKSI

in case of PLMN the UE shall consider the USIM as invalid for 5GS services until switching off the UICC containing the USIM is removed or the timer T3245 expires as described in subclause 5.3.19A.1;

in case of SNPN if the UE is not performing initial registration for onboarding services in SNPN and the UE does not support access to an SNPN using credentials from a credentials holder and does not support equivalent SNPNs the UE shall consider the selected entry of the "list of subscriber data" with the SNPN identity of the current SNPN as invalid for 5GS services until the UE is switched off the entry is updated or the timer T3245 expires as described in subclause 5.3.19A.2 in case of SNPN if the UE is not performing initial registration for onboarding services in SNPN and the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the UE shall consider the selected entry of the "list of subscriber data" as invalid for 3GPP access until the UE is switched off the entry is updated or the timer T3245 expires as described in subclause 5.3.19A.2 additionally if EAP based primary authentication and key agreement procedure using EAP-AKA' or 5G AKA based primary authentication and key agreement procedure was performed in the current SNPN the UE shall consider the USIM as invalid for the current SNPN until switching off the UICC containing the USIM is removed or the timer T3245 expires as described in subclause 5.3.19A.2

if the UE is not performing initial registration for onboarding services in SNPN the UE shall enter the state 5GMM-DEREGISTERED.NO-SUPI if the message has been successfully integrity checked by the NAS then the UE shall

1) set the counter for "SIM/USIM considered invalid for GPRS services" events and the counter for "USIM considered invalid for 5GS services over non-3GPP access" events in case of PLMN if the UE maintains these counters; or

2) set the counter for "the entry for the current SNPN considered invalid for 3GPP access" events and the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events in case of SNPN if the UE maintains these counters;

to a UE implementation-specific maximum value

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall handle the EMM parameters EMM state EPS update status 4G-GUTI last visited registered TAI TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the EPS attach request procedure is rejected with the EMM cause with the same value

if the UE is performing initial registration for onboarding services in SNPN the UE shall reset the registration attempt counter store the SNPN identity in the "permanently forbidden SNPNs for onboarding services in SNPN" list enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection or an SNPN selection for onboarding services according to 3GPP TS 23.122 [5] if the message has been successfully integrity checked by the NAS the UE shall set the SNPN-specific attempt counter for the current SNPN to the UE implementation-specific maximum value

if the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access the UE shall in addition handle 5GMM parameters and 5GMM state for this access as described for this 5GMM cause value

#10 (Implicitly de-registered)

5GMM cause #10 is only applicable when received from a wireline access network by the 5G-RG acting on behalf of the AUN3 device and indicates that there is no 5G-RG connected to the same wireline 5GMM cause #10 received when the 5G-RG is not acting on behalf of the AUN3 or received from a 5G access network other than a wireline access network is considered as abnormal cases and the behaviour of the UE is specified in subclause 5.5.1.2.7

when received over wireline access network the 5G-RG acting on behalf of the AUN3 device shall abort the initial registration procedure that was initiated on behalf of the AUN3 device the 5G-RG shall set its 5GS update status to 5U2 NOT UPDATED (and shall store it according to subclause 5.1.3.2.2) shall delete its 5G-GUTI last visited registered TAI TAI list ngKSI and shall reset its registration attempt counter and shall enter the state 5GMM-DEREGISTERED

#11 (PLMN not allowed)

this cause value received from a cell belonging to an SNPN and the UE is operating in SNPN access operation mode is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.2.7

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list and ngKSI the UE shall delete the list of equivalent PLMNs and reset the registration attempt counter and store the PLMN identity in the forbidden PLMN list as specified in subclause 5.3.13A and if the UE is configured to use timer T3245 then the UE shall start timer T3245 and proceed as described in subclause 5.3.19A.1 for 3GPP access the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform a PLMN selection according to 3GPP TS 23.122 [5] and for non-3GPP access the UE shall enter state 5GMM-DEREGISTERED.LIMITED-SERVICE and perform network selection as defined in 3GPP TS 24.502 [18] if the message has been successfully integrity checked by the NAS and the UE maintains the PLMN-specific attempt counter and the PLMN-specific attempt counter for non-3GPP access for that PLMN the UE shall set the PLMN-specific attempt counter and the PLMN-specific attempt counter for non-3GPP access for that PLMN to the UE implementation-specific maximum value

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall in addition handle the EMM parameters EMM state EPS update status 4G-GUTI last visited registered TAI TAI list eKSI and attach attempt counter as specified in 3GPP TS 24.301 [15] for the case when the EPS attach request procedure is rejected with the EMM cause with the same value

if the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access to the same PLMN the UE shall in addition handle 5GMM parameters and 5GMM state for this access as described for this 5GMM cause value

#12 (Tracking area not allowed)

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete last visited registered TAI and TAI list if the UE is not registering or has not registered to the same PLMN over both 3GPP access and non-3GPP access the UE shall additionally delete 5G-GUTI and ngKSI additionally the UE shall reset the registration attempt counter

if

1) the UE is not operating in SNPN access operation mode and the forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service" IE is not included in the REGISTRATION REJECT message the UE shall store the current TAI in the list of "5GS forbidden tracking areas for regional provision of service" and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE if the REGISTRATION REJECT message is not integrity protected the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for regional provision of service" for non-integrity protected NAS reject message; or

2) the UE is operating in SNPN access operation mode the UE shall store the current TAI in the list of "5GS forbidden tracking areas for regional provision of service" for the current SNPN and the selected entry of the "list of subscriber data" or the selected PLMN subscription and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE if the REGISTRATION REJECT is not integrity protected the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for regional provision of service" for the current SNPN and the selected entry of the "list of subscriber data" or the selected PLMN subscription for non-integrity protected NAS reject message if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5] subclause 3.9) the UE shall store the current TAI in the list of "5GS forbidden tracking areas for regional provision of service" for the current SNPN and the selected entry of the "list of subscriber data" or the selected PLMN subscription along with the GIN(s) broadcasted by the SNPN if any

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall handle the EMM parameters EMM state EPS update status 4G-GUTI last visited registered TAI TAI list eKSI and attach attempt counter as specified in 3GPP TS 24.301 [15] for the case when the EPS attach request procedure is rejected with the EMM cause with the same value

#13 (Roaming not allowed in this tracking area)

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete last visited registered TAI and TAI list if the UE is not registering or has not registered to the same PLMN over both 3GPP access and non-3GPP access the UE shall additionally delete 5G-GUTI ngKSI and the list of equivalent PLMNs (if available) or the list of equivalent SNPNs (if available) additionally the UE shall reset the registration attempt counter

if

1) the UE is not operating in SNPN access operation mode and the forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" IE is not included in the REGISTRATION REJECT message the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE or optionally 5GMM-DEREGISTERED.PLMN-SEARCH if the REGISTRATION REJECT message is not integrity protected the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for non-integrity protected NAS reject message; or

2) the UE is operating in SNPN access operation mode the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and the selected entry of the "list of subscriber data" or the selected PLMN subscription and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE or optionally 5GMM-DEREGISTERED.PLMN-SEARCH if the REGISTRATION REJECT message is not integrity protected the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and the selected entry of the "list of subscriber data" or the selected PLMN subscription for non-integrity protected NAS reject message if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5] subclause 3.9) the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and the selected entry of the "list of subscriber data" or the selected PLMN subscription along with the GIN(s) broadcasted by the SNPN if any

for 3GPP access if the UE is registered in S1 mode and operating in dual-registration mode the PLMN that the UE chooses to register in is specified in subclause 4.8.3 otherwise the UE shall perform a PLMN selection or SNPN selection according to 3GPP TS 23.122 [5]

for non-3GPP access the UE shall perform network selection as defined in 3GPP TS 24.502 [18]

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall handle the EMM parameters EMM state EPS update status 4G-GUTI last visited registered TAI TAI list eKSI and attach attempt counter as specified in 3GPP TS 24.301 [15] for the case when the EPS attach request procedure is rejected with the EMM cause with the same value

#15 (No suitable cells in tracking area)

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any last visited registered TAI and TAI list if the UE is not registering or has not registered to the same PLMN over both 3GPP access and non-3GPP access the UE shall additionally delete 5G-GUTI and ngKSI additionally the UE shall reset the registration attempt counter

if

1) the UE is not operating in SNPN access operation mode and the forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" IE is not included in the REGISTRATION REJECT message the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE if the REGISTRATION REJECT message is not integrity protected the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for non-integrity protected NAS reject message; or

2) the UE is operating in SNPN access operation mode the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and the selected entry of the "list of subscriber data" or the selected PLMN subscription and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE if the REGISTRATION REJECT message is not integrity protected the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and the selected entry of the "list of subscriber data" or the selected PLMN subscription for non-integrity protected NAS reject message if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5] subclause 3.9) the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and the selected entry of the "list of subscriber data" or the selected PLMN subscription along with the GIN(s) broadcasted by the SNPN if any

additionally the UE shall

1) if the extended 5GMM cause IE with value "Satellite NG-RAN not allowed in PLMN" is included in the REGISTRATION REJECT message

i) the message has been successfully integrity checked by the NAS; and the UE is configured for "Satellite disabling allowed for 5GMM cause #15" as specified in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22] then the UE shall disable satellite NG-RAN capability (see subclause 4.9.4); or

ii) otherwise the UE shall ignore the extended 5GMM cause IE;

2) if the RAT utilization control IE is included in the REGISTRATION REJECT message

i) the message has been successfully integrity checked by the NAS; the UE shall store the received RAT utilization control information together with the PLMN identity of the current PLMN in the list of "PLMNs with associated RAT restrictions" and replace the previously stored one associated with the current PLMN if any with the newly received RAT utilization control information; or

ii) otherwise the UE shall ignore the RAT utilization control IE; and

3) search for a suitable cell in another tracking area according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C]

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall handle the EMM parameters EMM state EPS update status 4G-GUTI last visited registered TAI TAI list eKSI and attach attempt counter as specified in 3GPP TS 24.301 [15] for the case when the EPS attach request procedure is rejected with the EMM cause with the same value

if received over non-3GPP access the cause shall be considered as an abnormal case and the behaviour of the UE for this case is specified in subclause 5.5.1.2.7

#22 (Congestion)

if the T3346 value IE is present in the REGISTRATION REJECT message and the value indicates that this timer is neither zero nor deactivated the UE shall proceed as described below; otherwise it shall be considered as an abnormal case and the behaviour of the UE for this case is specified in subclause 5.5.1.2.7

the UE shall abort the initial registration procedure set the 5GS update status to 5U2 NOT UPDATED reset the registration attempt counter and enter state 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION

the UE shall stop timer T3346 if it is running

if the REGISTRATION REJECT message is integrity protected the UE shall start timer T3346 with the value provided in the T3346 value IE

if the REGISTRATION REJECT message is not integrity protected the UE shall start timer T3346 with a random value from the default range specified in 3GPP TS 24.008 [12]

the UE stays in the current serving cell and applies the normal cell reselection process the initial registration procedure is started if still needed when timer T3346 expires or is stopped

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall handle the EMM parameters EMM state EPS update status and attach attempt counter as specified in 3GPP TS 24.301 [15] for the case when the EPS attach request procedure is rejected with the EMM cause with the same value

if the UE is registering for onboarding services in SNPN the UE may enter the state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection or an SNPN selection for onboarding services according to 3GPP TS 23.122 [5]

#27 (N1 mode not allowed)

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list and ngKSI additionally the UE shall reset the registration attempt counter and shall enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE if the message has been successfully integrity checked by the NAS the UE shall set

1) the PLMN-specific N1 mode attempt counter for 3GPP access and the PLMN-specific N1 mode attempt counter for non-3GPP access for that PLMN in case of PLMN; or

2) the SNPN-specific attempt counter for 3GPP access for the current SNPN in case of SNPN and the SNPN-specific attempt counter for non-3GPP access for the current SNPN;

to the UE implementation-specific maximum value

the UE shall disable the N1 mode capability for the specific access type for which the message was received (see subclause 4.9)

if the message has been successfully integrity checked by the NAS the UE shall disable the N1 mode capability also for the other access type (see subclause 4.9)

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall in addition set the EPS update status to EU3 ROAMING NOT ALLOWED and shall delete any 4G-GUTI last visited registered TAI TAI list and eKSI additionally the UE shall reset the attach attempt counter and enter the state EMM-DEREGISTERED

#31 (Redirection to EPC required)

5GMM cause #31 received by a UE that has not indicated support for CIoT optimizations or not indicated support for S1 mode or received by a UE over non-3GPP access is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.2.7

this cause value received from a cell belonging to an SNPN and the UE is operating in SNPN access operation mode is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.2.7

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list and ngKSI additionally the UE shall reset the registration attempt counter

the UE shall enable the E-UTRA capability if it was disabled disable the N1 mode capability for 3GPP access (see subclause 4.9.2) and enter the 5GMM-DEREGISTERED.NO-CELL-AVAILABLE

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall handle the EMM parameters EMM state EPS update status 4G-GUTI TAI list eKSI and attach attempt counter as specified in 3GPP TS 24.301 [15] for the case when the EPS attach procedure is rejected with the EMM cause with the same value

#36 (IAB-node operation not authorized)

this cause value is only applicable when received over 3GPP access by a UE operating as an IAB-node this cause value received from a 5G access network other than 3GPP access or received by a UE not operating as an IAB-node is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.2.7

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list and ngKSI

if

1) the UE is not operating in SNPN access operation mode

i) the UE shall delete the list of equivalent PLMNs and reset the registration attempt counter and store the PLMN identity in the forbidden PLMN list as specified in subclause 5.3.13A and if the UE is configured to use timer T3245 then the UE shall start timer T3245 and proceed as described in subclause 5.3.19a.1 the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform a PLMN selection according to 3GPP TS 23.122 [5] if the message has been successfully integrity checked by the NAS and the UE maintains the PLMN-specific attempt counter for 3GPP access for that PLMN the UE shall set the PLMN-specific attempt counter for 3GPP access for that PLMN to the UE implementation-specific maximum value; and

ii) if the UE is operating in single-registration mode the UE shall in addition handle the EMM parameters EMM state EPS update status 4G-GUTI last visited registered TAI TAI list eKSI and attach attempt counter as specified in 3GPP TS 24.301 [15] for the case when the EPS attach request procedure is rejected with the EMM cause with the same value; or

2) the UE is operating in SNPN access operation mode

i) the UE shall delete the list of equivalent SNPNs (if available) the UE shall reset the registration attempt counter and store the SNPN identity in the "temporarily forbidden SNPNs" list for 3GPP access and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the selected entry of the "list of subscriber data" or the selected PLMN subscription or "temporarily forbidden SNPNs for access for localized services in SNPN" list if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) for 3GPP access and the selected entry of the "list of subscriber data" or the selected PLMN subscription or the selected PLMN subscription or in the "temporarily forbidden SNPNs for onboarding services in SNPN" list if the UE is performing initial registration for onboarding services in SNPN for 3GPP access if the UE supports access to an SNPN using credentials from a credentials holder the UE shall store the SNPN identity in the "temporarily forbidden SNPNs" list along with the GIN(s) broadcasted by the SNPN if any for the selected entry of the "list of subscriber data" or the selected PLMN subscription if the UE supports access to an SNPN providing access for localized services in SNPN and the access for localized services in SNPN has been enabled the UE shall store the SNPN identity in the list of "temporarily forbidden SNPNs for access for localized services in SNPN" (if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) along with the GIN(s) broadcasted by the SNPN if any for the selected entry of the "list of subscriber data" or the selected PLMN subscription the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection according to 3GPP TS 23.122 [5] if the message has been successfully integrity checked by the NAS the UE shall set the SNPN attempt counter for 3GPP access for the current SNPN to the UE implementation-specific maximum value

#62 (No network slices available)

the UE shall abort the initial registration procedure set the 5GS update status to 5U2 NOT UPDATED and enter state 5GMM-DEREGISTERED ATTEMPTING-REGISTRATION or 5GMM-DEREGISTERED.PLMN-SEARCH additionally the UE shall reset the registration attempt counter

the UE receiving the rejected NSSAI in the REGISTRATION REJECT message takes the following actions based on the rejection cause in the rejected S-NSSAI(s)

"S-NSSAI not available in the current PLMN or SNPN"

the UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the current PLMN or SNPN as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current PLMN or SNPN over any access until switching off the UE the UICC containing the USIM is removed an entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated or the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2

"S-NSSAI not available in the current registration area"

the UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the current registration area as described in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current registration area over the current access until switching off the UE the UE moving out of the current registration area the UICC containing the USIM is removed the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated or the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2

"S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization"

the UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the failed or revoked NSSAA as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN or SNPN over any access until switching off the UE the UICC containing the USIM is removed the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated or the rejected S-NSSAI(s) are removed as described in subclause 4.6.1 and 4.6.2.2

"S-NSSAI not available due to maximum number of UEs reached"

unless the back-off timer value received along with the S-NSSAI is zero the UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the maximum number of UEs reached as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN or SNPN over the current access until switching off the UE the UICC containing the USIM is removed the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated or the rejected S-NSSAI(s) are removed as described in subclauses 4.6.1 and 4.6.2.2

NOTE 6 if the back-off timer value received along with the S-NSSAI in the rejected NSSAI for the maximum number of UEs reached is zero as specified in subclause 10.5.7.4a of 3GPP TS 24.008 [12] the UE does not consider the S-NSSAI as the rejected S-NSSAI

if there is one or more S-NSSAIs in the rejected NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" then for each S-NSSAI the UE shall behave as follows

a) stop the timer T3526 associated with the S-NSSAI if running;

b) start the timer T3526 with

1) the back-off timer value received along with the S-NSSAI if a back-off timer value is received along with the S-NSSAI that is neither zero nor deactivated; or

2) an implementation specific back-off timer value if no back-off timer value is received along with the S-NSSAI; and

c) remove the S-NSSAI from the rejected NSSAI for the maximum number of UEs reached when the timer T3526 associated with the S-NSSAI expires

if the UE has an allowed NSSAI or configured NSSAI and

1) at least one S-NSSAI of the allowed NSSAI or configured NSSAI is not included in the rejected NSSAI the UE may stay in the current serving cell apply the normal cell reselection process and start an initial registration with a requested NSSAI that includes any S-NSSAI from the allowed NSSAI or the configured NSSAI that is not in the rejected NSSAI

2) all the S-NSSAI(s) in the allowed NSSAI and configured NSSAI are rejected and at least one S-NSSAI is rejected due to "S-NSSAI not available in the current registration area" and

i) the REGISTRATION REJECT message is integrity protected the UE is not operating in SNPN access operation mode and the forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" IE is not included in the REGISTRATION REJECT message then the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for S-NSSAI is rejected due to "S-NSSAI not available in the current registration area" and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE the UE shall search for a suitable cell in another tracking area according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C]; or

ii) the REGISTRATION REJECT message is integrity protected and the UE is operating in SNPN access operation mode then the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for S-NSSAI is rejected due to "S-NSSAI not available in the current registration area" for the current SNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the selected entry of the "list of subscriber data" or the selected PLMN subscription and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE the UE shall search for a suitable cell in another tracking area according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C]

3) otherwise the UE may perform a PLMN selection or SNPN selection according to 3GPP TS 23.122 [5] and additionally the UE may disable the N1 mode capability for the current PLMN or SNPN if the UE does not have an allowed NSSAI and each S-NSSAI in the configured NSSAI if available was rejected with cause "S-NSSAI not available in the current PLMN or SNPN" or "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization" as described in subclause 4.9

if the UE has neither allowed NSSAI for the current PLMN or SNPN nor configured NSSAI for the current PLMN or SNPN and

1) if at least one S-NSSAI in the default configured NSSAI is not rejected the UE may stay in the current serving cell apply the normal cell reselection process and start an initial registration with a requested NSSAI with that default configured NSSAI; or

2) if all the S-NSSAI(s) in the default configured NSSAI are rejected and at least one S-NSSAI is rejected due to "S-NSSAI not available in the current registration area"

i) if the REGISTRATION REJECT message is integrity protected and the UE is not operating in SNPN access operation mode the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE the UE shall search for a suitable cell in another tracking area according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C]; or

ii) if the REGISTRATION REJECT message is integrity protected and the UE is operating in SNPN access operation mode the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the selected entry of the "list of subscriber data" or the selected PLMN subscription and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE the UE shall search for a suitable cell in another tracking area according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C]

3) otherwise the UE may perform a PLMN selection or SNPN selection according to 3GPP TS 23.122 [5] and additionally the UE may disable the N1 mode capability for the current PLMN or SNPN if each S-NSSAI in the default configured NSSAI was rejected with cause "S-NSSAI not available in the current PLMN or SNPN" or "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization" as described in subclause 4.9

if

1) the UE has allowed NSSAI for the current PLMN or SNPN or configured NSSAI for the current PLMN or SNPN or both and all the S-NSSAIs included in the allowed NSSAI or the configured NSSAI or both are rejected; or

2) the UE has neither allowed NSSAI for the current PLMN or SNPN nor configured NSSAI for the current PLMN or SNPN and all the S-NSSAIs included in the default configured NSSAI are rejected

and the UE has rejected NSSAI for the maximum number of UEs reached and the UE wants to obtain services in the current serving cell without performing a PLMN selection or SNPN selection the UE may stay in the current serving cell and attempt to use the rejected S-NSSAI(s) for the maximum number of UEs reached in the current serving cell after the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall in addition set the EPS update status to EU2 NOT UPDATED reset the attach attempt counter and enter the state EMM-DEREGISTERED

#72 (Non-3GPP access to 5GCN not allowed)

when received over non-3GPP access the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete last visited registered TAI and TAI list if the UE is not registering or has not registered to the same PLMN over 3GPP access the UE shall additionally delete 5G-GUTI and ngKSI additionally the UE shall reset the registration attempt counter and enter the state 5GMM-DEREGISTERED if the message has been successfully integrity checked by the NAS the UE shall set

1) the PLMN-specific N1 mode attempt counter for non-3GPP access for that PLMN in case of PLMN or

2) the SNPN-specific attempt counter for non-3GPP access for that SNPN in case of SNPN;

to the UE implementation-specific maximum value

NOTE 7 the 5GMM sublayer states the 5GMM parameters and the registration status are managed per access type independently i.e 3GPP access or non-3GPP access (see subclauses 4.7.2 and 5.1.3)

the UE shall disable the N1 mode capability for non-3GPP access (see subclause 4.9.3)

as an implementation option the UE may enter the state 5GMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection according to 3GPP TS 23.122 [5]

if received over 3GPP access the cause shall be considered as an abnormal case and the behaviour of the UE for this case is specified in subclause 5.5.1.2.7

#73 (Serving network not authorized)

this cause value received from a cell belonging to an SNPN and the UE is operating in SNPN access operation mode is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.2.7

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list and ngKSI the UE shall delete the list of equivalent PLMNs reset the registration attempt counter store the PLMN identity in the forbidden PLMN list as specified in subclause 5.3.13A for 3GPP access the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection according to 3GPP TS 23.122 [5] and for non-3GPP access the UE shall enter state 5GMM-DEREGISTERED.LIMITED-SERVICE and perform network selection as defined in 3GPP TS 24.502 [18] if the message has been successfully integrity checked by the NAS the UE shall set the PLMN-specific attempt counter and the PLMN-specific attempt counter for non-3GPP access for that PLMN to the UE implementation-specific maximum value

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall in addition set the EPS update status to EU3 ROAMING NOT ALLOWED and shall delete any 4G-GUTI last visited registered TAI TAI list and eKSI additionally the UE shall reset the attach attempt counter and enter the state EMM-DEREGISTERED

#74 (Temporarily not authorized for this SNPN)

5GMM cause #74 is only applicable when received from a cell belonging to an SNPN and the UE is operating in SNPN access operation mode 5GMM cause #74 received from a cell not belonging to an SNPN is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.2.7

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list ngKSI and the list of equivalent SNPNs (if available) the UE shall reset the registration attempt counter and store the SNPN identity in the "temporarily forbidden SNPNs" list or "temporarily forbidden SNPNs for access for localized services in SNPN" list if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) for the specific access type for which the message was received and the selected entry of the "list of subscriber data" or the selected PLMN subscription or in the "temporarily forbidden SNPNs for onboarding services in SNPN" list if the UE is performing initial registration for onboarding services in SNPN for the specific access type for which the message was received if the UE supports access to an SNPN using credentials from a credentials holder the UE shall store the SNPN identity in the "temporarily forbidden SNPNs" list along with the GIN(s) broadcasted by the SNPN if any for the selected entry of the "list of subscriber data" or the selected PLMN subscription if the UE supports access to an SNPN providing access for localized services in SNPN and the access for localized services in SNPN has been enabled the UE shall store the SNPN identity in the list of "temporarily forbidden SNPNs for access for localized services in SNPN" (if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) along with the GIN(s) broadcasted by the SNPN if any for the selected entry of the "list of subscriber data" or the selected PLMN subscription if the registration request is not for onboarding services in SNPN for 3GPP access the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection according to 3GPP TS 23.122 [5] and for non-3GPP access the UE shall enter state 5GMM-DEREGISTERED.LIMITED-SERVICE and perform network selection as defined in 3GPP TS 24.502 [18] if the registration request is for onboarding services in SNPN the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection or an SNPN selection for onboarding services according to 3GPP TS 23.122 [5] if the message has been successfully integrity checked by the NAS the UE shall set the SNPN-specific attempt counter for 3GPP access and the SNPN-specific attempt counter for non-3GPP access for the current SNPN to the UE implementation-specific maximum value

if the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access to the same SNPN the UE shall in addition handle 5GMM parameters and 5GMM state for this access as described for this 5GMM cause value

#75 (Permanently not authorized for this SNPN)

5GMM cause #75 is only applicable when received from a cell belonging to an SNPN with a globally-unique SNPN identity and the UE is operating in SNPN access operation mode 5GMM cause #75 received from a cell not belonging to an SNPN or a cell belonging to an SNPN with a non-globally-unique SNPN identity is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.2.7

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list ngKSI and the list of equivalent SNPNs (if available) the UE shall reset the registration attempt counter and store the SNPN identity in the "permanently forbidden SNPNs" list or "permanently forbidden SNPNs for access for localized services in SNPN" list if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) for the specific access type for which the message was received and the selected entry of the "list of subscriber data" or the selected PLMN subscription or in the "permanently forbidden SNPNs for onboarding services in SNPN" list if the UE is performing initial registration for onboarding services in SNPN for the specific access type for which the message was received if the UE supports access to an SNPN using credentials from a credentials holder the UE shall store the SNPN identity in the "permanently forbidden SNPNs" list along with the GIN(s) broadcasted by the SNPN if any for the selected entry of the "list of subscriber data" or the selected PLMN subscription if the UE supports access to an SNPN providing access for localized services in SNPN and the access for localized services in SNPN has been enabled the UE shall store the SNPN identity in the list of "permanently forbidden SNPNs for access for localized services in SNPN" (if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) along with the GIN(s) broadcasted by the SNPN if any for the selected entry of the "list of subscriber data" or the selected PLMN subscription if the registration request is not for onboarding services in SNPN for 3GPP access the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection according to 3GPP TS 23.122 [5] and for non-3GPP access the UE shall enter state 5GMM-DEREGISTERED.LIMITED-SERVICE and perform network selection as defined in 3GPP TS 24.502 [18] if the registration request is for onboarding services in SNPN the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection or an SNPN selection for onboarding services according to 3GPP TS 23.122 [5] if the message has been successfully integrity checked by the NAS the UE shall set the SNPN-specific attempt counter for 3GPP access and the SNPN-specific attempt counter for non-3GPP access for the current SNPN to the UE implementation-specific maximum val if the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access to the same SNPN the UE shall in addition handle 5GMM parameters and 5GMM state for this access as described for this 5GMM cause value

#76 (Not authorized for this CAG or authorized for CAG cells only)

this cause value received via non-3GPP access or from a cell belonging to an SNPN and the UE is operating in SNPN access operation mode is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.2.7

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED store the 5GS update status according to subclause 5.1.3.2.2 and reset the registration attempt counter

if 5GMM cause #76 is received from

1) a CAG cell and if the UE receives a "CAG information list" in the CAG information list IE or the extended CAG information list IE included in the REGISTRATION REJECT message the UE shall

i) replace the "CAG information list" stored in the UE with the received CAG information list IE or the extended CAG information list IE when received in the HPLMN or EHPLMN;

ii) replace the serving VPLMN's entry of the "CAG information list" stored in the UE with the serving VPLMN's entry of the received CAG information list IE or the extended CAG information list IE when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN; or

NOTE 8 when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN entries of a PLMN other than the serving VPLMN if any in the received CAG information list IE or the extended CAG information list IE are ignored

iii) remove the serving VPLMN's entry of the "CAG information list" stored in the UE when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN and the CAG information list IE or the extended CAG information list IE does not contain the serving VPLMN's entry

otherwise then the UE shall delete the CAG-ID(s) of the cell from the "allowed CAG list" for the current PLMN if the CAG-ID(s) are authorized based on the "allowed CAG list" in the case the "allowed CAG list" for the current PLMN only contains a range of CAG-IDs how the UE deletes the CAG-ID(s) of the cell from the "allowed CAG list" for the current PLMN is up to UE implementation in addition

i) if the entry in the "CAG information list" for the current PLMN does not include an "indication that the UE is only allowed to access 5GS via CAG cells" or if the entry in the "CAG information list" for the current PLMN includes an "indication that the UE is only allowed to access 5GS via CAG cells" and one or more CAG-ID(s) are authorized based on the updated "allowed CAG list" for the current PLMN then the UE shall enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C] with the updated "CAG information list";

ii) if the entry in the "CAG information list" for the current PLMN includes an "indication that the UE is only allowed to access 5GS via CAG cells" and no CAG-ID is authorized based on the updated "allowed CAG list" for the current PLMN then the UE shall enter the state 5GMM-DEREGISTERED.PLMN-SEARCH and shall apply the PLMN selection process defined in 3GPP TS 23.122 [5] with the updated "CAG information list"; or

iii) if the "CAG information list" does not include an entry for the current PLMN then the UE shall enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C] with the updated "CAG information list"

2) a non-CAG cell and if the UE receives a "CAG information list" in the CAG information list IE or the extended CAG information list IE included in the REGISTRATION REJECT message the UE shall

i) replace the "CAG information list" stored in the UE with the received CAG information list IE or the extended CAG information list IE when received in the HPLMN or EHPLMN;

ii) replace the serving VPLMN's entry of the "CAG information list" stored in the UE with the serving VPLMN's entry of the received CAG information list IE or the extended CAG information list IE when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN; or

NOTE 9 when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN entries of a PLMN other than the serving VPLMN if any in the received CAG information list IE or the extended CAG information list IE are ignored

iii) remove the serving VPLMN's entry of the "CAG information list" stored in the UE when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN and the CAG information list IE or the extended CAG information list IE does not contain the serving VPLMN's entry

otherwise the UE shall store an "indication that the UE is only allowed to access 5GS via CAG cells" in the entry of the "CAG information list" for the current PLMN if any if the "CAG information list" stored in the UE does not include the current PLMN's entry the UE shall add an entry for the current PLMN to the "CAG information list" and store an "indication that the UE is only allowed to access 5GS via CAG cells" in the entry of the "CAG information list" for the current PLMN if the UE does not have a stored "CAG information list" the UE shall create a new "CAG information list" and add an entry with an "indication that the UE is only allowed to access 5GS via CAG cells" for the current PLMN

in addition

i) if one or more CAG-ID(s) are authorized based on the "allowed CAG list" for the current PLMN then the UE shall enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] with the updated CAG information; or

ii) if no CAG-ID is authorized based on the "allowed CAG list" for the current PLMN then the UE shall enter the state 5GMM-DEREGISTERED.PLMN-SEARCH and shall apply the PLMN selection process defined in 3GPP TS 23.122 [5] with the updated "CAG information list"

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall in addition set the EPS update status to EU3 ROAMING NOT ALLOWED reset the attach attempt counter and enter the state EMM-DEREGISTERED

#77 (Wireline access area not allowed)

5GMM cause #77 is only applicable when received from a wireline access network by the 5G-RG or the W-AGF acting on behalf of the FN-CRG 5GMM cause #77 received from a 5G access network other than a wireline access network and 5GMM cause #77 received by the W-AGF acting on behalf of the FN-BRG are considered as abnormal cases and the behaviour of the UE is specified in subclause 5.5.1.2.7

when received over wireline access network the 5G-RG and the W-AGF acting on behalf of the FN-CRG shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) shall delete 5G-GUTI last visited registered TAI TAI list and ngKSI shall reset the registration attempt counter shall enter the state 5GMM-DEREGISTERED and shall act as specified in subclause 5.3.23

NOTE 10 the 5GMM sublayer states the 5GMM parameters and the registration status are managed per access type independently i.e 3GPP access or non-3GPP access (see subclauses 4.7.2 and 5.1.3)

#78 (PLMN not allowed to operate at the present UE location)

this cause value received from a non-satellite NG-RAN cell is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.2.7

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete last visited registered TAI and TAI list if the UE is not registering or has not registered to the same PLMN over non-3GPP access the UE shall additionally delete the list of equivalent PLMNs 5G-GUTI and ngKSI additionally the UE shall reset the registration attempt counter the UE shall store the PLMN identity and if it is known the current geographical location in the list of "PLMNs not allowed to operate at the present UE location" and shall start a corresponding timer instance (see subclause 4.23.2) the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform a PLMN selection according to 3GPP TS 23.122 [5]

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall handle the EMM parameters EMM state EPS update status 4G-GUTI TAI list eKSI and attach attempt counter as specified in 3GPP TS 24.301 [15] for the case when the EPS attach procedure is rejected with the EMM cause with the same value

#79 (UAS services not allowed)

this cause value received when the UE did not include the service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE of REGISTRATION REQUEST message is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.2.7

the UE shall abort the initial registration procedure set the 5GS update status to 5U2 NOT UPDATED and enter state 5GMM-DEREGISTERED ATTEMPTING-REGISTRATION or 5GMM-DEREGISTERED.PLMN-SEARCH additionally the UE shall reset the registration attempt counter if the UE re-attempt the registration procedure to the current PLMN the UE shall not include the service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE of REGISTRATION REQUEST message unless the UE receives a CONFIGURATION UPDATE COMMAND message including the service-level-AA service status indication in the Service-level-AA container IE with the UAS field set to "UAS services enabled"

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall in addition set the EPS update status to EU2 NOT UPDATED reset the attach attempt counter and enter the state EMM-DEREGISTERED

#80 (Disaster roaming for the determined PLMN with disaster condition not allowed)

this cause value received via non-3GPP access or from a cell belonging to an SNPN and the UE is operating in SNPN access operation mode or when the UE did not indicate "disaster roaming initial registration" in the 5GS registration type IE in the REGISTRATION REQUEST message is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.2.7

the UE shall abort the initial registration procedure set the 5GS update status to 5U2 NOT UPDATED enter state 5GMM-DEREGISTERED PLMN-SEARCH and shall delete any 5G-GUTI last visited registered TAI TAI list and ngKSI additionally the UE shall reset the registration attempt counter the UE shall not attempt to register for disaster roaming services on this PLMN for the UE determined PLMN with disaster condition for a period in the range of 12 to 24 hours the UE shall not attempt to register for disaster roaming services on this PLMN for a period in the range of 3 to 10 minutes the UE shall perform PLMN selection as described in 3GPP TS 23.122 [6] if the message has been successfully integrity checked by the NAS and the UE maintains the PLMN-specific attempt counter of the PLMN which sent the reject message for the UE determined PLMN with disaster condition the UE shall set the PLMN-specific attempt counter of the PLMN which sent the reject message for the UE determined PLMN with disaster condition to the UE implementation-specific maximum value

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall in addition set the EPS update status to EU2 NOT UPDATED reset the attach attempt counter and enter the state EMM-DEREGISTERED

#81 (Selected N3IWF is not compatible with the allowed NSSAI)

this cause value received when the UE does not access 5GCN over non-3GPP access using the N3IWF or has not indicated support for slice-based N3IWF selection in the REGISTRATION REQUEST message is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.2.7

the UE shall abort the initial registration procedure set the 5GS update status to 5U2 NOT UPDATED and enter state 5GMM-DEREGISTERED ATTEMPTING-REGISTRATION or 5GMM-DEREGISTERED.PLMN-SEARCH additionally the UE shall reset the registration attempt counter if the N3IWF identifier IE is included in the REGISTRATION REJECT message and the UE supports slice-based N3IWF selection the UE may use the provided N3IWF identifier IE in N3IWF selection as specified in 3GPP TS 24.502 [18] prior to an immediate consecutive initial registration attempt to the network otherwise the UE shall ignore the N3IWF identifier IE additionally if the UE selects a new N3IWF and a new initial registration attempt is performed the UE shall delete any 5G-GUTI last visited registered TAI TAI list and ngKSI

#82 (Selected TNGF is not compatible with the allowed NSSAI)

this cause value received when the UE does not access 5GCN over non-3GPP access using the TNGF or has not indicated support for slice-based TNGF selection in the REGISTRATION REQUEST message is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.2.7

the UE shall abort the initial registration procedure set the 5GS update status to 5U2 NOT UPDATED and enter state 5GMM-DEREGISTERED ATTEMPTING-REGISTRATION or 5GMM-DEREGISTERED.PLMN-SEARCH additionally the UE shall reset the registration attempt counter if the TNAN information IE is included in the REGISTRATION REJECT message and the UE supports slice-based TNGF selection the UE may use the provided TNAN information IE in TNAN selection as specified in 3GPP TS 24.502 [18] prior to an immediate consecutive registration attempt to the network otherwise the UE shall ignore the TNAN information IE additionally if the UE selects a new TNAN and a new initial registration attempt is performed the UE shall delete any 5G-GUTI last visited registered TAI TAI list and ngKSI

other values are considered as abnormal cases the behaviour of the UE in those cases is specified in subclause 5.5.1.2.7

##### 5.5.1.2.6 initial registration for emergency services not accepted by the network

upon receiving the REGISTRATION REJECT message including 5GMM cause #5 "PEI not accepted" the UE shall enter the state 5GMM-DEREGISTERED.NO-SUPI if the REGISTRATION REJECT message is received

- over 3GPP access; or

- over non-3GPP access and is integrity protected;

and the UE also supports the registration procedure over the other access the UE shall in addition handle 5GMM parameters and 5GMM state for this access as described for this 5GMM cause value

upon receiving the REGISTRATION REJECT message including 5GMM cause value which is not #5 "PEI not accepted" the UE shall perform the actions as described in subclause 5.5.1.2.5 with the following addition the UE shall inform the upper layers of the failure of the procedure

NOTE 1 this can result in the upper layers requesting implementation specific mechanisms e.g procedures specified in 3GPP TS 24.229 [14] can result in the emergency call being attempted to another IP-CAN

if the initial registration request for emergency services fails due to abnormal cases the UE shall perform the actions as described in subclause 5.5.1.2.7 and inform the upper layers of the failure to access the network or the failure of the procedure

NOTE 2 this can result in the upper layers requesting other implementation specific mechanisms e.g procedures specified in 3GPP TS 24.229 [14] can result in the emergency call being attempted to another IP-CAN

in a shared network upon receiving the REGISTRATION REJECT message the UE shall perform the actions as described in subclause 5.5.1.2.5 and shall

a) inform the upper layers of the failure of the procedure; or

NOTE 3 the upper layers can request implementation specific mechanisms e.g procedures specified in 3GPP TS 24.229 [14] that can result in the emergency call being attempted to another IP-CAN

b) attempt to perform a PLMN or SNPN selection in the shared network and if an initial registration for emergency services was not already attempted with the selected PLMN or SNPN and the REGISTRATION REQUEST message for which the REGISTRATION REJECT message was received is

- not for sending a PDU SESSION ESTABLISHMENT REQUEST message with request type set to "existing emergency PDU session" initiate an initial registration for emergency services with the selected PLMN or SNPN; or

- for sending a PDU SESSION ESTABLISHMENT REQUEST message with request type set to "existing emergency PDU session" and

i) the selected PLMN is an equivalent PLMN or the selected SNPN is an equivalent SNPN initiate an initial registration for emergency services with the selected PLMN or SNPN; and

ii) the selected PLMN is not an equivalent PLMN or the selected SNPN is not an equivalent SNPN perform a PLMN or SNPN selection and initiate an initial registration for emergency services with the selected PLMN or SNPN if an initial registration for emergency services was not already attempted with the selected PLMN or SNPN

in a shared network if the initial registration request for emergency services fails due to abnormal cases the UE shall perform the actions as described in subclause 5.5.1.2.7 and shall

a) inform the upper layers of the failure of the procedure; or

NOTE 4 the upper layers can request implementation specific mechanisms e.g procedures specified in 3GPP TS 24.229 [14] that can result in the emergency call being attempted to another IP-CAN

b) attempt to perform a PLMN or SNPN selection in the shared network and if an initial registration for emergency services was not already attempted with the selected PLMN or SNPN and the REGISTRATION REQUEST message is

- not for sending a PDU SESSION ESTABLISHMENT REQUEST message with request type set to "existing emergency PDU session" initiate an initial registration for emergency services with the selected PLMN or SNPN; or

- for sending a PDU SESSION ESTABLISHMENT REQUEST message with request type set to "existing emergency PDU session" and

i) the selected PLMN is an equivalent PLMN or the selected SNPN is an equivalent SNPN initiate an initial registration for emergency services with the selected PLMN or SNPN; and

ii) the selected PLMN is not an equivalent PLMN or the selected SNPN is not an equivalent SNPN perform a PLMN or SNPN selection and initiate an initial registration for emergency services with the selected PLMN or SNPN if an initial registration for emergency services was not already attempted with the selected PLMN or SNPN

##### 5.5.1.2.6A initial registration for initiating an emergency PDU session not accepted by the network

if the network cannot accept an initial registration request with 5GS registration type IE set to "initial registration" and for sending a PDU SESSION ESTABLISHMENT REQUEST message with request type set to "initial emergency request" the UE shall perform the procedures as described in subclause 5.5.1.2.5 then if the UE is in the same selected PLMN or SNPN where the last initial registration request was attempted the UE shall

a) inform the upper layers of the failure of the procedure; or

NOTE 1 this can result in the upper layers requesting implementation specific mechanisms e.g procedures specified in 3GPP TS 24.229 [14] can result in the emergency call being attempted to another IP-CAN

b) attempt initial registration for emergency services

if the network cannot accept an initial registration request with 5GS registration type IE set to "initial registration" for establishing an emergency PDU session and the PDU session needs to be established due to handover of an existing PDN connection for emergency bearer services the UE shall perform the procedures as described in subclause 5.5.1.2.5 then if the UE is in the same selected PLMN or equivalent PLMN or the same selected SNPN or equivalent SNPN where the last initial registration request was attempted the UE shall attempt initial registration for emergency services

if the initial registration request with 5GS registration type IE set to "initial registration" and for initiating an emergency PDU session fails due to abnormal case b) in subclause 5.5.1.2.7 the UE shall perform the actions as described in subclause 5.5.1.2.7 and inform the upper layers of the failure to access the network

NOTE 2 this can result in the upper layers requesting implementation specific mechanisms e.g procedures specified in 3GPP TS 24.229 [14] can result in the emergency call being attempted to another IP-CAN

if the initial registration request with 5GS registration type IE set to "initial registration" and for initiating an emergency PDU session fails due to abnormal cases c) d) or e) in subclause 5.5.1.2.7 the UE shall perform the actions as described in subclause 5.5.1.2.7 then if the UE is in

a) the same selected PLMN or SNPN where the last initial registration request was attempted and the PDU session does not need to be established due to handover of an existing PDN connection for emergency bearer services the UE shall

- inform the upper layers of the failure of the procedure; or

NOTE 3 this can result in the upper layers requesting implementation specific mechanisms e.g procedures specified in 3GPP TS 24.229 [14] can result in the emergency call being attempted to another IP-CAN

- attempt initial registration for emergency services; or

b) the same selected PLMN or equivalent PLMN or the same selected SNPN or equivalent SNPN where the last initial registration request was attempted and the PDU session needs to be established due to handover of an existing PDN connection for emergency bearer services attempt initial registration for emergency services

##### 5.5.1.2.7 abnormal cases in the UE

the following abnormal cases can be identified

a) timer T3346 is running

the UE shall not start the registration procedure for initial registration unless

1) the UE is a UE configured for high priority access in selected PLMN or SNPN;

2) the UE needs to perform the registration procedure for initial registration for emergency services;

3) the UE receives a DEREGISTRATION REQUEST message with the "re-registration required" indication;

4) the UE in NB-N1 mode is requested by the upper layer to transmit user data related to an exceptional event and

- the UE is allowed to use exception data reporting (see the ExceptionDataReportingAllowed leaf of the NAS configuration MO in 3GPP TS 24.368 [17] or the USIM file EFNASCONFIG in 3GPP TS 31.102 [22]); and

- timer T3346 was not started when N1 NAS signalling connection was established with RRC establishment cause set to "mo-ExceptionData"; or

5) the UE needs to perform the registration procedure with 5GS registration type IE set to "initial registration" for initiating of an emergency PDU session upon request of the upper layers to establish the emergency PDU session

the UE stays in the current serving cell and applies the normal cell reselection process

NOTE 1 it is considered an abnormal case if the UE needs to initiate a registration procedure for initial registration while timer T3346 is running independent on whether timer T3346 was started due to an abnormal case or a non-successful case

b) the lower layers indicate that the access attempt is barred

the UE shall not start the initial registration procedure the UE stays in the current serving cell and applies the normal cell reselection process receipt of the access barred indication shall not trigger the selection of a different core network type (EPC or 5GCN)

the initial registration procedure is started if still needed when the lower layers indicate that the barring is alleviated for the access category with which the access attempt was associated

ba) the lower layers indicate that

1) access barring is applicable for all access categories except categories 0 and 2 and the access category with which the access attempt was associated is other than 0 and 2; or

2) access barring is applicable for all access categories except category 0 and the access category with which the access attempt was associated is other than 0

if the REGISTRATION REQUEST message has not been sent the UE shall proceed as specified for case b if the REGISTRATION REQUEST message has been sent the UE shall proceed as specified for case e and additionally the registration procedure for initial registration is started if still needed when the lower layers indicate that the barring is alleviated for the access category with which the access attempt was associated

c) T3510 timeout

the UE shall abort the registration procedure for initial registration and the NAS signalling connection if any shall be released locally if the initial registration request is neither for emergency services nor for initiating a PDU session for emergency services with request type set to "existing emergency PDU session" the UE shall proceed as described below

d) REGISTRATION REJECT message other 5GMM cause values than those treated in subclause 5.5.1.2.5 and cases of 5GMM cause values #10 #11 #15 #22 #31 #36 #72 #73 #74 #75 #76 #77 #78 #79 #80 #81 and #82 if considered as abnormal cases according to subclause 5.5.1.2.5

if the registration request is neither an initial registration request for emergency services nor an initial registration request for initiating a PDU session for emergency services with request type set to "existing emergency PDU session" upon reception of the 5GMM causes #95 #96 #97 #99 and #111 the UE should set the registration attempt counter to 5

the UE shall proceed as described below

e) lower layer failure or release of the NAS signalling connection received from lower layers before the REGISTRATION ACCEPT or REGISTRATION REJECT message is received

the UE shall abort the registration procedure for initial registration and proceed as described below

f) UE initiated de-registration required

the registration procedure for initial registration shall be aborted and the UE initiated de-registration procedure shall be performed the UE shall populate the 5GS mobile identity IE in the DEREGISTRATION REQUEST message with the same UE identity as used in the REGISTRATION REQUEST message for the aborted initial registration procedure if the de-registration is due to USIM removal and T3519 is not running the UE may perform a local de-registration

g) De-registration procedure collision

if the UE receives a DEREGISTRATION REQUEST message from the network in state 5GMM-REGISTERED-INITIATED the de-registration procedure shall be aborted and the initial registration procedure shall be progressed

NOTE 2 the above collision case is valid if the DEREGISTRATION REQUEST message indicates the access type over which the initial registration procedure is attempted otherwise both the procedures are progressed

h) change in the current TAI

if the current TAI is changed before the registration procedure for initial registration is completed the registration procedure for initial registration shall be aborted and re-initiated immediately

if the REGISTRATION COMPLETE message needs to be sent and a tracking area border is crossed when the REGISTRATION ACCEPT message has been received but before a REGISTRATION COMPLETE message is sent and

1) if the current TAI is in the TAI list the UE sends the REGISTRATION COMPLETE message to the network; and

2) otherwise the registration procedure for initial registration shall be aborted and the registration procedure for mobility registration update shall be initiated

if a 5G-GUTI was allocated during the registration procedure this 5G-GUTI shall be used in the registration procedure

i) transmission failure of REGISTRATION COMPLETE message indication with change in the current TAI

1) if the current TAI is still part of the TAI list the UE resends the REGISTRATION COMPLETE message to the network; and

2) otherwise the registration procedure for initial registration shall be aborted and the registration procedure for mobility registration update shall be initiated

j) transmission failure of REGISTRATION COMPLETE message indication without change in the current TAI from lower layers

it is up to the UE implementation how to re-run the ongoing procedure

k) transmission failure of REGISTRATION REQUEST message indication from the lower layers

the registration procedure for initial registration shall be aborted and re-initiated immediately

l) timer T3447 is running

the UE shall not start the registration procedure for initial registration with Follow-on request indicator set to "Follow-on request pending" unless

1) the UE is a UE configured for high priority access in selected PLMN; or

2) the UE needs to perform the registration procedure for initial registration for emergency services

the UE stays in the current serving cell and applies the normal cell reselection process the registration procedure for initial registration is started if still necessary when timer T3447 expires or timer T3447 is stopped

m) UE is not registered to the access other than the access the REGISTRATION ACCEPT message is received and the 5GS registration result value in the 5GS registration result IE value in the REGISTRATION ACCEPT message is set to "3GPP access and non-3GPP access"

the UE shall consider itself as being registered to only the access where the REGISTRATION ACCEPT message is received

n) access for localized services in current SNPN is no longer allowed

if the initial registration request is neither for emergency services nor for initiating a PDU session for emergency services with request type set to "existing emergency PDU session" the selected SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) and

1) access for localized services in SNPN is disabled; or

2) the validity information for the selected SNPN is no longer met;

the UE shall reset the registration attempt counter stop T3510 abort the registration procedure for initial registration locally release the NAS signalling connection if any and enter state 5GMM-DEREGISTERED.LIMITED-SERVICE or 5GMM-DEREGISTERED.PLMN-SEARCH in order to perform SNPN selection according to 3GPP TS 23.122 [5]

for the cases c d and e the UE shall proceed as follows

timer T3510 shall be stopped if still running

if the registration procedure is neither an initial registration for emergency services nor for establishing an emergency PDU session with registration type not set to "emergency registration" the registration attempt counter shall be incremented unless it was already set to 5

if the registration attempt counter is less than 5

- if the initial registration request is not for emergency services timer T3511 is started and the state is changed to 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION when timer T3511 expires the registration procedure for initial registration shall be restarted if still required

if the registration attempt counter is equal to 5

- the UE shall delete TAI list and last visited registered TAI start timer T3502 if the value of the timer as indicated by the network is not zero and shall set the 5GS update status to 5U2 NOT UPDATED if the UE is not registering or has not registered to the same PLMN over both 3GPP access and non-3GPP access the UE shall additionally delete 5G-GUTI ngKSI and list of equivalent PLMNs (if any) or list of equivalent SNPNs (if any) the state is changed to 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION or optionally to 5GMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection SNPN selection or SNPN selection for onboarding services according to 3GPP TS 23.122 [5]

- if the value of T3502 as indicated by the network is zero the UE shall perform the actions defined for the expiry of the timer T3502

- if the procedure is performed via 3GPP access and the UE is operating in single-registration mode

- the UE shall in addition handle the EMM parameters EPS update status EMM state 4G-GUTI TAI list last visited registered TAI list of equivalent PLMNs and eKSI as specified in 3GPP TS 24.301 [15] for the abnormal cases when an EPS attach procedure fails and the attach attempt counter is equal to 5; and

- the UE shall attempt to select E-UTRAN radio access technology and proceed with appropriate EMM specific procedures additionally the UE may disable the N1 mode capability as specified in subclause 4.9

##### 5.5.1.2.8 abnormal cases on the network side

the following abnormal cases can be identified

a) lower layer failure

if a lower layer failure occurs before the REGISTRATION COMPLETE message has been received from the UE and timer T3550 is running the AMF shall locally abort the registration procedure for initial registration enter state 5GMM-REGISTERED and shall not resend the REGISTRATION ACCEPT message if a new 5G-GUTI was assigned to the UE in the registration procedure for initial registration the AMF shall consider both the old and the new 5G-GUTI as valid until the old 5G-GUTI can be considered as invalid by the AMF or the 5GMM context which has been marked as deregistered in the AMF is released if the old 5G-GUTI was allocated by an AMF other than the current AMF the current AMF does not need to retain the old 5G-GUTI during this period the network may use the identification procedure followed by a generic UE configuration update procedure if the old 5G-GUTI is used by the UE in a subsequent message

b) protocol error

if the REGISTRATION REQUEST message is received with a protocol error the AMF shall return a REGISTRATION REJECT message with one of the following 5GMM cause values

#96 invalid mandatory information;

#99 information element non-existent or not implemented;

#100 conditional IE error; or

#111 protocol error unspecified

c) T3550 time-out

on the first expiry of the timer the AMF shall retransmit the REGISTRATION ACCEPT message and shall reset and restart timer T3550

this retransmission is repeated four times i.e on the fifth expiry of timer T3550 the registration procedure for initial registration shall be aborted and the AMF enters state 5GMM-REGISTERED if a new 5G-GUTI was allocated in the REGISTRATION ACCEPT message the AMF shall consider both the old and the new 5G-GUTIs as valid until the old 5G-GUTI can be considered as invalid by the AMF or the 5GMM context which has been marked as de-registered in the AMF is released if the old 5G-GUTI was allocated by an AMF other than the current AMF the current AMF does not need to retain the old 5G-GUTI during this period if the old 5G-GUTI is used by the UE in a subsequent message the AMF acts as specified for case a) above

d) REGISTRATION REQUEST message received after the REGISTRATION ACCEPT message has been sent and before the REGISTRATION COMPLETE message is received if the REGISTRATION COMPLETE message is expected

1) if one or more of the information elements in the REGISTRATION REQUEST message differ from the ones received within the previous REGISTRATION REQUEST message the previously initiated the registration procedure for initial registration shall be aborted if the REGISTRATION COMPLETE message has not been received and the new registration procedure for initial registration shall be progressed; or

2) if the information elements do not differ then the REGISTRATION ACCEPT message shall be resent and the timer T3550 shall be restarted in that case the retransmission counter related to T3550 is not incremented

e) more than one REGISTRATION REQUEST message with 5GS registration type IE set to "initial registration" received and no REGISTRATION ACCEPT message or REGISTRATION REJECT message has been sent

1) if one or more of the information elements in the REGISTRATION REQUEST message with 5GS registration type IE set to "initial registration" differs from the ones received within the previous REGISTRATION REQUEST message with 5GS registration type IE set to "initial registration" the previously initiated the registration procedure for initial registration shall be aborted and the new the registration procedure for initial registration shall be executed;

2) if the information elements do not differ then the network shall continue with the previous the registration procedure for initial registration and shall ignore the second REGISTRATION REQUEST message

f) REGISTRATION REQUEST message with 5GS registration type IE set to "initial registration" received in state 5GMM-REGISTERED

if a REGISTRATION REQUEST message with 5GS registration type IE set to "initial registration" is received in state 5GMM-REGISTERED the network may initiate the 5GMM common procedures; if it turned out that the REGISTRATION REQUEST message was sent by a genuine UE that has already been registered the 5GMM context if any are deleted and the new REGISTRATION REQUEST is progressed otherwise if network considers REGISTRATION REQUEST message was not sent by a genuine UE based on authentication procedure the network shall maintain the 5GMM-context if any unchanged

NOTE 1 the network can determine that the UE is genuine by executing the authentication procedure as described in subclause 5.4.1

g) REGISTRATION REQUEST message with 5GS registration type IE set to "mobility registration updating" or "periodic registration updating" received before REGISTRATION COMPLETE message if the REGISTRATION COMPLETE message is expected

timer T3550 shall be stopped the allocated 5G-GUTI in the registration procedure for initial registration shall be considered as valid and the registration procedure for mobility and periodic registration update shall be progressed as described in subclause 5.5.1.3

h) DEREGISTRATION REQUEST message received before REGISTRATION COMPLETE message if the REGISTRATION COMPLETE message is expected

the AMF shall abort the registration procedure for initial registration and shall progress the de-registration procedure as described in subclause 5.5.2.2

i) UE security capabilities invalid or unacceptable

if the REGISTRATION REQUEST message is received with invalid or unacceptable UE security capabilities (e.g no 5GS encryption algorithms (all bits zero) no 5GS integrity algorithms (all bits zero) mandatory 5GS encryption algorithms not supported or mandatory 5GS integrity algorithms not supported etc.) the AMF shall return a REGISTRATION REJECT message

NOTE 2 5GMM cause value to be used in REGISTRATION REJECT message is up to the network implementation

j) based on operator policy if the initial registration request from a UE not supporting CAG is rejected due to CAG restrictions the network shall reject the initial registration with a 5GMM cause value other than the 5GMM cause #76 (Not authorized for this CAG or authorized for CAG cells only)

NOTE 3 5GMM cause #7 (5GS services not allowed) 5GMM cause #11 (PLMN not allowed) 5GMM cause #27 (N1 mode not allowed) 5GMM cause #73 (Serving network not authorized) can be used depending on the subscription of the UE and whether the UE roams or not

#### 5.5.1.3 registration procedure for mobility and periodic registration update

##### 5.5.1.3.1 general

this procedure is used by a UE for both mobility and periodic registration update of 5GS services this procedure when used for periodic registration update of 5GS services is performed only in 3GPP access

this procedure used for periodic registration update of 5GS services is controlled in the UE by timer T3512 when timer T3512 expires the registration procedure for mobility and periodic registration update is started start and reset of timer T3512 is described in subclause 10.2

if the MUSIM UE is registered for emergency services and initiates a registration procedure for mobility and periodic registration update the network shall not indicate the support of

- the NAS signalling connection release;

- the paging indication for voice services;

- the reject paging request; or

- the paging restriction;

in the REGISTRATION ACCEPT message

##### 5.5.1.3.2 mobility and periodic registration update initiation

the UE in state 5GMM-REGISTERED shall initiate the registration procedure for mobility and periodic registration update by sending a REGISTRATION REQUEST message to the AMF

a) when the UE detects that the current TAI is not in the list of tracking areas that the UE previously registered in the AMF;

b) when the periodic registration updating timer T3512 expires in 5GMM-IDLE mode and the UE is not registered for emergency services (see subclause 5.3.7);

c) when the UE receives a CONFIGURATION UPDATE COMMAND message indicating "registration requested" in the registration requested bit of the configuration update indication IE as specified in subclauses 5.4.4.3;

d) when the UE in state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE either receives a paging or the UE receives a NOTIFICATION message with access type indicating 3GPP access over the non-3GPP access for PDU sessions associated with 3GPP access;

NOTE 1 as an implementation option MUSIM UE is allowed to not respond to paging based on the information available in the paging message e.g voice service indication

e) upon inter-system change from S1 mode to N1 mode and if the UE previously had initiated an attach procedure or a tracking area updating procedure when in S1 mode;

f) when the UE receives an indication of "RRC connection failure" from the lower layers and does not have signalling pending (i.e when the lower layer requests NAS signalling connection recovery) except for the case specified in subclause 5.3.1.4;

g) when the UE changes the 5GMM capability or the S1 UE network capability or both;

h) when the UE's usage setting changes;

i) when the UE needs to change the slice(s) it is currently registered to;

NOTE 1A the UE can after the completion of the ongoing registration procedure initiate another registration procedure for mobility registration update to request more slices

j) when the UE changes the UE specific DRX parameters;

k) when the UE in state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE receives a request from the upper layers to establish an emergency PDU session or perform emergency services fallback;

l) when the UE needs to register for SMS over NAS indicate a change in the requirements to use SMS over NAS or de-register from SMS over NAS;

m) when the UE needs to indicate PDU session status to the network after performing a local release of PDU session(s) as specified in subclauses 6.4.1.5 and 6.4.3.5;

n) when the UE in 5GMM-IDLE mode changes the radio capability for NG-RAN or E-UTRAN;

o) when the UE receives a fallback indication from the lower layers and does not have signalling pending see subclauses 5.3.1.4 and 5.3.1.2);

p) void;

q) when the UE needs to request new LADN information;

r) when the UE needs to request the use of MICO mode or needs to stop the use of MICO mode or to request the use of new T3324 value or new T3512 value;

s) when the UE in 5GMM-CONNECTED mode with RRC inactive indication enters a cell in the current registration area belonging to an equivalent PLMN of the registered PLMN and not belonging to the registered PLMN;

t) when the UE receives over 3GPP access a SERVICE REJECT message or a DL NAS TRANSPORT message with the 5GMM cause value set to #28 "Restricted service area";

u) when the UE needs to request the use of eDRX when a change in the eDRX usage conditions at the UE requires different extended DRX parameters or needs to stop the use of eDRX;

NOTE 2 a change in the eDRX usage conditions at the UE can include e.g a change in the UE configuration a change in requirements from upper layers or the battery running low at the UE

v) when the UE supporting 5G-SRVCC from NG-RAN to UTRAN changes the mobile station classmark 2 or the supported codecs;

w) when the UE in state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE decides to request new network slices after being rejected due to no allowed network slices requested or request S-NSSAI(s) which have been removed from the rejected NSSAI for the maximum number of UEs reached;

x) when the UE is not in NB-N1 mode and the UE has received a UE radio capability ID deletion indication IE set to "Network-assigned UE radio capability IDs deletion requested”;

y) when the UE receives a REGISTRATION REJECT message with 5GMM cause values #3 #6 or #7 without integrity protection over another access;

z) when the UE needs to request new ciphering keys for ciphered broadcast assistance data;

za) when due to manual CAG selection the UE has selected a CAG-ID which is not a CAG-ID authorized based on the "allowed CAG list" for the selected PLMN or a CAG-ID in a PLMN for which the entry in the "CAG information list" does not exist or when the UE has selected without selecting a CAG-ID a PLMN for which the entry in the "CAG information list" includes an "indication that the UE is only allowed to access 5GS via CAG cells";

zb) when the UE needs to start stop or change the conditions for using the WUS assistance information or PEIPS assistance information;

zc) when the UE changes the UE specific DRX parameters in NB-N1 mode;

zd) when the UE in 5GMM-CONNECTED mode with RRC inactive indication enters a new cell with different RAT in current TAI list or not in current TAI list;

ze) when the UE enters state 5GMM-REGISTERED.NORMAL-SERVICE or 5GMM-REGISTERED.NON-ALLOWED-SERVICE (as described in subclause 5.3.5.2) over 3GPP access after the UE has sent a NOTIFICATION RESPONSE message over non-3GPP access in response to reception of a NOTIFICATION message over non-3GPP access as specified in subclause 5.6.3.1;

zf) when the UE supporting UAS services is not registered for UAS services and needs to register to the 5GS for UAS services;

zg) when the UE supporting MINT needs to perform the registration procedure for mobility and periodic registration update to register to the PLMN offering disaster roaming;

zh) when the MUSIM UE supporting the paging timing collision control needs to request a new 5G-GUTI assignment and the UE is not registered for emergency services;

NOTE 3 based on implementation the MUSIM UE can request a new 5G-GUTI assignment (e.g when the lower layers request to modify the timing of the paging occasions)

zi) when the network supports the paging restriction and the MUSIM UE in state 5GMM-REGISTERED.NON-ALLOWED-SERVICE needs to requests the network to remove the paging restriction;

zj) when the UE changes the 5GS preferred CIoT network behaviour or the EPS preferred CIoT network behaviour;

zk) when the UE that has entered 5GMM-REGISTERED.NO-CELL-AVAILABLE and it has one or more S-NSSAI(s) in pending NSSAI finds a suitable cell according to 3GPP TS 38.304 [28];

zl) when the UE is registered for disaster roaming services and receives a request from the upper layers to establish an emergency PDU session or perform emergency services fallback;

zm1) when the UE needs to provide the unavailability information or to update the unavailability information;

zm2) void;

NOTE 3A how UE determines that it is about to lose satellite coverage is an implementation option

zn) when the UE needs to come out of unavailability period and resume normal services;

zo) when the UE in state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE the UE supports the reconnection to the network due to RAN timing synchronization status change has been requested to reconnect to the network upon receiving an indication of a change in the RAN timing synchronization status (see subclauses 5.4.4.2 5.5.1.2.4 and 5.5.1.3.4) and the UE receives an indication of a change in the RAN timing synchronization status; or

zp) when the UE that supports non-3GPP access path switching needs to trigger non-3GPP access path switching from the old non-3GPP access to the new non-3GPP access that is in the same PLMN

NOTE 4 Non-3GPP access path switching from a non-3GPP access to a wireline access or from a wireline access to a non-3GPP access is not specified in this release of the specification

zq) if the UE moves from a tracking area for which the TAI is configured for partially rejected NSSAI to another tracking area within the registration area with aTAI for which the S-NSSAI(s) is supported and the UE still needs to request that S-NSSAI(s)

NOTE 4A the UEs that do not initiate the registration procedure for mobility and periodic registration update in the case above will not receive service for the S-NSSAI(s) that are configured to support the S-NSSAI(s) in the tracking areas supporting the S-NSSAI(s) operators are recomended to consider the impact of such a configuration of having partially rejected NSSAI applicable in some tracking areas within a registration area as it requires the UE to perform mobility and periodic registration update procedure upon mobility within the same registration area

if case b is the only reason for initiating the registration procedure for mobility and periodic registration update the UE shall indicate "periodic registration updating" in the 5GS registration type IE; otherwise if the UE initiates the registration procedure for mobility and periodic registration update due to case zg the UE shall indicate "disaster roaming mobility registration updating" in the 5GS registration type IE; otherwise the UE shall indicate "mobility registration updating"

if case zl is the reason for initiating the registration procedure for mobility and periodic registration update and if the UE supports S1 mode and the UE has not disabled its E-UTRA capability the UE shall

- set the S1 mode bit to "S1 mode supported" in the 5GMM capability IE of the REGISTRATION REQUEST message; and

- include the S1 UE network capability IE in the REGISTRATION REQUEST message;

if the UE which is not registered for disaster roaming services indicates "mobility registration updating" in the 5GS registration type IE and the UE supports S1 mode and the UE has not disabled its E-UTRA capability the UE shall

- set the S1 mode bit to "S1 mode supported" in the 5GMM capability IE of the REGISTRATION REQUEST message;

- include the S1 UE network capability IE in the REGISTRATION REQUEST message additionally if the UE supports EPS-UPIP the UE shall set the EPS-UPIP bit to "EPS-UPIP supported" in the S1 UE network capability IE in the REGISTRATION REQUEST message; and

- if the UE supports sending an ATTACH REQUEST message containing a PDN CONNECTIVITY REQUEST message with request type set to "handover" to transfer a PDU session from N1 mode to S1 mode set the HO attach bit to "attach request message containing PDN connectivity request with request type set to handover to transfer PDU session from N1 mode to S1 mode supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports the LTE positioning protocol (LPP) in N1 mode as specified in 3GPP TS 37.355 [26] the UE shall set the LPP bit to "LPP in N1 mode supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

if the UE supports the location services (LCS) notification mechanisms in N1 mode as specified in 3GPP TS 23.273 [6B] the UE shall set the 5G-LCS bit to "LCS notification mechanisms supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

if the UE supports the user plane positioning using LCS-UPP as specified in 3GPP TS 23.273 [6B] the UE shall set the LCS-UPP bit to "LCS-UPP user plane positioning supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

if the UE supports the user plane positioning using SUPL as specified in 3GPP TS 38.305 [67] and 3GPP TS 23.271 [68] the UE shall set the SUPL bit to "SUPL user plane positioning supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

if the UE supports network verified UE location over satellite NG-RAN as specified in 3GPP TS 23.501 [8] the UE shall set the NVL-SATNR bit to "Network verified UE location over satellite NG-RAN supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

for all cases except case b when the UE is not in NB-N1 mode and the UE supports RACS the UE shall set the RACS bit to "RACS supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports 5G-SRVCC from NG-RAN to UTRAN as specified in 3GPP TS 23.216 [6A] the UE shall set

- the 5G-SRVCC from NG-RAN to UTRAN capability bit to "5G-SRVCC from NG-RAN to UTRAN supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b; and

- include the mobile station classmark 2 IE and the supported codecs IE in the REGISTRATION REQUEST message for all cases except case b

if the UE supports the restriction on use of enhanced coverage the UE shall set the RestrictEC bit to "Restriction on use of enhanced coverage supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

if the UE supports network slice-specific authentication and authorization the UE shall set the NSSAA bit to "network slice-specific authentication and authorization supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

if the UE supports CAG feature the UE shall set the CAG bit to "CAG Supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

if the UE supports extended CAG information list the UE shall set the Ex-CAG bit to "Extended CAG information list supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

if the UE supports enhanced CAG information the UE shall set the ECI bit to "enhanced CAG information supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

if the UE supports sending of REGISTRATION COMPLETE message for acknowledging the reception of negotiated PEIPS assistance inforation IE the UE shall set the RCMAP bit to "Sending of REGISTRATION COMPLETE message for negotiated PEIPS assistance information supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

if the UE operating in the single-registration mode performs inter-system change from S1 mode to N1 mode and

a) has one or more stored UE policy sections identified by a UPSI with the PLMN ID part indicating the HPLMN or the selected PLMN the UE shall set the payload container type IE to "UE policy container" and include the UE STATE INDICATION message (see annex D) in the payload container IE of the REGISTRATION REQUEST message; or

b) does not have any stored UE policy section identified by a UPSI with the PLMN ID part indicating the HPLMN or the selected PLMN and the UE needs to send a UE policy container to the network the UE shall set the payload container type IE to "UE policy container" and include the UE STATE INDICATION message (see annex D) in the payload container IE of the REGISTRATION REQUEST message

NOTE 5 in this version of the protocol the UE can only include the payload container IE in the REGISTRATION REQUEST message to carry a payload of type "UE policy container"

the UE in state 5GMM-REGISTERED shall initiate the registration procedure for mobility and periodic registration update by sending a REGISTRATION REQUEST message to the AMF when the UE needs to request the use of SMS over NAS transport or the current requirements to use SMS over NAS transport change in the UE the UE shall set the SMS requested bit of the 5GS update type IE in the REGISTRATION REQUEST message as specified in subclause 5.5.1.2.2

when initiating a registration procedure for mobility and periodic registration update and the UE needs to send the 5GS update type IE for a reason different than indicating a change in requirement to use SMS over NAS the UE shall set the SMS requested bit of the 5GS update type IE in the REGISTRATION REQUEST message to the same value as indicated by the UE in the last REGISTRATION REQUEST message

if the UE no longer requires the use of SMS over NAS then the UE shall include the 5GS update type IE in the REGISTRATION REQUEST message with the SMS requested bit set to "SMS over NAS not supported"

after sending the REGISTRATION REQUEST message to the AMF the UE shall start timer T3510 if timer T3502 is currently running the UE shall stop timer T3502 if timer T3511 is currently running the UE shall stop timer T3511

if the last visited registered TAI is available the UE shall include the last visited registered TAI in the REGISTRATION REQUEST message

the UE shall handle the 5GS mobile identity IE in the REGISTRATION REQUEST message as follows

a) if the UE is operating in the single-registration mode performs inter-system change from S1 mode to N1 mode and the UE holds a valid native 4G-GUTI the UE shall create a 5G-GUTI mapped from the valid native 4G-GUTI as specified in 3GPP TS 23.003 [4] and indicate the mapped 5G-GUTI in the 5GS mobile identity IE additionally if the UE holds a valid 5G-GUTI the UE shall include the 5G-GUTI in the additional GUTI IE in the REGISTRATION REQUEST message in the following order

1) a valid 5G-GUTI that was previously assigned by the same PLMN with which the UE is performing the registration if available;

2) a valid 5G-GUTI that was previously assigned by an equivalent PLMN if available; and

3) a valid 5G-GUTI that was previously assigned by any other PLMN if available; and

NOTE 6 the 5G-GUTI included in the additional GUTI IE is a native 5G-GUTI

b) for all other cases if the UE holds a valid 5G-GUTI the UE shall indicate the 5G-GUTI in the 5GS mobile identity IE if the UE is registering with an SNPN and the valid 5G-GUTI was previously assigned by another SNPN the UE shall additionally include the NID of the other SNPN in the NID IE

if the UE does not operate in SNPN access operation mode holds two valid native 5G-GUTIs assigned by PLMNs and

1) one of the valid native 5G-GUTI was assigned by the PLMN with which the UE is performing the registration then the UE shall indicate the valid native 5G-GUTI assigned by the PLMN with which the UE is performing the registration in addition the UE shall include the other valid native 5G-GUTI in the additional GUTI IE; or

2) none of the valid native 5G-GUTI was assigned by the PLMN with which the UE is performing the registration then the UE shall indicate the valid native 5G-GUTI assigned over the same access via which the UE is performing the registration

if the UE supports MICO mode and requests the use of MICO mode then the UE shall include the MICO indication IE in the REGISTRATION REQUEST message if the UE requests to use an active time value it shall include the active time value in the T3324 IE in the REGISTRATION REQUEST message if the UE includes the T3324 IE it may also request a particular T3512 value by including the requested T3512 value IE in the REGISTRATION REQUEST message additionally if the UE supports strictly periodic registration timer the UE shall set the strictly periodic registration timer indication bit of the MICO indication IE in the REGISTRATION REQUEST message to "strictly periodic registration timer supported" if the UE needs to stop the use of MICO mode then the UE shall not include the MICO indication IE in the REGISTRATION REQUEST message

if the UE needs to use or change the UE specific DRX parameters the UE shall include the requested DRX parameters IE in the REGISTRATION REQUEST message for all cases except case b

if the UE is in NB-N1 mode and if the UE needs to use or change the UE specific DRX parameters for NB-N1 mode the UE shall include the requested NB-N1 mode DRX parameters IE in the REGISTRATION REQUEST message for all cases except case b

if the UE supports eDRX and requests the use of eDRX the UE shall include the requested extended DRX parameters IE in the REGISTRATION REQUEST message

for all cases except case b if the UE needs to request LADN information for specific LADN DNN(s) or indicates a request for LADN information as specified in 3GPP TS 23.501 [8] the UE shall include the LADN indication IE in the REGISTRATION REQUEST message and

- request specific LADN DNNs by including a LADN DNN value in the LADN indication IE for each LADN DNN for which the UE requests LADN information; or

- to indicate a request for LADN information by not including any LADN DNN value in the LADN indication IE

for all cases except case b if the UE is initiating the registration procedure for mobility and periodic registration update the UE may include the uplink data status IE to indicate which PDU session(s) is

- not associated with control plane only indication;

- associated with the access type the REGISTRATION REQUEST message is sent over; and

- have pending user data to be sent over user plane or are associated with active multicast MBS session(s)

if the UE has one or more active always-on PDU sessions associated with the access type over which the REGISTRATION REQUEST message is sent and the user-plane resources for these PDU sessions are not established and for cases triggering the REGISTRATION REQUEST message except b) the UE shall include the uplink data status IE and indicate that the UE has pending user data to be sent for those PDU sessions if the UE is located outside the LADN service area and inside the registration area assigned by the network the UE shall not include the PDU session for LADN in the uplink data status IE if the UE is in a non-allowed area or is not in an allowed area as specified in subclause 5.3.5 and the UE is in the registration area assigned by the network the UE shall not include the uplink data status IE except for emergency services or for high priority access if the MUSIM UE requests the network to release the NAS signalling connection the UE shall not include the uplink data status IE in the REGISTRATION REQUEST message

if the UE has one or more active PDU sessions which are not accepted by the network as always-on PDU sessions and no uplink user data pending to be sent for those PDU sessions the UE shall not include those PDU sessions in the uplink data status IE in the REGISTRATION REQUEST message

when the registration procedure for mobility and periodic registration update is initiated in 5GMM-IDLE mode the UE may include a PDU session status IE in the REGISTRATION REQUEST message indicating

a) which single access PDU sessions associated with the access type the REGISTRATION REQUEST message is sent over are not inactive in the UE; and

b) which MA PDU sessions are not inactive and having the corresponding user plane resources being established or established in the UE on the access the REGISTRATION REQUEST message is sent over

if the UE received a paging message with the access type indicating non-3GPP access the UE shall include the allowed PDU session status IE in the REGISTRATION REQUEST message if the UE has PDU session(s) over non-3GPP access where

a) the associated S-NSSAI(s) are included in the allowed NSSAI for 3GPP access or the partially allowed NSSAI for 3GPP access and the current TAI is in the list of TAs for which the S-NSSAI is allowed; and

b) the UE is currently located inside the NS-AoS of the S-NSSAI if the S-NSSAI location validity information is available

the UE shall indicate the PDU session(s) for which the UE allows to re-establish the user-plane resources over 3GPP access in the allowed PDU session status IE; otherwise the UE shall not indicate any PDU session(s) in the allowed PDU session status IE if the UE is in a non-allowed area or the UE is not in an allowed area the UE shall set the allowed PDU session status IE as specified in subclause 5.3.5.2

when the allowed PDU session status IE is included in the REGISTRATION REQUEST message the UE shall indicate that a PDU session is not allowed to be transferred to the 3GPP access if the 3GPP PS data off UE status is "activated" for the corresponding PDU session and the UE is not using the PDU session to send uplink IP packets for any of the 3GPP PS data off exempt services (see subclause 6.2.10)

if the UE operating in the single-registration mode performs inter-system change from S1 mode to N1 mode the UE

a) shall include the UE status IE with the EMM registration status set to "UE is in EMM-REGISTERED state" in the REGISTRATION REQUEST message;

NOTE 7 inclusion of the UE status IE with this setting corresponds to the indication that the UE is "moving from EPC" as specified in 3GPP TS 23.502 [9] subclause 4.11.1.3.3 and 4.11.2.3

NOTE 8 the value of the 5GMM registration status included by the UE in the UE status IE is not used by the AMF

b) may include the PDU session status IE in the REGISTRATION REQUEST message indicating the status of the PDU session(s) mapped during the inter-system change from S1 mode to N1 mode from the PDN connection(s) for which the EPS indicated that interworking to 5GS is supported if any (see subclause 6.1.4.1);

c) shall include a TRACKING AREA UPDATE REQUEST message as specified in 3GPP TS 24.301 [15] in the EPS NAS message container IE in the REGISTRATION REQUEST message if the registration procedure is initiated in 5GMM-IDLE mode and the UE has received an "interworking without N26 interface not supported" indication from the network;

c1) may include a TRACKING AREA UPDATE REQUEST message as specified in 3GPP TS 24.301 [15] in the EPS NAS message container IE in the REGISTRATION REQUEST message if the registration procedure is initiated in 5GMM-IDLE mode and the UE has received an "interworking without N26 interface supported" indication from the network; and

d) shall include an EPS bearer context status IE in the REGISTRATION REQUEST message indicating which EPS bearer contexts are active in the UE if the UE has locally deactivated EPS bearer context(s) for which interworking to 5GS is supported while the UE was in S1 mode without notifying the network

for a REGISTRATION REQUEST message with a 5GS registration type IE indicating "mobility registration updating" if the UE

a) is in NB-N1 mode and

1) the UE needs to change the slice(s) it is currently registered to within the same registration area; or

2) the UE has entered a new registration area; or

b) is not in NB-N1 mode and is not registered for onboarding services in SNPN;

the UE shall include the requested NSSAI IE containing the S-NSSAI(s) corresponding to the network slices to which the UE intends to register and associated mapped S-NSSAI(s) if available in the REGISTRATION REQUEST message as described in this subclause when the UE is entering a visited PLMN and intends to register to the slices for which the UE has only HPLMN S-NSSAI(s) available the UE shall include these HPLMN S-NSSAI(s) in the requested mapped NSSAI IE when the UE is entering an EHPLMN whose PLMN code is not derived from the IMSI and intends to register to the slices for which the UE has only HPLMN S-NSSAI(s) available the UE shall include HPLMN S-NSSAI(s) in the requested mapped NSSAI IE the sum of number of S-NSSAI values in the requested NSSAI IE and number of S-NSSAI values in the requested mapped NSSAI IE shall not exceed eight

NOTE 9 the REGISTRATION REQUEST message can include both the requested NSSAI IE and the requested mapped NSSAI IE as described below

if the UE is registered for onboarding services in SNPN the UE shall not include the requested NSSAI IE in the REGISTRATION REQUEST message

for case b the UE shall not include the requested NSSAI IE in the REGISTRATION REQUEST message

if the UE has allowed NSSAI or configured NSSAI or both for the current PLMN the requested NSSAI IE shall include either

a) the configured NSSAI for the current PLMN or SNPN or a subset thereof as described below;

b) the allowed NSSAI for the current PLMN or SNPN or a subset thereof as described below; or

c) the allowed NSSAI for the current PLMN or SNPN or a subset thereof as described below plus the configured NSSAI for the current PLMN or SNPN or a subset thereof as described below

in addition the requested NSSAI IE shall include S-NSSAI(s) applicable in the current PLMN or SNPN and if available the associated mapped S-NSSAI(s) for

a) each PDN connection that is established in S1 mode when the UE is operating in the single-registration mode and the UE is performing an inter-system change from S1 mode to N1 mode; or

b) each active PDU session

if the UE does not have S-NSSAI(s) applicable in the current PLMN or SNPN then the requested mapped NSSAI IE shall include HPLMN S-NSSAI(s) (e.g mapped S-NSSAI(s) if available) for

a) each PDN connection established in S1 mode when the UE is operating in the single-registration mode and the UE is performing an inter-system change from S1 mode to N1 mode to a visited PLMN; or

b) each active PDU session when the UE is performing mobility from N1 mode to N1 mode to a visited PLMN

NOTE 10 the requested NSSAI IE is used instead of requested mapped NSSAI IE in REGISTRATION REQUEST message when the UE enters HPLMN and the EHPLMN list is not present or is empty; or when the UE enters a PLMN whose PLMN code is derived from the IMSI and the EHPLMN list is not empty the requested mapped NSSAI IE is used when the UE enters an EHPLMN whose PLMN code is not derived from the IMSI

if both the S-NSSAI to be replaced and the alternative S-NSSAI are included in the configured NSSAI and the UE needs to request the S-NSSAI to be replaced the UE shall include the S-NSSAI to be replaced in the requested NSSAI IE or the requested mapped NSSAI IE

for a REGISTRATION REQUEST message with a 5GS registration type IE indicating "mobility registration updating" if the UE is in NB-N1 mode and the procedure is initiated for all cases except case a) c) e) i) s) t) w) and x) the REGISTRATION REQUEST message shall not include the requested NSSAI IE

if the UE has

- no allowed NSSAI for the current PLMN or SNPN;

- no configured NSSAI for the current PLMN or SNPN;

- neither active PDU session(s) nor PDN connection(s) to transfer associated with an S-NSSAI applicable in the current PLMN or SNPN; and

- neither active PDU session(s) nor PDN connection(s) to transfer associated with mapped S-NSSAI(s);

and has a default configured NSSAI then the UE shall

a) include the S-NSSAI(s) in the requested NSSAI IE of the REGISTRATION REQUEST message using the default configured NSSAI; and

b) include the network slicing indication IE with the default configured NSSAI indication bit set to "Requested NSSAI created from default configured NSSAI" in the REGISTRATION REQUEST message

if the UE has

- no allowed NSSAI for the current PLMN or SNPN;

- no configured NSSAI for the current PLMN or SNPN;

- neither active PDU session(s) nor PDN connection(s) to transfer associated with an S-NSSAI applicable in the current PLMN or SNPN

- neither active PDU session(s) nor PDN connection(s) to transfer associated with mapped S-NSSAI(s); and

- no default configured NSSAI

the UE shall include neither requested NSSAI IE nor requested mapped NSSAI IE in the REGISTRATION REQUEST message

if all the S-NSSAI(s) corresponding to the slice(s) to which the UE intends to register are included in the pending NSSAI the UE shall not include a requested NSSAI in the REGISTRATION REQUEST message

when the UE storing a pending NSSAI intends to register to additional S-NSSAI(s) over the same access type the UE shall send the requested NSSAI containing the additional S-NSSAI(s) that the UE intends to register to in the REGISTRATION REQUEST message the requested NSSAI shall not include any S-NSSAI from the pending NSSAI

the subset of configured NSSAI provided in the requested NSSAI consists of one or more S-NSSAIs in the configured NSSAI applicable to the current PLMN or SNPN where any included S-NSSAI is neither in the rejected NSSAI nor associated to an S-NSSAI in the rejected NSSAI if the UE is inside the NS-AoS of an S-NSSAI in the rejected NSSAI with a rejection cause value set to "S-NSSAI not available in the current registration area" the S-NSSAI may be included in the requested NSSAI

for case zq the subset of configured NSSAI provided in the requested NSSAI consists of one or more S-NSSAIs in the configured NSSAI applicable to the current PLMN or SNPN where any included S-NSSAI is in the partially rejected NSSAI and the current TAI is in the list of TAs for which the S-NSSAI is not rejected if the UE is inside the NS-AoS of an S-NSSAI in the partially rejected NSSAI and the current TAI is in the list of TAs for which the S-NSSAI is rejected the S-NSSAI may be included in the requested NSSAI

in addition if the NSSRG information is available the subset of configured NSSAI provided in the requested NSSAI shall be associated with at least one common NSSRG value the UE may also include in the requested NSSAI included in the requested NSSAI IE or the requested mapped NSSAI IE or both the S-NSSAI(s) which were added to configured NSSAI in S1 mode and for which the associated NSSRG information is not available if the UE is in 5GMM-REGISTERED state over the other access and has already an allowed NSSAI for the other access in the same PLMN or in different PLMNs all the S-NSSAI(s) in the requested NSSAI included in the requested NSSAI IE or the requested mapped NSSAI IE or both for the current access shall share at least an NSSRG value common to all the S-NSSAI(s) of the allowed NSSAI for the other access if the UE is simultaneously performing the registration procedure on the other access in different PLMNs the UE shall include S-NSSAIs that share at least a common NSSRG value across all access types if the UE has pending NSSAI which the UE is still interested in using then S-NSSAIs in the pending NSSAI and requested NSSAI shall be associated with at least one common NSSRG value

NOTE 11 if the UE has stored mapped S-NSSAI(s) for the rejected NSSAI and one or more S-NSSAIs in the stored mapped S-NSSAI(s) for the configured NSSAI are not included in the stored mapped S-NSSAI(s) for the rejected NSSAI then a S-NSSAI in the configured NSSAI associated to one or more of these mapped S-NSSAI(s) for the configured NSSAI are available to be included in the requested NSSAI together with their mapped S-NSSAI

NOTE 12 if one or more mapped S-NSSAIs in the stored mapped S-NSSAI(s) for the configured NSSAI are not included in the stored rejected NSSAI for the failed or revoked NSSAA a S-NSSAI in the configured NSSAI associated to one or more of these mapped S-NSSAI(s) for the configured NSSAI are available to be included in the registration request together with their mapped S-NSSAI

NOTE 13 there is no need to consider the case that the UE is simultaneously performing the registration procedure on the other access in the same PLMN due to that the UE is not allowed to initiate the registration procedure over one access when the registration over the other access to the same PLMN is going on

if

a) the UE is registered to current PLMN over the other access and has NSSRG information available;

b) the UE is attempting mobility registration to the same current PLMN from other PLMN in the current access; and

c) the UE has PDU session(s) or PDN connection(s) associated with NSSAI not sharing part of NSSRG available of the current PLMN;

then the UE locally releases these PDU session(s) or PDN connection(s) as the NSSAI for these PDU session(s) or PDN connection(s) will not be included in the requested or the requested mapped NSSAI in the current PLMN due to its lack of association to the common NSSRG of the current PLMN

the subset of allowed NSSAI provided in the requested NSSAI consists of one or more S-NSSAIs in the allowed NSSAI for this PLMN

if the UE supports the S-NSSAI time validity information S-NSSAI time validity information is available for an S-NSSAI and the S-NSSAI time validity information indicates that the S-NSSAI is not available the UE shall not include the S-NSSAI in the requested NSSAI IE of the REGISTRATION REQUEST message if the UE has S-NSSAI time validity information over the other access in the same PLMN and the S-NSSAI time validity information indicates that the S-NSSAI is not available the UE shall not include the S-NSSAI in the requested NSSAI IE of the REGISTRATION REQUEST message for the current access type

NOTE 14 how the UE selects the subset of configured NSSAI or allowed NSSAI to be provided in the requested NSSAI is implementation specific the UE can take preferences indicated by the upper layers (e.g policies like URSP applications) and UE local configuration into account

NOTE 14A if the UE determines the on-demand S-NSSAI for a PDU session establishment as specified in subclause 4.2.2 of 3GPP TS 24.526 [19] the UE includes the on-demand S-NSSAI in the requested NSSAI during the registration procedure

NOTE 15 the number of S-NSSAI(s) included in the requested NSSAI cannot exceed eight

if the UE supports NSAG the UE shall set the NSAG bit to "NSAG supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b if the UE supports sending of REGISTRATION COMPLETE message for acknowledging the reception of NSAG information IE in the REGISTRATION ACCEPT message the UE shall set the RCMAN bit to "Sending of REGISTRATION COMPLETE message for NSAG information supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

if the UE supports the unavailability period the UE shall set the UN-PER bit to "unavailability period supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

if the UE supports network slice replacement the UE shall set the NSR bit to "network slice replacement supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

for case zm1 if the network indicated support for the unavailability period in the last registration procedure the UE shall include the unavailability information IE in the REGISTRATION REQUEST message if the UE did not include a start of the unavailability period in the unavailability information IE the UE shall set the Follow-on request indicator to "No follow-on request pending" in the REGISTRATION REQUEST message and shall not include the uplink data status IE or the allowed PDU session status IE in the REGISTRATION REQUEST message even if the UE has one or more active always-on PDU sessions associated with the 3GPP access if the UE includes the unavailability information IE to indicate the type of the unavailability and the UE will be unavailable due to NR satellite access discontinuous coverage the UE shall set the unavailability type bit to "unavailability due to discontinuous coverage" in the unavailability information IE

for case zm1 the UE should initiate the registration procedure for mobility and periodic registration update only if the UE can determine based on its implementation that there is enough time to complete the procedure before the start of the unavailability period

NOTE 15A if the UE is unable to store its 5GMM and 5GSM contexts the UE triggers the de-registration procedure ability to store the 5GMM information for UEs not operating in SNPN access operation mode as described in subclause C.1 does not imply the ability to store the 5GMM and 5GSM contexts

NOTE 15B if the UE is able to store its 5GMM and 5GSM contexts the UE can store the 5GMM and 5GSM contexts even if the registration procedure for mobility and periodic registration update is not completed successfully

the UE shall set the Follow-on request indicator to "Follow-on request pending" if the UE

a) initiates the registration procedure for mobility and periodic registration update upon request of the upper layers to establish an emergency PDU session;

b) initiates the registration procedure for mobility and periodic registration update upon receiving a request from the upper layers to perform emergency services fallback; or

c) needs to prolong the established NAS signalling connection after the completion of the registration procedure for mobility and periodic registration update (e.g due to uplink signalling pending but no user data pending)

NOTE 16 the UE does not have to set the Follow-on request indicator to 1 even if the UE has to request resources for V2X communication over PC5 reference point 5G ProSe direct discovery over PC5 5G ProSe direct communication over PC5 or ranging and sidelink positioning or A2X communication over PC5 reference point

for case n the UE shall include the 5GS update type IE in the REGISTRATION REQUEST message with the NG-RAN-RCU bit set to "UE radio capability update needed" additionally if the UE is not in NB-N1 mode the UE supports RACS and the UE has an applicable UE radio capability ID for the new UE radio configuration in the serving PLMN or SNPN the UE shall include the applicable UE radio capability ID in the UE radio capability ID of the REGISTRATION REQUEST message

NOTE 16A for cases n if the UE supports RACS irrespective whether the UE has an applicable UE radio capability ID for the new UE radio configuration in the selected PLMN the 5GS update type IE in the REGISTRATION REQUEST message with the NG-RAN-RCU bit is set to "UE radio capability update needed"

if the UE is in the 5GMM-CONNECTED mode and the UE changes the radio capability for NG-RAN or E-UTRAN the UE may locally release the established N1 NAS signalling connection and enter the 5GMM-IDLE mode then the UE shall initiate the registration procedure for mobility and periodic registration update including the 5GS update type IE in the REGISTRATION REQUEST message with the NG-RAN-RCU bit set to " UE radio capability update needed"

for case o the UE shall include the uplink data status IE in the REGISTRATION REQUEST message indicating the PDU session(s) without active user-plane resources for which the UE has pending user data to be sent if any and the PDU session(s) for which user-plane resources were active prior to receiving the fallback indication if any if the UE has joined one or more multicast MBS session and was in 5GMM-CONNECTED mode with RRC inactive indication before receiving the fallback indication from the lower layers the UE shall include the uplink data status IE in the REGISTRATION REQUEST message indicating the PDU session(s) that are associated to the one or more multicast MBS session if the UE is in a non-allowed area or if the UE is not in allowed area the UE shall not include the uplink data status IE in REGISTRATION REQUEST message except if the PDU session for which user-plane resources were active prior to receiving the fallback indication is an emergency PDU session or if the UE is configured for high priority access in the selected PLMN or SNPN as specified in subclause 5.3.5

for case f the UE shall include the uplink data status IE in the REGISTRATION REQUEST message indicating the PDU session(s) for which the UE has uplink user data pending and the PDU session(s) for which user-plane resources were active prior to receiving "RRC connection failure" indication from the lower layers if any if the UE has joined one or more multicast MBS session and was in 5GMM-CONNECTED mode with RRC inactive indication before receiving the indication of "RRC connection failure" from the lower layers or before receiving the indication that the resumption of the RRC connection has failed from the lower layers the UE shall include the uplink data status IE in the REGISTRATION REQUEST message indicating the PDU session(s) that are associated to the one or more multicast MBS session if the UE is in non-allowed area or not in allowed area the UE shall not include the uplink data status IE in REGISTRATION REQUEST message except that the PDU session for which user-plane resources were active prior to receiving the "RRC connection failure"indication is emergency PDU session or that the UE is configured for high priority access in selected PLMN or SNPN as specified in subclause 5.3.5

if the UE supports service gap control then the UE shall set the SGC bit to "service gap control supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

for cases a x or if the UE operating in the single-registration mode performs inter-system change from S1 mode to N1 mode the UE shall

a) if the UE has an applicable network-assigned UE radio capability ID for the current UE radio configuration in the selected PLMN or SNPN include the applicable network-assigned UE radio capability ID in the UE radio capability ID IE of the REGISTRATION REQUEST message; and

b) if the UE

1) does not have an applicable network-assigned UE radio capability ID for the current UE radio configuration in the selected PLMN or SNPN; and

2) has an applicable manufacturer-assigned UE radio capability ID for the current UE radio configuration

include the applicable manufacturer-assigned UE radio capability ID in the UE radio capability ID IE of the REGISTRATION REQUEST message

for all cases except cases b and z if the UE supports ciphered broadcast assistance data and the UE needs to obtain new ciphering keys the UE shall include the additional information requested IE with the CipherKey bit set to "ciphering keys for ciphered broadcast assistance data requested" in the REGISTRATION REQUEST message

for case z the UE shall include the additional information requested IE with the CipherKey bit set to "ciphering keys for ciphered broadcast assistance data requested" in the REGISTRATION REQUEST message

for case a if the UE supports ciphered broadcast assistance data and the UE detects that one or more ciphering keys stored at the UE is not applicable in the current TAI the UE should include the additional information requested IE with the CipherKey bit set to "ciphering keys for ciphered broadcast assistance data requested" in the REGISTRATION REQUEST message

for all cases except case b for case b if the UE supports ciphered broadcast assistance data and the remaining validity time for one or more ciphering keys stored at the UE is less than timer T3512 the UE should include the additional information requested IE with the CipherKey bit set to "ciphering keys for ciphered broadcast assistance data requested" in the REGISTRATION REQUEST message

the UE shall set the WUSA bit to "WUS assistance information reception supported" in the 5GMM capability IE for all cases except case b if the UE supports WUS assistance information the UE may include its UE paging probability information in the requested WUS assistance information IE if the UE has set the WUSA bit to "WUS assistance information reception supported" in the 5GMM capability IE and does not have an active emergency PDU session

the UE shall set the NR-PSSI bit to "NR paging subgrouping supported" in the 5GMM capability IE for all cases except case b if the UE supports PEIPS assistance information is not registered for emergency services and does not have an active emergency PDU session the UE may include its UE paging probability information in the requested PEIPS assistance information IE if the UE has set the NR-PSSI bit to "NR paging subgrouping supported" in the 5GMM capability IE

if the network supports the N1 NAS signalling connection release and the MUSIM UE requests the network to release the NAS signalling connection the UE shall set request type to "NAS signalling connection release" in the UE request type IE set the Follow-on request indicator to "No follow-on request pending" and if the network supports the paging restriction may set the paging restriction preference in the paging restriction IE in the REGISTRATION REQUEST message in addition the UE shall not include the uplink data status IE or the allowed PDU session status IE in the REGISTRATION REQUEST message even if the UE has one or more active always-on PDU sessions associated with the 3GPP access

NOTE 17 if the network has already indicated support for N1 NAS signalling connection release in the current stored registration area and the UE doesn't have an emergency PDU session established the MUSIM UE is allowed to request the network to release the NAS signalling connection during registration procedure for mobility and periodic registration update that is due to mobility outside the registration area even before detecting whether the network supports the N1 NAS signalling connection release in the current TAI

NOTE 18 if the network has already indicated support for paging restriction in the current stored registration area and the UE doesn't have an emergency PDU session established the MUSIM UE is allowed to include paging restriction together with the request to the network to release the NAS signalling connection during registration procedure for mobility and periodic registration update that is due to mobility outside the registration area even before detecting whether the network supports the paging restriction in the current TAI

for case zi the UE shall not include the paging restriction IE in the REGISTRATION REQUEST message if the UE is in 5GMM-IDLE mode and the network supports the N1 NAS signalling connection release the UE may include the UE request type IE and set request type to "NAS signalling connection release" to remove the paging restriction and request the release of the NAS signalling connection at the same time in addition the UE shall not include the uplink data status IE in the REGISTRATION REQUEST message

if the UE does not have a valid 5G NAS security context and the UE is sending the REGISTRATION REQUEST message after an inter-system change from S1 mode to N1 mode in 5GMM-IDLE mode the UE shall send the REGISTRATION REQUEST message without including the NAS message container IE the UE shall include the entire REGISTRATION REQUEST message (i.e containing cleartext IEs and non-cleartext IEs if any) in the NAS message container IE that is sent as part of the SECURITY MODE COMPLETE message as described in subclauses 4.4.6 and 5.4.2.3

if the UE indicates "mobility registration updating" in the 5GS registration type IE and supports V2X as specified in 3GPP TS 24.587 [19B] the UE shall set the V2X bit to "V2X supported" in the 5GMM capability IE of the REGISTRATION REQUEST message if the UE indicates "mobility registration updating" in the 5GS registration type IE and supports V2X communication over E-UTRA-PC5 as specified in 3GPP TS 24.587 [19B] the UE shall set the V2XCEPC5 bit to "V2X communication over E-UTRA-PC5 supported" in the 5GMM capability IE of the REGISTRATION REQUEST message if the UE indicates "mobility registration updating" in the 5GS registration type IE and supports V2X communication over NR-PC5 as specified in 3GPP TS 24.587 [19B] the UE shall set the V2XCNPC5 bit to "V2X communication over NR-PC5 supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

the UE shall send the REGISTRATION REQUEST message including the NAS message container IE as described in subclause 4.4.6

a) when the UE is sending the message from 5GMM-IDLE mode the UE has a valid 5G NAS security context and needs to send non-cleartext IEs; or

b) when the UE is sending the message after an inter-system change from S1 mode to N1 mode in 5GMM-IDLE mode and the UE has a valid 5G NAS security context and needs to send non-cleartext IEs

the UE with a valid 5G NAS security context shall send the REGISTRATION REQUEST message without including the NAS message container IE when the UE does not need to send non-cleartext IEs and the UE is sending the message

a) from 5GMM-IDLE mode; or

b) after an inter-system change from S1 mode to N1 mode in 5GMM-IDLE mode

if the UE is sending the REGISTRATION REQUEST message after an inter-system change from S1 mode to N1 mode in 5GMM-CONNECTED mode and the UE needs to send non-cleartext IEs the UE shall cipher the NAS message container IE using the mapped 5G NAS security context and send the REGISTRATION REQUEST message including the NAS message container IE as described in subclause 4.4.6 if the UE does not need to send non-cleartext IEs the UE shall send the REGISTRATION REQUEST message without including the NAS message container IE

if the REGISTRATION REQUEST message includes a NAS message container IE the AMF shall process the REGISTRATION REQUEST message that is obtained from the NAS message container IE as described in subclause 4.4.6

if the UE is in NB-N1 mode then the UE shall set the control plane CIoT 5GS optimization bit to "Control plane CIoT 5GS optimization supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b for all cases except case b if the UE is capable of NB-S1 mode then the UE shall set the control plane CIoT EPS optimization bit to "Control plane CIoT EPS optimization supported" in the S1 UE network capability IE of the REGISTRATION REQUEST message

if the registration procedure for mobility and periodic registration update is initiated and there is request from the upper layers to perform "emergency services fallback" pending the UE shall send a REGISTRATION REQUEST message without an uplink data status IE

if the UE supports N3 data transfer and multiple user-plane resources in NB-N1 mode (see 3GPP TS 36.306 [25D] 3GPP TS 36.331 [25A]) then the UE shall set the multiple user-plane resources support bit to "Multiple user-plane resources supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

the UE shall set the ER-NSSAI bit to "Extended rejected NSSAI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

if the UE supports the NSSRG then the UE shall set the NSSRG bit to "NSSRG supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

for case zf the UE shall include the service-level device ID in the Service-level-AA container IE of the REGISTRATION REQUEST message and set the value to the CAA-level UAV ID the UE shall include the service-level-AA server address in the Service-level-AA container IE of the REGISTRATION REQUEST message and set the value to the USS address if it is provided by the upper layers the UE shall include the service-level-AA payload in the Service-level-AA container IE of the REGISTRATION REQUEST message and shall set the service-level-AA payload type if the service-level-AA payload is provided by upper layers

NOTE 18 the service-level-AA payload can be of type "C2 authorization payload" the C2 authorization payload can include one or both of an indication of the request for direct C2 communication and pairing information for direct C2 communication

for all cases except case b then

- if the UE supports 5G ProSe direct discovery as specified in 3GPP TS 24.554 [19E] the UE shall set the 5G ProSe-dd bit to "5G ProSe direct discovery supported" in the 5GMM capability IE of the REGISTRATION REQUEST message if the UE supports 5G ProSe direct communication as specified in 3GPP TS 24.554 [19E] the UE shall set the 5G ProSe-dc bit to "5G ProSe direct communication supported" in the 5GMM capability IE of the REGISTRATION REQUEST message if the UE supports acting as 5G ProSe layer-2 UE-to-network relay UE as specified in 3GPP TS 24.554 [19E] the UE shall set the 5G ProSe-l2relay bit to "Acting as a 5G ProSe layer-2 UE-to-network relay UE supported" in the 5GMM capability IE of the REGISTRATION REQUEST message if the UE supports acting as 5G ProSe layer-3 UE-to-network relay UE as specified in 3GPP TS 24.554 [19E] the UE shall set the 5G ProSe-l3relay bit to "Acting as a 5G ProSe layer-3 UE-to-network relay UE supported" in the 5GMM capability IE of the REGISTRATION REQUEST message if the UE supports acting as 5G ProSe layer-2 UE-to-network remote UE as specified in 3GPP TS 24.554 [19E] the UE shall set the 5G ProSe-l2rmt bit to "Acting as a 5G ProSe layer-2 UE-to-network remote UE supported" in the 5GMM capability IE of the REGISTRATION REQUEST message if the UE supports acting as 5G ProSe layer-3 UE-to-network remote UE as specified in 3GPP TS 24.554 [19E] the UE shall set the 5G ProSe-l3rmt bit to "Acting as a 5G ProSe layer-3 UE-to-network remote UE supported" in the 5GMM capability IE of the REGISTRATION REQUEST message if the UE supports acting as 5G ProSe layer-2 UE-to-UE relay UE as specified in 3GPP TS 24.554 [19E] the UE shall set the 5G ProSe-l2U2U relay bit to "Acting as a 5G ProSe layer-2 UE-to-UE relay UE supported" in the 5GMM capability IE of the REGISTRATION REQUEST message if the UE supports acting as 5G ProSe layer-3 UE-to-UE relay UE as specified in 3GPP TS 24.554 [19E] the UE shall set the 5G ProSe-l3U2U relay bit to "Acting as a 5G ProSe layer-3 UE-to-UE relay UE supported" in the 5GMM capability IE of the REGISTRATION REQUEST message if the UE supports acting as 5G ProSe layer-2 end UE as specified in 3GPP TS 24.554 [19E] the UE shall set the 5G ProSe-l2end bit to "Acting as a 5G ProSe layer-2 end UE supported" in the 5GMM capability IE of the REGISTRATION REQUEST message if the UE supports acting as 5G ProSe layer-3 end UE as specified in 3GPP TS 24.554 [19E] the UE shall set the 5G ProSe-l3end bit to "Acting as a 5G ProSe layer-3 end UE supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

Editor’s note [WID:5G\_ProSe\_Ph3 CR:6552] it is FFS how to enhance the 5G ProSe capability for multi-hop relays

for all cases except case b if the MUSIM UE supports the N1 NAS signalling connection release then the UE shall set the N1 NAS signalling connection release bit to "N1 NAS signalling connection release supported" in the 5GMM capability IE of the REGISTRATION REQUEST message otherwise the UE shall not set the N1 NAS signalling connection release bit to "N1 NAS signalling connection release supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

for all cases except case b if the MUSIM UE supports the paging indication for voice services then the UE shall set the paging indication for voice services bit to "paging indication for voice services supported" in the 5GMM capability IE of the REGISTRATION REQUEST message otherwise the UE shall not set the paging indication for voice services bit to "paging indication for voice services supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

for all cases except case b if the MUSIM UE supports the reject paging request then the UE shall set the reject paging request bit to "reject paging request supported" in the 5GMM capability IE of the REGISTRATION REQUEST message otherwise the UE shall not set the reject paging request bit to "reject paging request supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

for all cases except case b if the MUSIM UE sets

- the reject paging request bit to "reject paging request supported";

- the N1 NAS signalling connection release bit to "N1 NAS signalling connection release supported"; or

- both of them;

and supports the paging restriction then the UE shall set the paging restriction bit to "paging restriction supported" in the 5GMM capability IE of the REGISTRATION REQUEST message otherwise the UE shall not set the paging restriction bit to "paging restriction supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports MINT the UE shall set the MINT bit to "MINT supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

if the UE supports slice-based N3IWF selection the UE shall set the SBNS bit to "Slice-based N3IWF selection supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

if the UE supports slice-based TNGF selection the UE shall set the SBTS bit to "Slice-based TNGF selection supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

for all cases except case b then

- if the UE supports UAS services the UE shall set the UAS bit to "UAS services supported" in the 5GMM capability IE of the REGISTRATION REQUEST message if the UE supports A2X over E-UTRA-PC5 as specified in 3GPP TS 24.577 [60] the UE shall set the A2XEPC5 bit to "A2X over E-UTRA-PC5 supported" in the 5GMM capability IE of the REGISTRATION REQUEST message if the UE supports A2X over NR-PC5 as specified in 3GPP TS 24.577 [60] the UE shall set the A2XNPC5 bit to "A2X over NR-PC5 supported" in the 5GMM capability IE of the REGISTRATION REQUEST message if the UE supports A2X over uu as specified in 3GPP TS 24.577 [60] the UE shall set the A2X-Uu bit to "A2X over uu supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

for case zg if the UE has determined the UE determined PLMN with disaster condition as specified in 3GPP TS 23.122 [5] and

a) the UE determined PLMN with disaster condition is the HPLMN and

1) the additional GUTI IE is included in the REGISTRATION REQUEST message and does not contain a valid 5G-GUTI that was previously assigned by the HPLMN; or

2) the additional GUTI IE is not included in the REGISTRATION REQUEST message and the 5GS mobile identity IE contains neither the SUCI nor a valid 5G-GUTI that was previously assigned by the HPLMN; or

b) the UE determined PLMN with disaster condition is not the HPLMN and

1) the additional GUTI IE is included in the REGISTRATION REQUEST message and does not contain a valid 5G-GUTI that was previously assigned by the UE determined PLMN with disaster condition; or

2) the additional GUTI IE is not included in the REGISTRATION REQUEST message and the 5GS mobile identity IE does not contain a valid 5G-GUTI that was previously assigned by the UE determined PLMN with disaster condition;

the UE shall include in the REGISTRATION REQUEST message the UE determined PLMN with disaster condition IE indicating the UE determined PLMN with disaster condition

NOTE 19 if the UE initiates the registration procedure for disaster roaming services and the UE determined PLMN with disaster condition cannot be determined when an NG-RAN cell of the PLMN broadcasts the disaster related indication as specified in 3GPP TS 23.122 [5] the UE does not include in the REGISTRATION REQUEST message the UE determined PLMN with disaster condition IE but includes the additional GUTI IE or the 5GS mobile identity IE or both as specified in subclauses 5.5.1.2.2

for case zh the UE shall indicate "mobility registration updating" in the 5GS registration type IE of the REGISTRATION REQUEST message

for case zp the UE shall send the REGISTRATION REQUEST message over the new non-3GPP access the UE shall include the uplink data status IE in the REGISTRATION REQUEST message indicating the MA PDU session ID(s) or the single access PDU session ID(s) whose user plan resources are to be switched from the old non-3GPP access to the new non-3GPP access or to be established over the new non-3GPP access if any if the UE requests the network to keep using the user plane resources of the old non-3GPP access during path switching to the new non-3GPP access the UE shall include the Non-3GPP path switching information IE in the REGISTRATION REQUEST message and set the NSONR bit to "non-3GPP path switching while using old non-3GPP resources requested"

if the UE supports event notification the UE shall set the EventNotification bit to "Event notification supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

if the UE supports access to an SNPN using credentials from a credentials holder and

a) the UE is in its HPLMN or EHPLMN or the subscribed SNPN; or

b) the UE is in a non-subscribed SNPN and supports equivalent SNPNs;

the UE shall set the SSNPNSI bit to "SOR-SNPN-SI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

if the UE supports equivalent SNPNs the UE shall set the ESI bit to "equivalent SNPNs supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b if the UE supports LADN per DNN and S-NSSAI the UE shall set the LADN-DS bit to "LADN per DNN and S-NSSAI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

if the UE supports the reconnection to the network due to RAN timing synchronization status change the UE shall set the reconnection to the network due to RAN timing synchronization status change (RANtiming) bit to "Reconnection to the network due to RAN timing synchronization status change supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

if the UE supports MPS indicator update via the UE configuration update procedure the UE shall set the MPSIU bit to "MPS indicator update supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

if the UE supports MCS indicator update via the UE configuration update procedure the UE shall set the MCSIU bit to "MCS indicator update supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

for all cases except case b if the UE supports ranging and sidelink positioning as specified in 3GPP TS 24.514 [62] and supports

a) V2X communication over PC5 as specified in 3GPP TS 24.587 [19B];

b) 5G ProSe direct discovery and 5G ProSe direct communication as specified in 3GPP TS 24.554 [19E]; or

c) both a) and b)

the UE shall set

a) the RSLP bit to "Ranging and sidelink positioning supported" if the UE supports ranging and sidelink positioning as target UE or SL reference UE or both;

b) the RSLPL bit to "Ranging and sidelink positioning for located UE supported" if the UE supports ranging and sidelink positioning as located UE;

c) the RSLPS bit to "Ranging and sidelink positioning for SL positioning server UE supported" if the UE supports ranging and sidelink positioning as SL positioning server UE; or

d) any combination of a) b) and c) in the 5GMM capability IE of the REGISTRATION REQUEST message;

and in addition

a) if the UE supports ranging and sidelink positioning with V2X capable UE the UE shall set the RSLPVU bit to "Ranging and sidelink positioning with V2X capable UE supported" in the 5GMM capability IE of the REGISTRATION REQUEST message; and

b) if the UE supports ranging and sidelink positioning with 5G ProSe capable UE the UE shall set the RSLPPU bit to "Ranging and sidelink positioning with 5G ProSe capable UE supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

if the UE supports the partial network slice the UE shall set the PNS bit to "Partial network slice supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

if the UE supports network slice usage control the UE shall set the NSUC bit to "Network slice usage control supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

if the UE supports the S-NSSAI time validity information the UE shall set the TempNS bit to "S-NSSAI time validity information supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

if the UE supports the S-NSSAI location validity information the UE shall set the SLVI bit to "S-NSSAI location validity information supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b

if the UE supports RAT utilization control the UE shall set the RATUC bit to "RAT utilization control supported" in the 5GMM capability IE of the REGISTRATION REQUEST message over 3GPP access for all cases except case b

figure 5.5.1.3.2.1 registration procedure for mobility and periodic registration update

##### 5.5.1.3.3 5GMM common procedure initiation

the AMF may initiate 5GMM common procedures e.g the identification authentication and security procedures during the registration procedure depending on the information received in the REGISTRATION REQUEST message

the AMF may be configured to skip the authentication procedure even if no 5GS security context is available and proceed directly to the execution of the security mode control procedure as specified in subclause 5.4.2 during the registration procedure for mobility and periodic registration update for a UE that has only an emergency PDU session

the AMF shall not initiate a 5GMM authentication procedure before completion of the registration procedure for mobility and periodic registration update if the following conditions apply

a) the UE initiated the registration procedure for mobility and periodic registration update after handover or inter-system change to N1 mode in 5GMM-CONNECTED mode;

b) the target cell is a shared network cell; and

c.1) the UE has provided its 5G-GUTI in the 5GS mobile identity IE or the additional GUTI IE in the REGISTRATION REQUEST message and the PLMN identity included in the 5G-GUTI is different from the selected PLMN identity of the target cell; or

c.2) the UE has included the 5G-GUTI mapped from the 4G-GUTI in the 5GS mobile identity IE and not included an additional GUTI IE in the REGISTRATION REQUEST message and the PLMN identity included in the 5G-GUTI is different from the selected PLMN identity of the target cell

##### 5.5.1.3.4 mobility and periodic registration update accepted by the network

if the registration update request has been accepted by the network the AMF shall send a REGISTRATION ACCEPT message to the UE

NOTE 0 if the AMF receives the registration update request over non-3GPP access and detects that the N3IWF used by the UE is compatible with only part of the allowed NSSAI and the UE has not indicated its support for slice-based N3IWF selection in the REGISTRATION REQUEST message the AMF accepts the registration update request

NOTE 0A if the AMF receives the registration update request over non-3GPP access and detects that the TNGF used by the UE is compatible with only part of the allowed NSSAI and the UE has not indicated its support for slice-based TNGF selection in the REGISTRATION REQUEST message the AMF accepts the registration update request

if timer T3513 is running in the AMF the AMF shall stop timer T3513 if a paging request was sent with the access type indicating non-3GPP and the REGISTRATION REQUEST message includes the allowed PDU session status IE

if timer T3565 is running in the AMF the AMF shall stop timer T3565 when a REGISTRATION REQUEST message is received

for each of the information elements 5GMM capability S1 UE network capability and UE security capability the AMF shall store all octets received from the UE in the REGISTRATION REQUEST message up to the maximum length defined for the respective information element

NOTE 1 this information is forwarded to the new AMF during inter-AMF handover or to the new MME during inter-system handover to S1 mode

the 5G-GUTI reallocation shall be part of the registration procedure for mobility registration update the 5G-GUTI reallocation should be part of the registration procedure for periodic registration update during the registration procedure for mobility registration update if the AMF has not allocated a new 5G-GUTI by the generic UE configuration update procedure the AMF shall include in the REGISTRATION ACCEPT message the new assigned 5G-GUTI

if the UE has set the CAG bit to "CAG supported" in the 5GMM capability IE of the REGISTRATION REQUEST message and the AMF needs to update the "CAG information list" stored in the UE the AMF shall include the CAG information list IE or the extended CAG information list IE in the REGISTRATION ACCEPT message

NOTE 2 the "CAG information list" can be provided by the AMF and include no entry if no "CAG information list" exists in the subscription

NOTE 2A if the UE supports extended CAG information list the CAG information list can be included either in the CAG information list IE or extended CAG information list IE

if the UE does not support extended CAG information list the CAG information list shall not be included in the extended CAG information list IE

if a 5G-GUTI or the SOR transparent container IE is included in the REGISTRATION ACCEPT message the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3

if the Operator-defined access category definitions IE or the extended emergency number list IE ,the CAG information list IE or the extended CAG information list IE are included in the REGISTRATION ACCEPT message the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3

if the UE has set the RCMP bit to "Sending of REGISTRATION COMPLETE message for negotiated PEIPS assistance information supported" in the 5GMM capability IE of the REGISTRATION REQUEST message and if the PEIPS assistance information IE is included in the REGISTRATION ACCEPT message the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3

if the UE is not in NB-N1 mode and the UE has set the RACS bit to "RACS supported" in the 5GMM capability IE of the REGISTRATION REQUEST message the AMF may include either a UE radio capability ID IE or a UE radio capability ID deletion indication IE in the REGISTRATION ACCEPT message if the UE radio capability ID IE or the UE radio capability ID deletion indication IE is included in the REGISTRATION ACCEPT message the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3

the AMF may include a new TAI list for the UE in the REGISTRATION ACCEPT message the new TAI list shall not contain both tracking areas in NB-N1 mode and tracking areas not in NB-N1 mode the UE upon receiving a REGISTRATION ACCEPT message shall delete its old TAI list and store the received TAI list if there is no TAI list received the UE shall consider the old TAI list as valid if the registration area contains TAIs belonging to different PLMNs which are equivalent PLMNs and

a) the UE already has stored allowed NSSAI for the current registration area the UE shall store the allowed NSSAI for the current registration area in each of the allowed NSSAIs which are associated with each of the PLMNs in the registration area;

b) the UE already has stored rejected NSSAI for the current registration area the UE shall store the rejected NSSAI for the current registration area in each of the rejected NSSAIs which are associated with each of the PLMNs in the registration area;

c) the UE already has stored rejected NSSAI for the failed or revoked NSSAA the UE shall store the rejected NSSAI for the failed or revoked NSSAA in each of the rejected NSSAIs which are associated with each of the PLMNs in the registration area;

d) the UE already has stored rejected NSSAI for the maximum number of UEs reached the UE shall store the rejected NSSAI for the maximum number of UEs reached in each of the rejected NSSAIs which are associated with each of the PLMNs in the registration area;

e) the UE already has stored pending NSSAI the UE shall store the pending NSSAI in each of the pending NSSAIs which are associated with each of the PLMNs in the registration area; and

f) the UE already has stored partially rejected NSSAI the UE shall store the partially rejected NSSAI in each of the partially rejected NSSAIs which are associated with each of the PLMNs in the registration area

NOTE 3 when assigning the TAI list the AMF can take into account the eNodeB's capability of support of CIoT 5GS optimization

the AMF may also include a list of equivalent PLMNs in the REGISTRATION ACCEPT message each entry in the list contains a PLMN code (MCC+MNC) the UE shall store the list as provided by the network and if there is no emergency PDU session established the UE shall remove from the list any PLMN code that is already in the forbidden PLMN list as specified in subclause 5.3.13A if the UE is not registered for emergency services and there is an emergency PDU session established the UE shall remove from the list of equivalent PLMNs any PLMN code present in the forbidden PLMN list as specified in subclause 5.3.13A when the emergency PDU session is released in addition the UE shall add to the stored list the PLMN code of the registered PLMN that sent the list the UE shall replace the stored list on each receipt of the REGISTRATION ACCEPT message if the REGISTRATION ACCEPT message does not contain a list then the UE shall delete the stored list the AMF of a PLMN shall not include a list of equivalent SNPNs

if the ESI bit of the 5GMM capability IE of the REGISTRATION REQUEST message is set to "equivalent SNPNs supported" the AMF of a SNPN may include a list of equivalent SNPNs in the REGISTRATION ACCEPT message if the UE is registered for onboarding services in SNPN the AMF shall not include a list of equivalent SNPNs in the REGISTRATION ACCEPT message each entry in the list contains an SNPN identity the UE shall store the list as provided by the network if there is no emergency PDU session established and the UE is not registered for onboarding services in SNPN the UE shall remove from the list any SNPN identity that is already in

- the "permanently forbidden SNPNs" list or the "temporarily forbidden SNPNs" list if the SNPN is not an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]); or

- the "permanently forbidden SNPNs for access for localized services in SNPN" list or the " temporarily forbidden SNPNs for access for localized services in SNPN" list if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5])

if the UE is not registered for emergency services and there is an emergency PDU session established the UE shall remove from the list of equivalent SNPNs any SNPN identity present in the "permanently forbidden SNPNs" list or the "temporarily forbidden SNPNs" list when the emergency PDU session is released the UE shall add to the stored list the SNPN identity of the registered SNPN that sent the list the UE shall replace the stored list on each receipt of the REGISTRATION ACCEPT message if the REGISTRATION ACCEPT message does not contain a list then the UE shall delete the stored list the AMF of an SNPN shall not include a list of equivalent PLMNs

NOTE 3A0 if N1 mode was disabled for an SNPN due to reception of 5GMM cause #27 or #62 the UE implementation ensures that it does not register to this SNPN due to being part of the list of "equivalent SNPNs" received while registered in another SNPN

if the UE is not registered for emergency services and if the PLMN identity of the registered PLMN is a member of the forbidden PLMN list as specified in subclause 5.3.13A any such PLMN identity shall be deleted from the corresponding list(s)

the AMF may include new service area restrictions in the service area list IE in the REGISTRATION ACCEPT message the UE upon receiving a REGISTRATION ACCEPT message with new service area restrictions shall act as described in subclause 5.3.5

if the service area list IE is not included in the REGISTRATION ACCEPT message any tracking area in the registered PLMN and its equivalent PLMN(s) in the registration area or in the registered SNPN is considered as an allowed tracking area as described in subclause 5.3.5

the AMF shall include the MICO indication IE in the REGISTRATION ACCEPT message only if the MICO indication IE was included in the REGISTRATION REQUEST message the AMF supports and accepts the use of MICO mode if the AMF supports and accepts the use of MICO mode the AMF may indicate "all PLMN registration area allocated" in the MICO indication IE in the REGISTRATION ACCEPT message if "all PLMN registration area allocated" is indicated in the MICO indication IE the AMF shall not assign and include the TAI list in the REGISTRATION ACCEPT message if the REGISTRATION ACCEPT message includes an MICO indication IE indicating "all PLMN registration area allocated" the UE shall treat all TAIs in the current PLMN as a registration area and delete its old TAI list if "strictly periodic registration timer supported" is indicated in the MICO indication IE in the REGISTRATION REQUEST message the AMF may indicate "strictly periodic registration timer supported" in the MICO indication IE and may include the T3512 value IE in the REGISTRATION ACCEPT message if the timer value received in T3512 IE is different from the already stored value of the timer T3512 and the timer T3512 is running the UE shall restart T3512 with the new value received in the T3512 value IE

the AMF shall include an active time value in the T3324 IE in the REGISTRATION ACCEPT message if the UE requested an active time value in the REGISTRATION REQUEST message and the AMF accepts the use of MICO mode and the use of active time

if the UE does not include MICO indication IE in the REGISTRATION REQUEST message then the AMF shall disable MICO mode if it was already enabled

if the AMF supports and accepts the use of MICO and the UE included the requested T3512 value IE in the REGISTRATION REQUEST message then the AMF shall take into account the T3512 value requested when providing the T3512 value IE in the REGISTRATION ACCEPT message

NOTE 3A the T3512 value assigned to the UE by AMF can be different from the T3512 value requested by the UE AMF can take several factors into account when assigning the T3512 value e.g local configuration expected UE behaviour UE requested T3512 value UE subscription data network policies

the AMF may include the T3512 value IE in the REGISTRATION ACCEPT message only if the REGISTRATION REQUEST message was sent over the 3GPP access

the AMF may include the non-3GPP de-registration timer value IE in the REGISTRATION ACCEPT message only if the REGISTRATION REQUEST message was sent for the non-3GPP access

if the UE indicates support of the N1 NAS signalling connection release in the REGISTRATION REQUEST message and the network decides to accept the N1 NAS signalling connection release then the AMF shall set the N1 NAS signalling connection release bit to "N1 NAS signalling connection release supported" in the 5GS network feature support IE of the REGISTRATION ACCEPT message

if the UE indicates support of the paging indication for voice services in the REGISTRATION REQUEST message and the network decides to accept the paging indication for voice services then the AMF shall set the paging indication for voice services bit to "paging indication for voice services supported" in the 5GS network feature support IE of the REGISTRATION ACCEPT message if the UE receives the REGISTRATION ACCEPT message with the paging indication for voice services bit set to "paging indication for voice services supported" the UE NAS layer informs the lower layers that paging indication for voice services is supported otherwise the UE NAS layer informs the lower layers that paging indication for voice services is not supported

if the UE indicates support of the reject paging request in the REGISTRATION REQUEST message and the network decides to accept the reject paging request then the AMF shall set the reject paging request bit to "reject paging request supported" in the 5GS network feature support IE of the REGISTRATION ACCEPT message

if the UE indicates support of the paging restriction in the REGISTRATION REQUEST message and the AMF sets

- the reject paging request bit to "reject paging request supported";

- the N1 NAS signalling connection release bit to "N1 NAS signalling connection release supported"; or

- both of them;

in the 5GS network feature support IE of the REGISTRATION ACCEPT message and the network decides to accept the paging restriction then the AMF shall set the paging restriction bit to "paging restriction supported" in the 5GS network feature support IE of the REGISTRATION ACCEPT message

if the MUSIM UE does not include the paging restriction IE in the REGISTRATION REQUEST message the AMF shall delete any stored paging restriction for the UE and stop restricting paging

if the MUSIM UE requests the release of the NAS signalling connection by setting request type to "NAS signalling connection release" in the UE request type IE included in the REGISTRATION REQUEST message and the AMF supports the N1 NAS signalling connection release the AMF shall initiate the release of the NAS signalling connection after the completion of the registration procedure for mobility and periodic registration update if the UE requests restriction of paging by including the paging restriction IE and the AMF supports the paging restriction the AMF

- if accepts the paging restriction shall include the 5GS additional request result IE in the REGISTRATION ACCEPT message and set the paging restriction decision to "paging restriction is accepted" the AMF shall store the paging restriction of the UE and enforce these restrictions in the paging procedure as described in subclause 5.6.2; or

- if rejects the paging restriction shall include the 5GS additional request result IE in the REGISTRATION ACCEPT message and set the paging restriction decision to "paging restriction is rejected" and shall discard the received paging restriction the AMF shall delete any stored paging restriction for the UE and stop restricting paging

if the UE requests "control plane CIoT 5GS optimization" in the 5GS update type IE indicates support of control plane CIoT 5GS optimization in the 5GMM capability IE and the AMF decides to accept the requested CIoT 5GS optimization and the registration request the AMF shall indicate "control plane CIoT 5GS optimization supported" in the 5GS network feature support IE of the REGISTRATION ACCEPT message

if the UE has indicated support for the control plane CIoT 5GS optimizations and the AMF decides to activate the congestion control for transport of user data via the control plane then the AMF shall include the T3448 value IE in the REGISTRATION ACCEPT message

if the AMF decides to deactivate the congestion control for transport of user data via the control plane then the AMF shall delete the stored control plane data back-off time for the UE and the AMF shall not include timer T3448 value IE in the REGISTRATION ACCEPT message

if

- the UE in NB-N1 mode is using control plane CIoT 5GS optimization; and

- the network is configured to provide the truncated 5G-S-TMSI configuration for control plane CIoT 5GS optimizations;

the AMF shall include the truncated 5G-S-TMSI configuration IE in the REGISTRATION ACCEPT message and set the "Truncated AMF set ID value" and the "Truncated AMF pointer value" in the truncated 5G-S-TMSI configuration IE based on network policies the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3

for inter-system change from S1 mode to N1 mode in 5GMM-IDLE mode if the UE has included a ngKSI indicating a current 5G NAS security context in the REGISTRATION REQUEST message by which the REGISTRATION REQUEST message is integrity protected the AMF shall take one of the following actions

a) if the AMF retrieves the current 5G NAS security context as indicated by the ngKSI and 5G-GUTI sent by the UE the AMF shall integrity check the REGISTRATION REQUEST message using the current 5G NAS security context and integrity protect the REGISTRATION ACCEPT message using the current 5G NAS security context;

b) if the AMF cannot retrieve the current 5G NAS security context as indicated by the ngKSI and 5G-GUTI sent by the UE the AMF shall treat the REGISTRATION REQUEST message fails the integrity check and take actions as specified in subclause 4.4.4.3; or

c) if the UE has not included an additional GUTI IE the AMF may treat the REGISTRATION REQUEST message as in the previous item i.e as if it cannot retrieve the current 5G NAS security context

NOTE 4 the handling described above at failure to retrieve the current 5G NAS security context or if no additional GUTI IE was provided does not preclude the option for the AMF to perform a primary authentication and key agreement procedure and create a new native 5G NAS security context

for inter-system change from S1 mode to N1 mode in 5GMM-CONNECTED mode the AMF shall integrity check REGISTRATION REQUEST message using the current K'AMF as derived when triggering the handover to N1 mode (see subclause 4.4.2.2) the AMF shall verify the received UE security capabilities in the REGISTRATION REQUEST message the AMF shall then take one of the following actions

a) if the REGISTRATION REQUEST does not contain a valid KSIAMF in the Non-current native NAS key set identifier IE the AMF shall remove the non-current native 5G NAS security context if any for any 5G-GUTI for this UE the AMF shall then integrity protect and cipher the REGISTRATION ACCEPT message using the security context based on K'AMF and take the mapped 5G NAS security context into use; or

b) if the REGISTRATION REQUEST contains a valid KSIAMF in the Non-current native NAS key set identifier IE and

1) the AMF decides to take the native 5G NAS security context into use the AMF shall initiate a security mode control procedure to take the corresponding native 5G NAS security context into use and then integrity protect and cipher the REGISTRATION ACCEPT message using the corresponding native 5G NAS security context; and

2) otherwise the AMF shall then integrity protect and cipher the REGISTRATION ACCEPT message using the security context based on K'AMF and take the mapped 5G NAS security context into use

NOTE 5 in above bullet b) it is recommended for the AMF to initiate a security mode control procedure to take the corresponding native 5G NAS security context into use

if the UE has included the service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE of the REGISTRATION REQUEST message and if

- the UE has a valid aerial UE subscription information; and

- the UUAA procedure is to be performed during the registration procedure according to operator policy; and

- there is no valid successful UUAA result for the UE in the UE 5GMM context

then the AMF shall initiate the UUAA-MM procedure with the UAS-NF as specified in 3GPP TS 23.256 [6AB] and shall include a service-level-AA pending indication in the Service-level-AA container IE of the REGISTRATION ACCEPT message the AMF shall store in the UE 5GMM context that a UUAA procedure is pending the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3

if the UE has included the service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE of the REGISTRATION REQUEST message and if

- the UE has a valid aerial UE subscription information;

- the UUAA procedure is to be performed during the registration procedure according to operator policy; and

- there is a valid successful UUAA result for the UE in the UE 5GMM context

then the AMF shall include a service-level-AA response in the Service-level-AA container IE of the REGISTRATION ACCEPT message and set the SLAR field in the service-level-AA response to "Service level authentication and authorization was successful"

if the AMF determines that the UUAA-MM procedure needs to be performed for a UE the AMF has not received the service -level device ID set to the CAA-level UAV ID in the Service-level-AA container IE of the REGISTRATION REQUEST message from the UE and the AMF decides to accept the UE to be registered for other services than UAS services based on the user's subscription data and the operator policy the AMF shall accept the registration update request and shall mark in the UE's 5GMM context that the UE is not allowed to request UAS services

if the UE supports MINT the AMF may include the list of PLMNs to be used in disaster condition IE in the REGISTRATION ACCEPT message

if the UE supports MINT the AMF may include the disaster roaming wait range IE in the REGISTRATION ACCEPT message

if the UE supports MINT the AMF may include the disaster return wait range IE in the REGISTRATION ACCEPT message

NOTE 6 the AMF can determine the content of the "list of PLMN(s) to be used in disaster condition" the value of the disaster roaming wait range and the value of the disaster return wait range based on the network local configuration

if the AMF received the list of TAIs from the satellite NG-RAN as described in 3GPP TS 23.501 [8] and determines that by UE subscription and operator's preferences any but not all TAIs in the received list of TAIs is forbidden for roaming or for regional provision of service the AMF shall include the TAI(s) in

a) the forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" IE; or

b) the forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service" IE; or

c) both;

in the REGISTRATION ACCEPT message

NOTE 7A void

if the UE has set the reconnection to the network due to RAN timing synchronization status change (RANtiming) bit to "Reconnection to the network due to RAN timing synchronization status change supported" in the 5GMM capability IE of the REGISTRATION REQUEST message the AMF may include the RAN timing synchronization IE with the RecReq bit set to "Reconnection requested" in the REGISTRATION ACCEPT message

if the AMF receives the mobility and periodic registration request along with along with the mobile IAB-indication over N2 reference point (see TS 38.413 [31]) from an UE and the UE is authorized to operate as an MBSR based on the subscription information and local policy (see 3GPP TS 23.501 [8]) the AMF shall include the feature authorization indication IE in the REGISTRATION ACCEPT message and shall set the MBSRAI field to "authorized to operate as MBSR" if the AMF receives the mobility and periodic registration request along with along with the mobile IAB-indication over N2 reference point (see TS 38.413 [31]) from a UE and the UE is not authorized operate as an MBSR based on the subscription information and local policy but can operate as a UE the AMF shall include the feature authorization indication IE in the REGISTRATION ACCEPT message and shall set the MBSRAI field to "not authorized to operate as MBSR but allowed to operate as a UE"

if the UE supports user plane positioning using LCS-UPP SUPL or both the AMF shall set the LCS-UPP bit the SUPL bit or both in the 5GS network feature support IE of the REGISTRATION ACCEPT message as specified in 3GPP TS 24.572 [64]

upon receipt of the REGISTRATION ACCEPT message the UE shall reset the registration attempt counter and service request attempt counter enter state 5GMM-REGISTERED and set the 5GS update status to 5U1 UPDATED

if the UE receives the REGISTRATION ACCEPT message from a PLMN then the UE shall reset the PLMN-specific attempt counter for that PLMN for the specific access type for which the message was received the UE shall also reset the PLMN-specific N1 mode attempt counter for that PLMN for the specific access type for which the message was received if the message was received via 3GPP access the UE shall reset the counter for "SIM/USIM considered invalid for GPRS services" events and the counter for "SIM/USIM considered invalid for non-GPRS services" if any if the message was received via non-3GPP access the UE shall reset the counter for "USIM considered invalid for 5GS services over non-3GPP" events

if the UE receives the REGISTRATION ACCEPT message from an SNPN then the UE shall reset the SNPN-specific attempt counter for the current SNPN for the specific access type for which the message was received if the message was received via 3GPP access the UE shall reset the counter for "the entry for the current SNPN considered invalid for 3GPP access" events if the message was received via non-3GPP access the UE shall reset the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events

if the REGISTRATION ACCEPT message included a T3512 value IE the UE shall use the value in T3512 value IE as periodic registration update timer (T3512) if the T3512 value IE is not included the UE shall use the value currently stored e.g from a prior REGISTRATION ACCEPT message

if the REGISTRATION ACCEPT message include a T3324 value IE the UE shall use the value in the T3324 value IE as active time timer (T3324) if the REGISTRATION ACCEPT message does not include a T3324 value IE UE shall not start the timer T3324 until a new value is received from the network

if the REGISTRATION ACCEPT message included a non-3GPP de-registration timer value IE the UE shall use the value in non-3GPP de-registration timer value IE as non-3GPP de-registration timer if non-3GPP de-registration timer value IE is not included the UE shall use the value currently stored e.g from a prior REGISTRATION ACCEPT message if non-3GPP de-registration timer value IE is not included and there is no stored non-3GPP de-registration timer value in the UE the UE shall use the default value of the non-3GPP de-registration timer

if the REGISTRATION ACCEPT message contains a 5G-GUTI the UE shall return a REGISTRATION COMPLETE message to the AMF to acknowledge the received 5G-GUTI stop timer T3519 if running and delete any stored SUCI the UE shall provide the 5G-GUTI to the lower layer of 3GPP access if the REGISTRATION ACCEPT message is sent over the non-3GPP access and the UE is in 5GMM-REGISTERED in both 3GPP access and non-3GPP access in the same PLMN

if the REGISTRATION ACCEPT message contains

a) the network slicing indication IE with the network slicing subscription change indication set to "Network slicing subscription changed";

b) a configured NSSAI IE with a new configured NSSAI for the current PLMN or SNPN and optionally the mapped S-NSSAI(s) for the configured NSSAI for the current PLMN or SNPN;

c) an NSSRG information IE with a new NSSRG information;

d) an alternative NSSAI IE with a new alternative NSSAI;

e) an S-NSSAI location validity information in the registration accept type 6 IE container IE with a new S-NSSAI location validity information;

f) an S-NSSAI time validity information IE with a new S-NSSAI time validity information; or

g) an On-demand NSSAI IE with a new on-demand NSSAI or an updated slice deregistration inactivity timer value

the UE shall return a REGISTRATION COMPLETE message to the AMF to acknowledge the successful update of the network slicing information if the UE has set the RCMAN bit to "Sending of REGISTRATION COMPLETE message for NSAG information supported" in the 5GMM capability IE of the REGISTRATION REQUEST message and if REGISTRATION ACCEPT message contains the NSAG information IE the UE shall return REGISTRATION COMPLETE message to the AMF to acknowledge the reception of the NSAG information IE

NOTE 7B when the UE receives the NSSRG information IE the UE may provide the NSSRG information to lower layers for the purpose of NSAG-aware cell reselection

if the REGISTRATION ACCEPT message contains the CAG information list IE or the extended CAG information list IE and the UE had set the CAG bit to "CAG supported" in the 5GMM capability IE of the REGISTRATION REQUEST message the UE shall

a) replace the "CAG information list" stored in the UE with the received CAG information list IE or the extended CAG information list IE when received in the HPLMN or EHPLMN;

b) replace the serving VPLMN's entry of the "CAG information list" stored in the UE with the serving VPLMN's entry of the received CAG information list IE or the extended CAG information list IE when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN; or

NOTE 7 when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN entries of a PLMN other than the serving VPLMN if any in the received CAG information list IE or the extended CAG information list IE are ignored

c) remove the serving VPLMN's entry of the "CAG information list" stored in the UE when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN and the CAG information list IE or the extended CAG information list IE does not contain the serving VPLMN's entry

the UE shall store the "CAG information list" received in the CAG information list IE or the extended CAG information list IE as specified in annex c

if the received "CAG information list" includes an entry containing the identity of the registered PLMN the UE shall operate as follows

a) if the UE receives the REGISTRATION ACCEPT message via a CAG cell,none of the CAG-ID(s) supported by the current CAG cell is authorized based on the "Allowed CAG list" of the entry for the registered PLMN in the received "CAG information list" and

1) the entry for the registered PLMN in the received "CAG information list" does not include an "indication that the UE is only allowed to access 5GS via CAG cells" then the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C] with the updated "CAG information list"; or

2) the entry for the registered PLMN in the received "CAG information list" includes an "indication that the UE is only allowed to access 5GS via CAG cells" and

i) if one or more CAG-ID(s) are authorized based on the "Allowed CAG list" of the entry for the registered PLMN in the received "CAG information list" the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] with the updated "CAG information list"; or

ii) if no CAG-ID is authorized based on the "Allowed CAG list" of the entry for the registered PLMN in the received "CAG information list" and

A) the UE does not have an emergency PDU session then the UE shall enter the state 5GMM-REGISTERED.PLMN-SEARCH and shall apply the PLMN selection process defined in 3GPP TS 23.122 [5] with the updated "CAG information list"; or

B) the UE has an emergency PDU session then the UE shall perform a local release of all PDU sessions associated with 3GPP access except for the emergency PDU session and enter the state 5GMM-REGISTERED.LIMITED-SERVICE; or

b) if the UE receives the REGISTRATION ACCEPT message via a non-CAG cell and the entry for the registered PLMN in the received "CAG information list" includes an "indication that the UE is only allowed to access 5GS via CAG cells" and

1) if one or more CAG-ID(s) are authorized based on the "allowed CAG list" for the registered PLMN in the received "CAG information list" the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] with the updated "CAG information list"; or

2) if no CAG-ID is authorized based on the "Allowed CAG list" of the entry for the registered PLMN in the received "CAG information list" and

i) the UE does not have an emergency PDU session then the UE shall enter the state 5GMM-REGISTERED.PLMN-SEARCH and shall apply the PLMN selection process defined in 3GPP TS 23.122 [5] with the updated "CAG information list"; or

ii) the UE has an emergency PDU session then the UE shall perform a local release of all PDU sessions associated with 3GPP access except for the emergency PDU session and enter the state 5GMM-REGISTERED.LIMITED-SERVICE

if the received "CAG information list" does not include an entry containing the identity of the registered PLMN and the UE receives the REGISTRATION ACCEPT message via a CAG cell the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C] with the updated "CAG information list"

if the REGISTRATION ACCEPT message contains the Operator-defined access category definitions IE the extended emergency number list IE the CAG information list IE or the extended CAG information list IE the UE shall return a REGISTRATION COMPLETE message to the AMF to acknowledge reception of the operator-defined access category definitions or the extended local emergency numbers list or the CAG information list

if the UE has set the RCMAP bit to " sending of REGISTRATION COMPLETE message for negotiated PEIPS assistance information supported " in the 5GMM capability IE of the REGISTRATION REQUEST message and if REGISTRATION ACCEPT message contains the negotiated PEIPS assistance information IE the UE shall return a REGISTRATION COMPLETE message to the AMF to acknowledge reception of the negotiated PEIPS assistance information IE

if the REGISTRATION ACCEPT message contains the UE radio capability ID IE or the UE radio capability ID deletion indication IE the UE shall return a REGISTRATION COMPLETE message to the AMF to acknowledge reception of the UE radio capability ID IE or the UE radio capability ID deletion indication IE

if the T3448 value IE is present in the received REGISTRATION ACCEPT message and the value indicates that this timer is neither zero nor deactivated the UE shall

a) stop timer T3448 if it is running; and

b) start timer T3448 with the value provided in the T3448 value IE

if the UE is using 5GS services with control plane CIoT 5GS optimization the T3448 value IE is present in the REGISTRATION ACCEPT message and the value indicates that this timer is either zero or deactivated the UE shall ignore the T3448 value IE and proceed as if the T3448 value IE was not present

if the UE in 5GMM-IDLE mode initiated the registration procedure for mobility and periodic registration update and the REGISTRATION ACCEPT message does not include the T3448 value IE and if timer T3448 is running then the UE shall stop timer T3448

upon receiving a REGISTRATION COMPLETE message the AMF shall stop timer T3550 and change to state 5GMM-REGISTERED the 5G-GUTI if sent in the REGISTRATION ACCEPT message shall be considered as valid the PEIPS assistance information if sent in the REGISTRATION ACCEPT message shall be considered as valid and the UE radio capability ID if sent in the REGISTRATION ACCEPT message shall be considered as valid

if the 5GS update type IE was included in the REGISTRATION REQUEST message with the SMS requested bit set to "SMS over NAS supported" and

a) the SMSF address is stored in the UE 5GMM context and

1) the UE is considered available for SMS over NAS; or

2) the UE is considered not available for SMS over NAS and the SMSF has confirmed that the activation of the SMS service is successful; or

b) the SMSF address is not stored in the UE 5GMM context the SMSF selection is successful and the SMSF has confirmed that the activation of the SMS service is successful;

then the AMF shall set the SMS allowed bit of the 5GS registration result IE in the REGISTRATION ACCEPT message as specified in subclause 5.5.1.2.4 if the UE 5GMM context does not contain an SMSF address or the UE is not considered available for SMS over NAS then the AMF shall

a) store the SMSF address in the UE 5GMM context if not stored already; and

b) store the value of the SMS allowed bit of the 5GS registration result IE in the UE 5GMM context and consider the UE available for SMS over NAS

if SMSF selection in the AMF or SMS activation via the SMSF is not successful or the AMF does not allow the use of SMS over NAS then the AMF shall set the SMS allowed bit of the 5GS registration result IE to "SMS over NAS not allowed" in the REGISTRATION ACCEPT message

if the 5GS update type IE was included in the REGISTRATION REQUEST message with the SMS requested bit set to "SMS over NAS not supported" or the 5GS update type IE was not included in the REGISTRATION REQUEST message then the AMF shall

a) mark the 5GMM context to indicate that the UE is not available for SMS over NAS; and

NOTE 8 the AMF can notify the SMSF that the UE is deregistered from SMS over NAS based on local configuration

b) set the SMS allowed bit of the 5GS registration result IE to "SMS over NAS not allowed" in the REGISTRATION ACCEPT message

when the UE receives the REGISTRATION ACCEPT message if the UE is also registered over another access to the same PLMN the UE considers the value indicated by the SMS allowed bit of the 5GS registration result IE as applicable for both accesses over which the UE is registered

if the 5GS update type IE was included in the REGISTRATION REQUEST message with the NG-RAN-RCU bit set to "UE radio capability update needed" the AMF shall delete the stored UE radio capability information or the UE radio capability ID if any

the AMF shall include the 5GS registration result IE in the REGISTRATION ACCEPT message if the 5GS registration result value in the 5GS registration result IE indicates

a) "3GPP access" the UE

1) shall consider itself as being registered to 3GPP access; and

2) if in 5GMM-REGISTERED state over non-3GPP access and on the same PLMN or SNPN as 3GPP access shall enter state 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION over non-3GPP access and set the 5GS update status to 5U2 NOT UPDATED over non-3GPP access; or

b) "Non-3GPP access" the UE

1) shall consider itself as being registered to non-3GPP access; and

2) if in the 5GMM-REGISTERED state over 3GPP access and is on the same PLMN or SNPN as non-3GPP access shall enter the state 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION over 3GPP access and set the 5GS update status to 5U2 NOT UPDATED over 3GPP access; or

c) "3GPP access and non-3GPP access" the UE shall consider itself as being registered to both 3GPP access and non-3GPP access

if the UE is not currently registered for emergency services and the emergency registered bit of the 5GS registration result IE in the REGISTRATION ACCEPT message is set to "Registered for emergency services" the UE shall consider itself registered for emergency services and shall locally release all non-emergency PDU sessions if any

in roaming scenarios the AMF shall provide mapped S-NSSAI(s) for the configured NSSAI the allowed NSSAI the partially allowed NSSAI the rejected NSSAI (if extended rejected NSSAI IE is used) the partially rejected NSSAI the pending NSSAI or NSSRG information when included in the REGISTRATION ACCEPT message

the AMF shall include the allowed NSSAI for the current PLMN or SNPN in roaming scenarios and shall include the mapped S-NSSAI(s) for the allowed NSSAI contained in the requested NSSAI (i.e requested NSSAI IE or requested mapped NSSAI IE) from the UE in the REGISTRATION ACCEPT message if the UE included the requested NSSAI in the REGISTRATION REQUEST message and the AMF allows one or more S-NSSAIs for the current PLMN or SNPN in the requested NSSAI IE or one or more mapped S-NSSAIs in the requested NSSAI IE or requested mapped NSSAI IE additionally if the AMF allows one or more subscribed S-NSSAIs for the UE the AMF may include the allowed subscribed S-NSSAI(s) in the allowed NSSAI in the REGISTRATION ACCEPT message the S-NSSAI associated with each of the active PDN connections for which interworking to 5GS is supported shall be included in the allowed NSSAI if the UE included the UE status IE with the EMM registration status set to "UE is in EMM-REGISTERED state" in the REGISTRATION REQUEST message and the AMF supports N26 interface

the AMF may also include rejected NSSAI in the REGISTRATION ACCEPT message if the UE is not registered for onboarding services in SNPN if the UE has set the ER-NSSAI bit to "Extended rejected NSSAI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message the rejected NSSAI shall be included in the extended rejected NSSAI IE in the REGISTRATION ACCEPT message; otherwise the rejected NSSAI shall be included in the rejected NSSAI IE in the REGISTRATION ACCEPT message if the UE is registered for onboarding services in SNPN the AMF shall not include rejected NSSAI in the REGISTRATION ACCEPT message

if the UE has indicated the support for partial network slice and the AMF determines one or more S-NSSAI(s) in the requested NSSAI are to be included in the partially rejected NSSAI as specified in subclause 4.6.2.11 the AMF shall include the partially rejected NSSAI IE in the registration accept type 6 IE container IE of the REGISTRATION ACCEPT message

if the UE receives the partially rejected NSSAI IE in the registration accept type 6 IE container IE of the REGISTRATION ACCEPT message the UE shall store the partially rejected NSSAI as specified in subclause 4.6.2.2

if the UE has set the ER-NSSAI bit to "Extended rejected NSSAI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message the rejected NSSAI contains S-NSSAI(s) which was included in the requested NSSAI but rejected by the network associated with rejection cause(s); otherwise the rejected NSSAI contains S-NSSAI(s) which was included in the requested NSSAI but rejected by the network associated with rejection cause(s) with the following restrictions

a) rejected NSSAI for the current PLMN or SNPN shall not include an S-NSSAI for the current PLMN or SNPN which is associated to multiple mapped S-NSSAIs and some of these but not all mapped S-NSSAIs are not allowed; and

b) rejected NSSAI for the current registration area shall not include an S-NSSAI for the current PLMN or SNPN which is associated to multiple mapped S-NSSAIs and some of these but not all mapped S-NSSAIs are not allowed

NOTE 9 the UE that does not support extended rejected NSSAI can avoid requesting an S-NSSAI associated with a mapped S-NSSAI which was included in the previous requested NSSAI but neither in the allowed NSSAI nor in the rejected NSSAI in the consequent registration procedures

if the UE indicated the support for network slice-specific authentication and authorization and if the requested NSSAI (i.e the requested NSSAI IE or the requested mapped NSSAI IE) includes one or more S-NSSAIs subject to network slice-specific authentication and authorization the AMF shall in the REGISTRATION ACCEPT message include

a) the allowed NSSAI containing the S-NSSAI(s) or the mapped S-NSSAI(s) if any

1) which are not subject to network slice-specific authentication and authorization and are allowed by the AMF; or

2) for which the network slice-specific authentication and authorization has been successfully performed;

aa) the partially allowed NSSAI containing the S-NSSAI(s) or the mapped S-NSSAI(s) if any

1) which are not subject to network slice-specific authentication and authorization and are allowed by the AMF; or

2) for which the network slice-specific authentication and authorization has been successfully performed;

b) optionally the rejected NSSAI;

ba) optionally the partially rejected NSSAI;

c) pending NSSAI containing one or more S-NSSAIs for which network slice-specific authentication and authorization (except for re-NSSAA) will be performed or is ongoing and one or more S-NSSAIs from the pending NSSAI which the AMF provided to the UE during the previous registration procedure for which network slice-specific authentication and authorization will be performed or is ongoing if any; and

d) the "NSSAA to be performed" indicator in the 5GS registration result IE set to indicate that the network slice-specific authentication and authorization procedure will be performed by the network if the allowed NSSAI is not included in the REGISTRATION ACCEPT message

if the UE is not registered for onboarding services in SNPN the UE indicated the support for network slice-specific authentication and authorization and

a) the UE did not include the requested NSSAI in the REGISTRATION REQUEST message or none of the S-NSSAIs in the requested NSSAI in the REGISTRATION REQUEST message are allowed;

b) all default S-NSSAIs are subject to network slice-specific authentication and authorization; and

c) the network slice-specific authentication and authorization procedure has not been successfully performed for any of the default S-NSSAIs

the AMF shall in the REGISTRATION ACCEPT message include

a) the "NSSAA to be performed" indicator in the 5GS registration result IE to indicate that the network slice-specific authentication and authorization procedure will be performed by the network; and

b) pending NSSAI containing one or more default S-NSSAIs for which network slice-specific authentication and authorization will be performed or is ongoing and one or more S-NSSAIs from the pending NSSAI which the AMF provided to the UE during the previous registration procedure for which network slice-specific authentication and authorization will be performed or is ongoing (if any); and

c) optionally the rejected NSSAI

if the UE is not registered for onboarding services in SNPN the UE indicated the support for network slice-specific authentication and authorization and

a) the UE did not include the requested NSSAI in the REGISTRATION REQUEST message or none of the S-NSSAIs in the requested NSSAI in the REGISTRATION REQUEST message are allowed; and

b) one or more default S-NSSAIs are not subject to network slice-specific authentication and authorization or the network slice-specific authentication and authorization procedure has been successfully performed for one or more default S-NSSAIs;

the AMF shall in the REGISTRATION ACCEPT message include

a) pending NSSAI containing one or more default S-NSSAIs for which network slice-specific authentication and authorization will be performed or is ongoing (if any) and one or more S-NSSAIs from the pending NSSAI which the AMF provided to the UE during the previous registration procedure for which network slice-specific authentication and authorization will be performed or is ongoing (if any);

b) allowed NSSAI containing S-NSSAI(s) for the current PLMN or SNPN each of which corresponds to a default S-NSSAI which are not subject to network slice-specific authentication and authorization or for which the network slice-specific authentication and authorization has been successfully performed;

c) allowed NSSAI containing one or more default S-NSSAIs as the mapped S-NSSAI(s) for the allowed NSSAI in roaming scenarios which are not subject to network slice-specific authentication and authorization or for which the network slice-specific authentication and authorization has been successfully performed; and

d) optionally the rejected NSSAI; and

e) optionally the partially rejected NSSAI

if the UE did not include the requested NSSAI in the REGISTRATION REQUEST message or none of the S-NSSAIs in the requested NSSAI in the REGISTRATION REQUEST message are allowed the allowed NSSAI shall not contain default S-NSSAI(s) that are subject to NSAC if the subscription information includes the NSSRG information the S-NSSAIs of the allowed NSSAI shall be associated with at least one common NSSRG value if the network has pending NSSAI the S-NSSAIs in the pending NSSAI and allowed NSSAI shall be associated with at least one common NSSRG value

when the REGISTRATION ACCEPT includes a pending NSSAI the pending NSSAI shall contain all S-NSSAIs for which network slice-specific authentication and authorization (except for re-NSSAA) will be performed or is ongoing from the requested NSSAI of the REGISTRATION REQUEST message that was received over the 3GPP access non-3GPP access or both the 3GPP access and non-3GPP access

if the UE supports extended rejected NSSAI and the AMF determines that maximum number of UEs reached for all S-NSSAIs in the requested NSSAI as specified in subclause 4.6.2.5 the AMF shall include the rejected NSSAI containing one or more S-NSSAIs with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" in the extended rejected NSSAI IE in the REGISTRATION ACCEPT message in addition the AMF may include a back-off timer value for each S-NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" included in the extended rejected NSSAI IE of the REGISTRATION ACCEPT message to avoid that large numbers of UEs simultaneously initiate deferred requests the network should select the value for the backoff timer for each S-NSSAI for the informed UEs so that timeouts are not synchronised

if the UE does not indicate support for extended rejected NSSAI and the maximum number of UEs has been reached the AMF should include the rejected NSSAI containing one or more S-NSSAIs with the rejection cause "S-NSSAI not available in the current registration area" in the rejected NSSAI IE and should not include these S-NSSAIs in the allowed NSSAI in the REGISTRATION ACCEPT message

NOTE 10 based on network policies the AMF can include the S-NSSAI(s) for which the maximum number of UEs has been reached in the rejected NSSAI with rejection causes other than "S-NSSAI not available in the current registration area"

if the UE indicates support for network slice usage control and the AMF determines to provide the on-demand NSSAI the AMF shall include the On-demand NSSAI IE in the REGISTRATION ACCEPT message in addition the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3

if the AMF has a new configured NSSAI for the current PLMN or SNPN the AMF shall include the configured NSSAI for the current PLMN or SNPN in the REGISTRATION ACCEPT message

NOTE 10A a new configured NSSAI can be available at the AMF following an indication that the subscription data for network slicing has changed

the AMF may include a new configured NSSAI for the current PLMN or SNPN in the REGISTRATION ACCEPT message if

a) the REGISTRATION REQUEST message did not include a requested NSSAI and the UE is not registered for onboarding services in SNPN;

b) the REGISTRATION REQUEST message included a requested NSSAI containing an S-NSSAI that is not valid in the serving PLMN or SNPN;

c) the REGISTRATION REQUEST message included a requested NSSAI containing an S-NSSAI with incorrect mapped S-NSSAI(s);

d) the REGISTRATION REQUEST message included the network slicing indication IE with the default configured NSSAI indication bit set to "Requested NSSAI created from default configured NSSAI";

e) the REGISTRATION REQUEST message included the requested mapped NSSAI;

f) the S-NSSAIs of the requested NSSAI in the REGISTRATION REQUEST message are not associated with any common NSSRG value except for the case that the AMF based on the indication received from the UDM as specified in 3GPP TS 23.501 [8] has provided all subscribed S-NSSAIs in the configured NSSAI to a UE who does not support NSSRG;

NOTE 11 if the S-NSSAIs of the requested NSSAI in the REGISTRATION REQUEST message are not associated with any common NSSRG value it is possible that at least one of the S-NSSAIs is not included in any of new allowed NSSAI new (extended) rejected NSSAI (if applicable) and new pending NSSAI (if applicable)

g) the UE is in 5GMM-REGISTERED state over the other access and the S-NSSAIs of the requested NSSAI in the REGISTRATION REQUEST message over the current access and the allowed NSSAI over the other access are not associated with any common NSSRG value;

h) the REGISTRATION REQUEST message included a 5GS mobile identity IE containing a mapped 5G-GUTI and did not include an additional GUTI IE; or

i) the REGISTRATION REQUEST message included an additional GUTI IE containing a valid native 5G-GUTI which was not allocated by the current PLMN or SNPN

the AMF may include a new configured NSSAI for the current PLMN or SNPN in the REGISTRATION ACCEPT message if the REGISTRATION REQUEST message includes a requested NSSAI containing an S-NSSAI and the S-NSSAI time validity information if available indicates that the S-NSSAI is not available (see 3GPP TS 23.501 [8]) in this case if the TempNS bit of the 5GMM capability IE in the REGISTRATION REQUEST message is set to

a) "S-NSSAI time validity information supported" and the S-NSSAI time validity information indicates that the S-NSSAI will

1) become available again then the AMF shall also send S-NSSAI time validity information; or

2) not become available again then the AMF shall not include the S-NSSAI in the new configured NSSAI; or

b) "S-NSSAI time validity information not supported" and the AMF sends a new configured NSSAI then the AMF shall not include the S-NSSAI in the new configured NSSAI

if a new configured NSSAI for the current PLMN or SNPN is included and the UE is roaming the AMF shall also include the mapped S-NSSAI(s) for the configured NSSAI for the current PLMN or SNPN in the REGISTRATION ACCEPT message in this case the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3

if a new configured NSSAI for the current PLMN or SNPN is included the subscription information includes the NSSRG information and the NSSRG bit in the 5GMM capability IE of the REGISTRATION REQUEST message is set to

a) "NSSRG supported" then the AMF shall include the NSSRG information in the REGISTRATION ACCEPT message; or

b) "NSSRG not supported" then the configured NSSAI shall include S-NSSAIs each of which is associated with all the NSSRG value(s) of the default S-NSSAI(s) or the configured NSSAI shall include based on the indication received from the UDM as specified in 3GPP TS 23.501 [8] all subscribed S-NSSAIs even if these S-NSSAIs do not share any common NSSRG value

if the AMF needs to update the NSSRG information and the UE has set the NSSRG bit to "NSSRG supported" in the 5GMM capability IE of the REGISTRATION REQUEST message then the AMF shall include the new NSSRG information in the REGISTRATION ACCEPT message in addition the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3

if the UE supports S-NSSAI time validity information and the AMF needs to update the S-NSSAI time validity information then the AMF shall include the S-NSSAI time validity information IE in the REGISTRATION ACCEPT message in addition the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3

if the UE supports S-NSSAI location validity information and the AMF needs to update the S-NSSAI location validity information then the AMF shall include the S-NSSAI location validity information IE in the registration accept type 6 IE container IE of the REGISTRATION ACCEPT message in addition the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3

the AMF shall include the network slicing indication IE with the network slicing subscription change indication set to "Network slicing subscription changed" in the REGISTRATION ACCEPT message if the UDM has indicated that the subscription data for network slicing has changed in this case the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3

if the S-NSSAI(s) associated with the existing PDU session(s) of the UE is not included in the requested NSSAI (i.e requested NSSAI IE or requested mapped NSSAI IE) of the REGISTRATION REQUEST message the AMF shall perform a local release of the PDU session(s) associated with the S-NSSAI(s) except for a PDU session associated with DNN and S-NSSAI in the AMF onboarding configuration data and shall request the SMF to perform a local release of those PDU session(s)

the UE that has indicated the support for network slice-specific authentication and authorization receiving the pending NSSAI in the REGISTRATION ACCEPT message shall store the S-NSSAI(s) in the pending NSSAI as specified in subclause 4.6.2.2 if the registration area contains TAIs belonging to different PLMNs which are equivalent PLMNs the UE shall store the received pending NSSAI for each of the equivalent PLMNs as specified in subclause 4.6.2.2 if the pending NSSAI is not included in the REGISTRATION ACCEPT message and the "NSSAA to be performed" indicator is not set to "Network slice-specific authentication and authorization is to be performed" in the 5GS registration result IE of the REGISTRATION ACCEPT message then the UE shall delete the pending NSSAI for the current PLMN and its equivalent PLMN(s) or SNPN if existing as specified in subclause 4.6.2.2

the UE receiving the rejected NSSAI in the REGISTRATION ACCEPT message takes the following actions based on the rejection cause in the rejected S-NSSAI(s)

"S-NSSAI not available in the current PLMN or SNPN"

the UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current PLMN or SNPN as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current PLMN or SNPN over any access until switching off the UE the UICC containing the USIM is removed the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated or the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2

"S-NSSAI not available in the current registration area"

the UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current registration area as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current registration area over the current until switching off the UE the UE moving out of the current registration area the UICC containing the USIM is removed the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated or the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2

"S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization"

the UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the failed or revoked NSSAA as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN or SNPN over any access until switching off the UE the UICC containing the USIM is removed the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated or the rejected S-NSSAI(s) are removed as described in subclause 4.6.1 and 4.6.2.2

"S-NSSAI not available due to maximum number of UEs reached"

unless the back-off timer value received along with the S-NSSAI is zero the UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the maximum number of UEs reached as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN or SNPN over the current access until switching off the UE the UICC containing the USIM is removed the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated or the rejected S-NSSAI(s) are removed as described in subclauses 4.6.1 and 4.6.2.2

NOTE 12 if the back-off timer value received along with the S-NSSAI in the rejected NSSAI for the maximum number of UEs reached is zero as specified in subclause 10.5.7.4a of 3GPP TS 24.008 [12] the UE does not consider the S-NSSAI as the rejected S-NSSAI

if there is one or more S-NSSAIs in the rejected NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" then for each S-NSSAI the UE shall behave as follows

a) stop the timer T3526 associated with the S-NSSAI if running;

b) start the timer T3526 with

1) the back-off timer value received along with the S-NSSAI if a back-off timer value is received along with the S-NSSAI that is neither zero nor deactivated; or

2) an implementation specific back-off timer value if no back-off timer value is received along with the S-NSSAI; and

c) remove the S-NSSAI from the rejected NSSAI for the maximum number of UEs reached when the timer T3526 associated with the S-NSSAI expires

if the UE sets the NSSAA bit in the 5GMM capability IE to "Network slice-specific authentication and authorization not supported" and

a) if the requested NSSAI IE only includes the S-NSSAI(s) subject to network slice-specific authentication and authorization and one or more default S-NSSAIs (containing one or more S-NSSAIs each of which may be associated with a new S-NSSAI) which are not subject to network slice-specific authentication and authorization are available the AMF shall in the REGISTRATION ACCEPT message include

1) the allowed NSSAI or the partially allowed NSSAI containing S-NSSAI(s) for the current PLMN or SNPN each of which corresponds to a default S-NSSAI which are not subject to network slice-specific authentication and authorization;

2) the allowed NSSAI or the partially allowed NSSAI containing the default S-NSSAIs as the mapped S-NSSAI(s) for the allowed NSSAI in roaming scenarios which are not subject to network slice-specific authentication and authorization; and

3) the rejected NSSAI containing the S-NSSAI(s) subject to network slice specific authentication and authorization with the rejection cause indicating "S-NSSAI not available in the current PLMN or SNPN" except if the UE has not set the ER-NSSAI bit to "Extended rejected NSSAI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message and the S-NSSAI(s) is associated to multiple mapped S-NSSAIs and some of these but not all mapped S-NSSAIs are subject to NSSAA; or

b) if the requested NSSAI IE includes one or more S-NSSAIs subject to network slice-specific authentication and authorization the AMF shall in the REGISTRATION ACCEPT message include

1) the allowed NSSAI or the partially allowed NSSAI containing the S-NSSAI(s) or the mapped S-NSSAI(s) which are not subject to network slice-specific authentication and authorization; and

2) the rejected NSSAI containing

i) the S-NSSAI(s) subject to network slice specific authentication and authorization with the rejection cause indicating "S-NSSAI not available in the current PLMN or SNPN" except if the UE has not set the ER-NSSAI bit to "Extended rejected NSSAI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message and the S-NSSAI(s) is associated to multiple mapped S-NSSAIs and some of these but not all mapped S-NSSAIs are subject to NSSAA; and

ii) the S-NSSAI(s) which was included in the requested NSSAI but rejected by the network associated with the rejection cause indicating "S-NSSAI not available in the current PLMN or SNPN" or the rejection cause indicating "S-NSSAI not available in the current registration area" if any

for a REGISTRATION REQUEST message with a 5GS registration type IE indicating "mobility registration updating" if the UE does not indicate support for network slice-specific authentication and authorization the UE is not registered for onboarding services in SNPN and

a) the UE is not in NB-N1 mode; and

b) if

1) the UE did not include the requested NSSAI in the REGISTRATION REQUEST message; or

2) none of the S-NSSAIs in the requested NSSAI in the REGISTRATION REQUEST message are allowed;

and one or more default S-NSSAIs which are not subject to network slice-specific authentication and authorization are available the AMF shall

a) put the allowed S-NSSAI(s) for the current PLMN or SNPN each of which corresponds to a default S-NSSAI and not subject to network slice-specific authentication and authorization in the allowed NSSAI of the REGISTRATION ACCEPT message;

b) put the default S-NSSAIs and not subject to network slice-specific authentication and authorization as the mapped S-NSSAI(s) for the allowed NSSAI in roaming scenarios in the allowed NSSAI of the REGISTRATION ACCEPT message; and

c) determine a registration area such that all S-NSSAIs of the allowed NSSAI are available in the registration area

during a registration procedure for mobility and periodic registration update for which the 5GS registration type IE indicates

a) "periodic registration updating"; or

b) "mobility registration updating" and the UE is in NB-N1 mode;

and the UE is not registered for onboarding services in SNPN the AMF

a) may provide a new allowed NSSAI a new partially allowed NSSAI or both to the UE;

b) shall provide a pending NSSAI to the UE if the UE has indicated the support for network slice-specific authentication and authorization and there are S-NSSAIs for which network slice-specific authentication and authorization (except for re-NSSAA) will be performed or is ongoing for the current PLMN or SNPN; or

c) may provide both a new allowed NSSAI and a pending NSSAI to the UE;

in the REGISTRATION ACCEPT message additionally if a pending NSSAI is provided without an allowed NSSAI and no S-NSSAI is currently allowed for the UE the REGISTRATION ACCEPT message shall include the 5GS registration result IE with the "NSSAA to be performed" indicator set to "Network slice-specific authentication and authorization is to be performed"

if the REGISTRATION ACCEPT message contains the network slicing indication IE with the network slicing subscription change indication set to "Network slicing subscription changed" the UE shall delete the network slicing information and the NSSAI inclusion mode for each and every PLMN or SNPN except for the current PLMN or SNPN as specified in subclause 4.6.2.2 and remove all tracking areas from the list of "5GS forbidden tracking areas for roaming" which were added due to rejection of S-NSSAI due to "S-NSSAI not available in the current registration area"

if the REGISTRATION ACCEPT message contains the allowed NSSAI then the UE shall store the included allowed NSSAI together with the PLMN identity of the registered PLMN or the SNPN identity of the registered SNPN and the registration area as specified in subclause 4.6.2.2 if the registration area contains TAIs belonging to different PLMNs which are equivalent PLMNs the UE shall store the received allowed NSSAI in each of allowed NSSAIs which are associated with each of the PLMNs

for each of the PDU session(s) active in the UE

a) if the allowed NSSAI contains an HPLMN S-NSSAI (e.g. mapped S-NSSAI in roaming scenarios) matching to the HPLMN S-NSSAI of the PDU session the UE shall locally update the S-NSSAI associated with the PDU session to the corresponding S-NSSAI received in the allowed NSSAI;

b) if the allowed NSSAI does not contain an HPLMN S-NSSAI (e.g. mapped S-NSSAI in roaming scenarios) matching to the HPLMN S-NSSAI of the PDU session the UE may perform a local release of the PDU session except for an emergency PDU session if any and except for a PDU session established when the UE is registered for onboarding services in SNPN if any; and

c) if the partially allowed NSSAI contains an S-NSSAI associated with a PDU session and the UE is in the TA where the S-NSSAI is not supported

1) the UE may initiate

i) the PDU session release procedure; or

ii) the PDU session modification procedure to set the 3GPP PS data off status to "deactivated" as specified in 3GPP TS 24.008 [13]; and

2) the SMF may initiate the PDU session release procedure

NOTE 13 according to 3GPP TS 23.501 [8] also the AMF will determine which PDU sessions can no longer be supported based on the new allowed NSSAI and it will cause a release on the UE side either by indicating in the PDU session status IE which PDU sessions are inactive on the network side or by triggering the SMF to initiate a release via 5GSM signalling

NOTE 13AA if a dedicated S-NSSAI for MWAB is not included in the new allowed NSSAI then the AMF can decide not to indicate in the PDU session status IE a PDU session associated with the S-NSSAI and DNN combination for MWAB as inactive on the network side and to delay the notification of the SMF associated with the PDU session to initiate the network-requested PDU session release procedure for a locally configured time

if the REGISTRATION ACCEPT message contains a configured NSSAI IE with a new configured NSSAI for the current PLMN or SNPN and optionally the mapped S-NSSAI(s) for the configured NSSAI for the current PLMN or SNPN the UE shall store the contents of the configured NSSAI IE as specified in subclause 4.6.2.2 in addition if the REGISTRATION ACCEPT message contains

a) an NSSRG information IE the UE shall store the contents of the NSSRG information IE as specified in subclause 4.6.2.2 if the UE receives a configured NSSAI IE in the REGISTRATION ACCEPT message and no NSSRG information IE the UE shall delete any stored NSSRG information if any as specified in subclause 4.6.2.2;

b) an S-NSSAI location validity information IE in the registration accept type 6 IE container IE the UE shall store the contents of the S-NSSAI location validity information as specified in subclause 4.6.2.2 if the UE receives a configured NSSAI IE in the REGISTRATION ACCEPT message and no S-NSSAI location validity information IE the UE shall delete any stored S-NSSAI location validity information as specified in subclause 4.6.2.2;

c) an S-NSSAI time validity information IE the UE shall store the contents of the S-NSSAI time validity information IE as specified in subclause 4.6.2.2 if the UE receives a configured NSSAI IE in the REGISTRATION ACCEPT message and no S-NSSAI time validity information IE the UE shall delete any stored S-NSSAI time validity information as specified in subclause 4.6.2.2; or

d) an On-demand NSSAI IE the UE shall store the contents of the On-demand NSSAI IE as specified in subclause 4.6.2.2 if the UE receives a configured NSSAI IE in the REGISTRATION ACCEPT message and no On-demand NSSAI IE the UE shall delete any stored on-demand NSSAI as specified in subclause 4.6.2.2 the UE shall stop any slice deregistration inactivity timer associated with an S-NSSAI which is deleted from the on-demand NSSAI

if the UE has set the NSAG bit to "NSAG supported" in the 5GMM capability IE of the REGISTRATION REQUEST message over 3GPP access the AMF may include the NSAG information IE in the REGISTRATION ACCEPT message up to 4 NSAG entries are allowed to be associated with a TAI list in the NSAG information IE if the UE has set the RCMAN bit to "Sending of REGISTRATION COMPLETE message for NSAG information supported" in the 5GMM capability IE of the REGISTRATION REQUEST message and if the NSAG information IE is included in the REGISTRATION ACCEPT message the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3

NOTE 13A how the AMF selects NSAG entries to be included in the NSAG information IE is implementation specific e.g take the NSAG priority and the current registration area into account

NOTE 13B if the NSAG for the PLMN and its equivalent PLMN(s) have different associations with S-NSSAIs then the AMF includes a TAI list for the NSAG entry in the NSAG information IE

NOTE 13C if the NSAG for the PLMN and its equivalent PLMN(s) have different associations with S-NSSAIs then the AMF includes a TAI list for the NSAG entry in the NSAG information IE

if the UE receives the NSAG information IE in the REGISTRATION ACCEPT message the UE shall store the NSAG information as specified in subclause 4.6.2.2

if the UE supports network slice replacement and the AMF determines to provide the mapping information between the S-NSSAI to be replaced and the alternative S-NSSAI to the UE then the AMF shall include the alternative NSSAI IE the allowed NSSAI IE including the alternative S-NSSAI if not included in the current allowed NSSAI and the configured NSSAI IE including the alternative S-NSSAI if not included in the current configured NSSAI in the REGISTRATION ACCEPT message if the AMF determines that the replaced S-NSSAI is available then the AMF shall provide the updated alternative NSSAI excluding the replaced S-NSSAI and the corresponding alternative S-NSSAI in the alternative NSSAI IE in the REGISTRATION ACCEPT message if the AMF determines that all the replaced S-NSSAI(s) are available then the AMF shall provide the alternative NSSAI IE with length of alternative NSSAI contents set to 0 in the REGISTRATION ACCEPT message if the AMF determines that the replaced S-NSSAI is not supported due to the UE moving outside of NS-AoS of the S-NSSAI while the alternative S-NSSAI is available then the AMF shall provide the updated allowed NSSAI and partially allowed NSSAI if available excluding the replaced S-NSSAI if included in the allowed NSSAI or partially allowed NSSAI in the REGISTRATION ACCEPT message in addition the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3

if the UE receives the alternative NSSAI IE in the REGISTRATION ACCEPT message the UE shall store the alternative NSSAI as specified in subclause 4.6.2.2

if the UE has indicated the support for partial network slice and the AMF determines one or more S-NSSAI(s) in the requested NSSAI are to be included in the partially allowed NSSAI as specified in subclause 4.6.2.11 the AMF shall include the partially allowed NSSAI IE in the registration accept type 6 IE container IE of the REGISTRATION ACCEPT message

if the UE receives the partially allowed NSSAI IE in the registration accept type 6 IE container IE of the REGISTRATION ACCEPT message the UE shall store the partially allowed NSSAI as specified in subclause 4.6.2.2

if the REGISTRATION ACCEPT message

a) includes the 5GS registration result IE with the "NSSAA to be performed" indicator set to "Network slice-specific authentication and authorization is to be performed";

b) includes a pending NSSAI;

c) does not include an allowed NSSAI; and

d) does not include a partially allowed NSSAI;

the UE

a) shall not perform the registration procedure for mobility and periodic registration update with the uplink data status IE except for emergency services;

b) shall not initiate a service request procedure except for emergency services for emergency services fallback procedure for responding to paging or notification over non-3GPP access for cases f) i) m) and o) in subclause 5.6.1.1;

c) shall not initiate a 5GSM procedure except for emergency services indicating a change of 3GPP PS data off UE status or to request the release of a PDU session; and

d) shall not initiate the NAS transport procedure except for sending a CIoT user data container SMS an LPP message a UPP-CMI container an SLPP message a location services message an SOR transparent container a UE policy container or a UE parameters update transparent container;

until the UE receives an allowed NSSAI a partially allowed NSSAI or both

during a registration procedure for mobility and periodic registration update for which the 5GS registration type IE indicates

a) "mobility registration updating" and the UE is in NB-N1 mode; or

b) "periodic registration updating";

if the REGISTRATION ACCEPT message includes the 5GS registration result IE with the "NSSAA to be performed" indicator not set to "Network slice-specific authentication and authorization is to be performed" and the message does not contain an allowed NSSAI and no new allowed NSSAI the UE shall consider the previously received allowed NSSAI as valid

during a registration procedure for mobility and periodic registration update for which the 5GS registration type IE indicates

a) "mobility registration updating"; or

b) "periodic registration updating";

if the REGISTRATION ACCEPT message includes the 5GS registration result IE with the "NSSAA to be performed" indicator set to "Network slice-specific authentication and authorization is to be performed" and the message contains a pending NSSAI the UE shall delete any stored allowed NSSAI as specified in subclause 4.6.2.2

if the uplink data status IE is included in the REGISTRATION REQUEST message

a) if the AMF determines that the UE is in non-allowed area or is not in allowed area and the PDU session(s) indicated by the uplink data status IE is non-emergency PDU session(s) or the UE is not configured for high priority access in selected PLMN or SNPN the AMF shall include the PDU session reactivation result IE in the REGISTRATION ACCEPT message indicating that user-plane resources for the corresponding PDU session(s) cannot be re-established and shall include the PDU session reactivation result error cause IE with the 5GMM cause set to #28 "Restricted service area";

b) otherwise the AMF shall

1) indicate the SMF to re-establish the user-plane resources for the corresponding PDU session;

2) include PDU session reactivation result IE in the REGISTRATION ACCEPT message to indicate the user-plane resources re-establishment result of the PDU sessions for which the UE requested to re-establish the user-plane resources; and

3) determine the UE presence in LADN service area (see subclause 6.2.6) and forward the UE presence in LADN service area towards the SMF if the corresponding PDU session is a PDU session for LADN

if the uplink data status IE is not included in the REGISTRATION REQUEST message and the REGISTRATION REQUEST message is sent for the trigger d) in subclause 5.5.1.3.2 the AMF may indicate the SMF to re-establish the user-plane resources for the PDU sessions

if the registration procedure for mobility registration update is triggered for non-3GPP access path switching from the old non-3GPP access to the new non-3GPP access and there are

a) one or more single access PDU sessions whose user plane resources are associated to the old non-3GPP access but whose PDU session ID(s) are not indicated in the uplink data status IE in the REGISTRATION REQUEST message; or

b) one or more MA PDU sessions whose PDU session ID(s) are not indicated in the uplink data status IE in the REGISTRATION REQUEST message;

the AMF shall not release those PDU session(s) and shall release the user plane resources of the old non-3GPP access of those PDU session(s) so that the UE or the network can re-establish user-plane resources on the new non-3GPP access by triggering a service request procedure

if a PDU session status IE is included in the REGISTRATION REQUEST message

a) for single access PDU sessions the AMF shall

1) perform a local release of all those PDU sessions which are not in 5GSM state PDU SESSION INACTIVE on the AMF side associated with the access type the REGISTRATION REQUEST message is sent over but are indicated by the UE as being in 5GSM state PDU SESSION INACTIVE if any of those PDU sessions is associated with one or more MBS multicast sessions the SMF shall consider the UE as removed from the associated multicast MBS sessions; and

2) include a PDU session status IE in the REGISTRATION ACCEPT message to indicate which PDU sessions associated with the access type the REGISTRATION ACCEPT message is sent over are not in 5GSM state PDU SESSION INACTIVE in the AMF; and

b) for MA PDU sessions

1) for all those PDU sessions which are not in 5GSM state PDU SESSION INACTIVE and have user plane resources being established or established on the access the REGISTRATION REQUEST message is sent over on the AMF side but are indicated by the UE as no user plane resources are being established or established

i) for PDU sessions having user plane resources being established or established only on the access the REGISTRATION REQUEST message is sent over the AMF shall perform a local release of all those PDU sessions if the MA PDU session is associated with one or more multicast MBS sessions the SMF shall consider the UE as removed from the associated multicast MBS sessions; and

ii) for PDU sessions having user plane resources being established or established on both accesses the AMF shall perform a local release on the user plane resources associated with the access type the REGISTRATION REQUEST message is sent over if the REGISTRATION REQUEST message is sent over 3GPP access and the MA PDU session is associated with one or more multicast MBS sessions the SMF shall consider the UE as removed from the associated multicast MBS sessions; and

2) the AMF shall include a PDU session status IE in the REGISTRATION ACCEPT message to indicate which MA PDU sessions having the corresponding user plane resources are being established or established on the AMF side on the access the REGISTRATION ACCEPT message is sent over

if the allowed PDU session status IE is included in the REGISTRATION REQUEST message the AMF shall

a) for a 5GSM message from each SMF that has indicated pending downlink signalling only forward the received 5GSM message via 3GPP access to the UE after the REGISTRATION ACCEPT message is sent;

b) for each SMF that has indicated pending downlink data only

1) notify the SMF that reactivation of the user-plane resources for the corresponding PDU session(s) associated with non-3GPP access cannot be performed if the corresponding PDU session ID(s) are not indicated in the allowed PDU session status IE; and

2) notify the SMF that reactivation of the user-plane resources for the corresponding PDU session(s) associated with non-3GPP access can be performed if the corresponding PDU session ID(s) are indicated in the allowed PDU session status IE

c) for each SMF that have indicated pending downlink signalling and data

1) notify the SMF that reactivation of the user-plane resources for the corresponding PDU session(s) associated with non-3GPP access cannot be performed if the corresponding PDU session ID(s) are not indicated in the allowed PDU session status IE;

2) notify the SMF that reactivation of the user-plane resources for the corresponding PDU session(s) associated with non-3GPP access can be performed if the corresponding PDU session ID(s) are indicated in the allowed PDU session status IE; and

3) discard the received 5GSM message for PDU session(s) associated with non-3GPP access; and

d) include the PDU session reactivation result IE in the REGISTRATION ACCEPT message to indicate the successfully re-established user-plane resources for the corresponding PDU sessions if any

if the PDU session reactivation result IE is included in the REGISTRATION ACCEPT message indicating that the user-plane resources have been successfully reactivated for a PDU session that was indicated by the UE in the allowed PDU session status IE as allowed to be re-established over 3GPP access the UE considers the corresponding PDU session to be associated with the 3GPP access if the user-plane resources of a PDU session have been successfully reactivated over the 3GPP access the AMF and SMF update the associated access type of the corresponding PDU session

if the PDU session reactivation result IE is included in the REGISTRATION ACCEPT message indicating that the user-plane resources cannot be established for a PDU session that was indicated by the UE in the allowed PDU session status IE as allowed to be re-established over 3GPP access the UE considers the corresponding PDU session to be associated with the non-3GPP access

if an EPS bearer context status IE is included in the REGISTRATION REQUEST message the AMF handles the received EPS bearer context status IE as specified in 3GPP TS 23.502 [9]

if the EPS bearer context status information is generated for the UE during the inter-system change from S1 mode to N1 mode as specified in 3GPP TS 23.502 [9] and the AMF supports N26 interface the AMF shall include an EPS bearer context status IE in the REGISTRATION ACCEPT message to indicate the UE which mapped EPS bearer contexts are active in the network

if the user-plane resources cannot be established for a PDU session the AMF shall include the PDU session reactivation result IE in the REGISTRATION ACCEPT message indicating that user-plane resources for the corresponding PDU session cannot be re-established and

a) if the user-plane resources cannot be established because the SMF indicated to the AMF that the UE is located out of the LADN service area (see 3GPP TS 29.502 [20A]) the AMF shall include the PDU session reactivation result error cause IE with the 5GMM cause set to #43 "LADN not available";

b) if the user-plane resources cannot be established because the SMF indicated to the AMF that only prioritized services are allowed (see 3GPP TS 29.502 [20A]) the AMF shall include the PDU session reactivation result error cause IE with the 5GMM cause set to #28 "restricted service area";

c) if the user-plane resources cannot be established because the SMF indicated to the AMF that the resource is not available in the UPF (see 3GPP TS 29.502 [20A]) the AMF shall include the PDU session reactivation result error cause IE with the 5GMM cause set to #92 "insufficient user-plane resources for the PDU session";

d) if the user-plane resources cannot be established because the SMF indicated to the AMF that the S-NSSAI associated with the PDU session is unavailable due to NSAC (see 3GPP TS 29.502 [20A]) the AMF shall include the PDU session reactivation result error cause IE with the 5GMM cause set to #69 "insufficient resources for specific slice";

e) if the user-plane resources cannot be established because the AMF determines that the UE is outside the NS-AoS of the S-NSSAI associated with the PDU session the AMF may include the PDU session reactivation result error cause IE with the 5GMM cause set to #69 "insufficient resources for specific slice" to indicate the cause of failure to re-establish the user-plane resources; or

f) otherwise the AMF may include the PDU session reactivation result error cause IE to indicate the cause of failure to re-establish the user-plane resources

NOTE 14 it is up to UE implementation when to re-send a request for user-plane re-establishment for the associated PDU session after receiving a PDU session reactivation result error cause IE with a 5GMM cause set to #92 "insufficient user-plane resources for the PDU session"

NOTE 15 the UE can locally start a back-off timer after receiving a PDU session reactivation result error cause IE with a 5GMM cause set to #69 "insufficient resources for specific slice" the value of the back-off timer is up to UE implementation upon expiry of the back-off timer the UE can re-send a request for user-plane re-establishment for the associated PDU session

if the AMF needs to initiate PDU session status synchronization the AMF shall include a PDU session status IE in the REGISTRATION ACCEPT message to indicate the UE

- which single access PDU sessions associated with the access the REGISTRATION ACCEPT message is sent over are not in 5GSM state PDU SESSION INACTIVE in the AMF; and

- which MA PDU sessions are not in 5GSM state PDU SESSION INACTIVE and having user plane resources established in the AMF on the access the REGISTRATION ACCEPT message is sent over

the AMF may include the LADN information IE in the REGISTRATION ACCEPT message as described in subclause 5.5.1.2.4 the UE upon receiving the REGISTRATION ACCEPT message with the LADN information IE shall delete its old LADN information (if any) and store the received new LADN information

if the UE has set the LADN-DS bit to "LADN per DNN and S-NSSAI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message the AMF may include the extended LADN information IE in the registration accept type 6 IE container IE in the REGISTRATION ACCEPT message as described in subclause 5.5.1.2.4 the UE upon receiving the REGISTRATION ACCEPT message with the registration accept type 6 IE container IE which includes the extended LADN information IE shall delete its old extended LADN information (if any) and store the received new extended LADN information

NOTE 15A0 the AMF allocates the LADN service area and the TAI list associated with the S-NSSAI in the partially allowed NSSAI independently if applicable

if

- the UE does not support LADN per DNN and S-NSSAI;

- the UE is subscribed to the LADN DNN for a single S-NSSAI only; and

- the AMF has the extended LADN information but no LADN information;

the AMF may decide to provide the LADN service area for that LADN DNN of the extended LADN information as the LADN information and include the LADN information in the LADN information IE of the REGISTRATION ACCEPT message

NOTE 15A if the LADN service area is configured per DNN and S-NSSAI in order to serve the UEs that do not support LADN per DNN and S-NSSAI it is recommended that the LADN DNN is only served by a single S-NSSAI

NOTE 15B in case of the UE is subscribed to the LADN DNN for multiple S-NSSAIs the AMF can treat this as no extended LADN information is available

if the UE does not support LADN per DNN and S-NSSAI and the AMF has neither the LADN information nor the extended LADN information the AMF shall not provide any LADN information to the UE

if the AMF does not include

- the LADN information IE; or

- the extended LADN information IE in the registration accept type 6 IE container IE

in the REGISTRATION ACCEPT message during registration procedure for mobility and periodic registration update the UE shall delete its old LADN information or old extended LADN information respectively

if the PDU session status IE is included in the REGISTRATION ACCEPT message

a) for single access PDU sessions the UE shall perform a local release of all those PDU sessions associated with the access type the REGISTRATION ACCEPT message is sent over which are not in 5GSM state PDU SESSION INACTIVE or PDU SESSION ACTIVE PENDING on the UE side but are indicated by the AMF as being in 5GSM state PDU SESSION INACTIVE if a locally released PDU session is associated with one or more multicast MBS sessions the UE shall locally leave the associated multicast MBS sessions; and

b) for MA PDU sessions for all those PDU sessions which are not in 5GSM state PDU SESSION INACTIVE and have the corresponding user plane resources being established or established in the UE on the access the REGISTRATION ACCEPT message is sent over but are indicated by the AMF as no user plane resources are being established or established

1) for MA PDU sessions having the corresponding user plane resources being established or established only on the access the REGISTRATION ACCEPT message is sent over the UE shall perform a local release of those MA PDU sessions if a locally released MA PDU session is associated with one or more multicast MBS sessions the UE shall locally leave the associated multicast MBS sessions; and

2) for MA PDU sessions having user plane resources being established or established on both accesses the UE shall perform a local release on the user plane resources on the access the REGISTRATION ACCEPT message is sent over if the user plane resources over 3GPP access are released and the MA PDU session is associated with one or more multicast MBS sessions the UE shall locally leave the associated multicast MBS sessions

if

a) the UE included a PDU session status IE in the REGISTRATION REQUEST message;

b) the UE is operating in the single-registration mode;

c) the UE is performing inter-system change from S1 mode to N1 mode in 5GMM-IDLE mode; and

d) the UE has received the IWK N26 bit set to "interworking without N26 interface supported";

the UE shall ignore the PDU session status IE if received in the REGISTRATION ACCEPT message

if the EPS bearer context status IE is included in the REGISTRATION ACCEPT message the UE shall locally delete all those QoS flow descriptions and all associated QoS rules if any which are associated with inactive EPS bearer contexts as indicated by the AMF in the EPS bearer context status IE

if the UE included S1 mode supported indication in the REGISTRATION REQUEST message the AMF supporting interworking with EPS shall set the IWK N26 bit to either

a) "interworking without N26 interface not supported" if the AMF supports N26 interface; or

b) "interworking without N26 interface supported" if the AMF does not support N26 interface

in the 5GS network feature support IE in the REGISTRATION ACCEPT message

the UE supporting S1 mode shall operate in the mode for inter-system interworking with EPS as follows

a) if the IWK N26 bit in the 5GS network feature support IE is set to "interworking without N26 interface not supported" the UE shall operate in single-registration mode;

b) if the IWK N26 bit in the 5GS network feature support IE is set to "interworking without N26 interface supported" and the UE supports dual-registration mode the UE may operate in dual-registration mode; or

NOTE 16 the registration mode used by the UE is implementation dependent

c) if the IWK N26 bit in the 5GS network feature support IE is set to "interworking without N26 interface supported" and the UE only supports single-registration mode the UE shall operate in single-registration mode

the UE shall store the received interworking without N26 interface indicator for inter-system change with EPS as specified in subclause C.1 and treat it as valid in the entire PLMN and its equivalent PLMN(s)

the network informs the UE about the support of specific features such as IMS voice over PS session location services (5G-LCS) emergency services emergency services fallback ATSSS and non-3GPP access path switching in the 5GS network feature support information element in a UE with IMS voice over PS session capability the IMS voice over PS session indicator emergency services support indicator and emergency services fallback indicator shall be provided to the upper layers the upper layers take the IMS voice over PS session indicator into account when selecting the access domain for voice sessions or calls when initiating an emergency call the upper layers take the IMS voice over PS session indicator emergency services support indicator and emergency services fallback indicator into account for the access domain selection when the UE determines via the IMS voice over PS session indicator that the network does not support IMS voice over PS sessions in N1 mode then the UE shall not perform a local release of any persistent PDU session if the AMF does not indicate that the PDU session is in 5GSM state PDU SESSION INACTIVE via the PDU session status IE when the UE determines via the emergency services support indicator that the network does not support emergency services in N1 mode then the UE shall not perform a local release of any emergency PDU session if user-plane resources associated with that emergency PDU session are established if the AMF does not indicate that the PDU session is in 5GSM state PDU SESSION INACTIVE via the PDU session status IE in a UE with LCS capability location services indicators (5G-LCS) shall be provided to the upper layers in a UE with the capability for ATSSS the network support for ATSSS shall be provided to the upper layers if the UE receives the 5GS network feature support IE with the ATSSS support indicator set to "ATSSS not supported" the UE shall perform a local release of the MA PDU session if any if a locally released MA PDU session is associated with one or more multicast MBS sessions the UE shall locally leave the associated multicast MBS sessions in a UE that supports non-3GPP access path switching the network support for non-3GPP access path switching shall be provided to the upper layers if the UE receives the 5GS network feature support IE with the NAPS bit set to "non-3GPP access path switching not supported" the UE shall not perform the registration procedure for mobility registration update for non-3GPP access path switching

NOTE 16A if the UE is registered to different PLMNs over 3GPP and non-3GPP accesses the UE uses the capability received over non-3GPP access to determine whether to initiate the registration procedure for mobility registration update for non-3GPP path switching

the AMF shall set the EMF bit in the 5GS network feature support IE to

a) "Emergency services fallback supported in NR connected to 5GCN and E-UTRA connected to 5GCN" if the network supports the emergency services fallback procedure when the UE is in an NR cell connected to 5GCN or an E-UTRA cell connected to 5GCN;

b) "Emergency services fallback supported in NR connected to 5GCN only" if the network supports the emergency services fallback procedure when the UE is in an NR cell connected to 5GCN and does not support the emergency services fallback procedure when the UE is in an E-UTRA cell connected to 5GCN;

c) "Emergency services fallback supported in E-UTRA connected to 5GCN only" if the network supports the emergency services fallback procedure when the UE is in an E-UTRA cell connected to 5GCN and does not support the emergency services fallback procedure when the UE is in an NR cell connected to 5GCN; or

d) "Emergency services fallback not supported" if network does not support the emergency services fallback procedure when the UE is in any cell connected to 5GCN

NOTE 17 if the emergency services are supported in neither the EPS nor the 5GS homogeneously based onoperator policy the AMF will set the EMF bit in the 5GS network feature support IE to "Emergency services fallback not supported"

NOTE 18 even though the AMF's support of emergency services fallback is indicated per RAT the UE's support of emergency services fallback is not per RAT i.e the UE's support of emergency services fallback is the same for both NR connected to 5GCN and E-UTRA connected to 5GCN

if the UE indicates support for restriction on use of enhanced coverage in the REGISTRATION REQUEST message and

a) in WB-N1 mode the AMF decides to restrict the use of CE mode b for the UE then the AMF shall set the RestrictEC bit to "CE mode b is restricted";

b) in WB-N1 mode the AMF decides to restrict the use of both CE mode a and CE mode b for the UE then the AMF shall set the RestrictEC bit to " both CE mode a and CE mode b are restricted"; or

c) in NB-N1 mode the AMF decides to restrict the use of enhanced coverage for the UE then the AMF shall set the RestrictEC bit to "Use of enhanced coverage is restricted"

in the 5GS network feature support IE in the REGISTRATION ACCEPT message

access identity 1 is only applicable while the UE is in N1 mode access identity 2 is only applicable while the UE is in N1 mode

when the UE is registered to the same PLMN or SNPN over 3GPP and non-3GPP access the UE and the AMF maintain one MPS indicator and one MCS indicator that are common to both 3GPP and non-3GPP access when the UE is registered to different PLMNs or SNPNs over 3GPP access and non-3GPP access the UE maintains two MPS indicators and two MCS indicators separately for different accesses i.e. an MPS indicator and an MCS indicator for the 3GPP access and another MPS indicator and an MCS indicator for the non-3GPP access for both 3GPP and non-3GPP access the access identity is determined according to subclause 4.5.2

- if the UE is not operating in SNPN access operation mode

a) the network informs the UE that the use of access identity 1 is valid in the RPLMN or equivalent PLMN by setting the MPS indicator bit of the 5GS network feature support IE to "Access identity 1 valid" in the REGISTRATION ACCEPT message based on operator policy the AMF sets the MPS indicator bit in the REGISTRATION ACCEPT message based on the MPS priority information in the user's subscription context obtained from the UDM;

b) upon receiving a REGISTRATION ACCEPT message with the MPS indicator bit set to "Access identity 1 valid"

- via 3GPP access; or

- via non-3GPP access if the UE is registered to the same PLMN over 3GPP access and non-3GPP access;

the UE shall act as a UE with access identity 1 configured for MPS as described in subclause 4.5.2 in all NG-RAN of the registered PLMN and its equivalent PLMNs the MPS indicator bit in the 5GS network feature support IE provided in the REGISTRATION ACCEPT message is valid in all NG-RAN of the registered PLMN and its equivalent PLMNs until the UE receives a REGISTRATION ACCEPT message or a CONFIGURATION UPDATE COMMAND message with the MPS indicator bit set to "Access identity 1 not valid"

- via 3GPP access; or

- via non-3GPP access if the UE is registered to the same PLMN over 3GPP access and non-3GPP access; or

until the UE selects a non-equivalent PLMN over 3GPP access;

b1) upon receiving a REGISTRATION ACCEPT message with the MPS indicator bit set to "Access identity 1 valid"

- via non-3GPP access; or

- via 3GPP access if the UE is registered to the same PLMN over 3GPP access and non-3GPP access;

the UE shall act as a UE with access identity 1 configured for MPS as described in subclause 4.5.2 in non-3GPP access of the registered PLMN and its equivalent PLMNs the MPS indicator bit in the 5GS network feature support IE provided in the REGISTRATION ACCEPT message is valid in non-3GPP access of the registered PLMN and its equivalent PLMNs until the UE receives a REGISTRATION ACCEPT message or a CONFIGURATION UPDATE COMMAND message with the MPS indicator bit set to "Access identity 1 not valid"

- via non-3GPP access; or

- via 3GPP access if the UE is registered to the same PLMN over 3GPP access and non-3GPP access; or

until the UE selects a non-equivalent PLMN over non-3GPP access;

c) during ongoing active PDU sessions that were set up relying on the MPS indicator bit being set to "Access identity 1 valid" if the network indicates in a registration update that the MPS indicator bit is reset to "Access identity 1 not valid" then the UE shall no longer act as a UE with access identity 1 configured for MPS as described in subclause 4.5.2 unless the USIM contains a valid configuration for access identity 1 in RPLMN or equivalent PLMN in the UE the ongoing active PDU sessions are not affected by the change of the MPS indicator bit;

d) the network informs the UE that the use of access identity 2 is valid in the RPLMN or equivalent PLMN by setting the MCS indicator bit of the 5GS network feature support IE to "Access identity 2 valid" in the REGISTRATION ACCEPT message based on operator policy the AMF sets the MCS indicator bit in the REGISTRATION ACCEPT message based on the MCS priority information in the user's subscription context obtained from the UDM;

e) upon receiving a REGISTRATION ACCEPT message with the MCS indicator bit set to "Access identity 2 valid"

- via 3GPP access; or

- via non-3GPP access if the UE is registered to the same PLMN over 3GPP access and non-3GPP access;

the UE shall act as a UE with access identity 2 configured for MCS as described in subclause 4.5.2 in all NG-RAN of the registered PLMN and its equivalent PLMNs the MCS indicator bit in the 5GS network feature support IE provided in the REGISTRATION ACCEPT message is valid in all NG-RAN of the registered PLMN and its equivalent PLMNs until the UE receives a REGISTRATION ACCEPT message or a CONFIGURATION UPDATE COMMAND message with the MCS indicator bit set to "Access identity 2 not valid"

- via 3GPP access; or

- via non-3GPP access if the UE is registered to the same PLMN over 3GPP access and non-3GPP access; or

until the UE selects a non-equivalent PLMN over 3GPP access;

e1) upon receiving a REGISTRATION ACCEPT message with the MCS indicator bit set to "Access identity 2 valid"

- via non-3GPP access; or

- via 3GPP access if the UE is registered to the same PLMN over 3GPP access and non-3GPP access;

the UE shall act as a UE with access identity 2 configured for MCS as described in subclause 4.5.2 in non-3GPP access of the registered PLMN and its equivalent PLMNs the MCS indicator bit in the 5GS network feature support IE provided in the REGISTRATION ACCEPT message is valid in non-3GPP access of the registered PLMN and its equivalent PLMNs until the UE receives a REGISTRATION ACCEPT message or a CONFIGURATION UPDATE COMMAND message with the MCS indicator bit set to "Access identity 2 not valid"

- via non-3GPP access; or

- via 3GPP access if the UE is registered to the same PLMN over 3GPP access and non-3GPP access; or

until the UE selects a non-equivalent PLMN over non-3GPP access; and

f) during ongoing active PDU sessions that were set up relying on the MCS indicator bit being set to "Access identity 2 valid" if the network indicates in a registration update that the MCS indicator bit is reset to "Access identity 2 not valid" then the UE shall no longer act as a UE with access identity 2 configured for MCS as described in subclause 4.5.2 unless the USIM contains a valid configuration for access identity 2 in RPLMN or equivalent PLMN in the UE the ongoing active PDU sessions are not affected by the change of the MCS indicator bit; or

- if the UE is operating in SNPN access operation mode

a) the network informs the UE that the use of access identity 1 is valid in the RSNPN or equivalent SNPN by setting the MPS indicator bit of the 5GS network feature support IE to "Access identity 1 valid" in the REGISTRATION ACCEPT message based on operator policy the AMF sets the MPS indicator bit in the REGISTRATION ACCEPT message based on the MPS priority information in the user's subscription context obtained from the UDM;

b) upon receiving a REGISTRATION ACCEPT message with the MPS indicator bit set to "Access identity 1 valid"

- via 3GPP access; or

- via non-3GPP access if the UE is registered to the same SNPN over 3GPP access and non-3GPP access;

the UE shall act as a UE with access identity 1 configured for MPS as described in subclause 4.5.2A in all NG-RAN of the registered SNPN and its equivalent SNPNs the MPS indicator bit in the 5GS network feature support IE provided in the REGISTRATION ACCEPT message is valid in all NG-RAN of the registered SNPN and its equivalent SNPNs until the UE receives a REGISTRATION ACCEPT message or a CONFIGURATION UPDATE COMMAND message with the MPS indicator bit set to "Access identity 1 not valid"

- via 3GPP access; or

- via non-3GPP access if the UE is registered to the same SNPN over 3GPP access and non-3GPP access; or

until the UE selects a non-equivalent SNPN over 3GPP access;

b1) upon receiving a REGISTRATION ACCEPT message with the MPS indicator bit set to "Access identity 1 valid"

- via non-3GPP access; or

- via 3GPP access if the UE is registered to the same SNPN over 3GPP access and non-3GPP access;

the UE shall act as a UE with access identity 1 configured for MPS as described in subclause 4.5.2A in non-3GPP access of the registered SNPN and its equivalent SNPNs the MPS indicator bit in the 5GS network feature support IE provided in the REGISTRATION ACCEPT message is valid in non-3GPP access of the registered SNPN and its equivalent SNPNs until the UE receives a REGISTRATION ACCEPT message or a CONFIGURATION UPDATE COMMAND message with the MPS indicator bit set to "Access identity 1 not valid"

- via non-3GPP access; or

- via 3GPP access if the UE is registered to the same SNPN over 3GPP access and non-3GPP access; or

until the UE selects a non-equivalent SNPN over non-3GPP access;

c) during ongoing active PDU sessions that were set up relying on the MPS indicator bit being set to "Access identity 1 valid" if the network indicates in a registration update that the MPS indicator bit is reset to "Access identity 1 not valid" then the UE shall no longer act as a UE with access identity 1 configured for MPS as described in subclause 4.5.2A unless the unified access control configuration in the "list of subscriber data" stored in the ME (see 3GPP TS 23.122 [5]) indicates the UE is configured for access identity 1 in the RSNPN or equivalent SNPN in the UE the ongoing active PDU sessions are not affected by the change of the MPS indicator bit;

d) the network informs the UE that the use of access identity 2 is valid in the RSNPN or equivalent SNPN by setting the MCS indicator bit of the 5GS network feature support IE to "Access identity 2 valid" in the REGISTRATION ACCEPT message based on operator policy the AMF sets the MCS indicator bit in the REGISTRATION ACCEPT message based on the MCS priority information in the user's subscription context obtained from the UDM;

e) upon receiving a REGISTRATION ACCEPT message with the MCS indicator bit set to "Access identity 2 valid"

- via 3GPP access; or

- via non-3GPP access if the UE is registered to the same SNPN over 3GPP access and non-3GPP access;

the UE shall act as a UE with access identity 2 configured for MCS as described in subclause 4.5.2A in all NG-RAN of the registered SNPN and its equivalent SNPNs the MCS indicator bit in the 5GS network feature support IE provided in the REGISTRATION ACCEPT message is valid in all NG-RAN of the registered SNPN and its equivalent SNPNs until the UE receives a REGISTRATION ACCEPT message or a CONFIGURATION UPDATE COMMAND message with the MCS indicator bit set to "Access identity 2 not valid"

- via 3GPP access; or

- via non-3GPP access if the UE is registered to the same SNPN over 3GPP access and non-3GPP access; or

until the UE selects a non-equivalent SNPN;

e1) upon receiving a REGISTRATION ACCEPT message with the MCS indicator bit set to "Access identity 2 valid"

- via non-3GPP access; or

- via 3GPP access if the UE is registered to the same SNPN over 3GPP access and non-3GPP access;

the UE shall act as a UE with access identity 2 configured for MCS as described in subclause 4.5.2A in non-3GPP access of the registered SNPN and its equivalent SNPNs the MCS indicator bit in the 5GS network feature support IE provided in the REGISTRATION ACCEPT message is valid in non-3GPP access of the registered SNPN and its equivalent SNPNs until the UE receives a REGISTRATION ACCEPT message or a CONFIGURATION UPDATE COMMAND message with the MCS indicator bit set to "Access identity 2 not valid"

- via non-3GPP access; or

- via 3GPP access if the UE is registered to the same SNPN over 3GPP access and non-3GPP access; or

until the UE selects a non-equivalent SNPN over non-3GPP access; and

f) during ongoing active PDU sessions that were set up relying on the MCS indicator bit being set to "Access identity 2 valid" if the network indicates in a registration update that the MCS indicator bit is reset to "Access identity 2 not valid" then the UE shall no longer act as a UE with access identity 2 configured for MCS as described in subclause 4.5.2A unless the unified access control configuration in the "list of subscriber data" stored in the ME (see 3GPP TS 23.122 [5]) indicates the UE is configured for access identity 2 in the RSNPN or equivalent SNPN in the UE the ongoing active PDU sessions are not affected by the change of the MCS indicator bit

if the UE has set the Follow-on request indicator to "Follow-on request pending" in the REGISTRATION REQUEST message or the network has downlink signalling pending the AMF shall not immediately release the NAS signalling connection after the completion of the registration procedure

if the UE is authorized to use V2X communication over PC5 reference point based on

a) at least one of the following bits in the 5GMM capability IE of the REGISTRATION REQUEST message set by the UE or already stored in the 5GMM context in the AMF during the previous registration procedure as follows

1) the V2XCEPC5 bit to "V2X communication over E-UTRA-PC5 supported"; or

2) the V2XCNPC5 bit to "V2X communication over NR-PC5 supported"; and

b) the user's subscription context obtained from the UDM as defined in 3GPP TS 23.287 [6C];

the AMF should not immediately release the NAS signalling connection after the completion of the registration procedure

if the UE is authorized to use A2X communication over PC5 reference point based on

a) at least one of the following bits in the 5GMM capability IE of the REGISTRATION REQUEST message set by the UE or already stored in the 5GMM context in the AMF during the previous registration procedure as follows

1) the A2XEPC5 bit to "A2X over E-UTRA-PC5 supported"; or

2) the A2XNPC5 bit to "A2X over NR-PC5 supported"; and

b) the user's subscription context obtained from the UDM as defined in 3GPP TS 23.256 [6C];

the AMF should not immediately release the NAS signalling connection after the completion of the registration procedure

if the UE is authorized to use 5G ProSe services based on

a) at least one of the following bits in the 5GMM capability IE of the REGISTRATION REQUEST message set by the UE or already stored in the 5GMM context in the AMF during the previous registration procedure as follows

1) the 5G ProSe direct discovery bit to "5G ProSe direct discovery supported"; or

2) the 5G ProSe direct communication bit to "5G ProSe direct communication supported"; and

b) the user's subscription context obtained from the UDM as defined in 3GPP TS 23.304 [6E];

the AMF should not immediately release the NAS signalling connection after the completion of the registration procedure

if the UE indicates support of ranging and sidelink positioning in the REGISTRATION REQUEST message and the network supports and accepts the use of ranging and sidelink positioning the AMF shall set the ranging and sidelink positioning support bit to "Ranging and sidelink positioning supported" in the 5GS network feature support IE of the REGISTRATION ACCEPT message

if the UE has included the Non-3GPP path switching information IE in the REGISTRATION REQUEST message with the NSONR bit set to "non-3GPP path switching while using old non-3GPP resources requested" and the AMF supports non-3GPP path switching while using old non-3GPP resources the AMF shall not release the user plane resources of the old non-3GPP access of the PDU session(s) supporting non-3GPP access path switching and whose PDU session ID(s) are included in the uplink data status IE of the REGISTRATION REQUEST message until the user plane resources of the new non-3GPP access are established otherwise the AMF shall release the user plane resources of the old non-3GPP access before proceeding with the registration procedure

if the UE has triggered the registration procedure for mobility registration update for non-3GPP access path switching from the old non-3GPP access to the new non-3GPP access and the UE receives the REGISTRATION ACCEPT message over the new non-3GPP access the UE shall consider itself as de-registered for 5GS services over the old non-3GPP access

if the requested DRX parameters IE was included in the REGISTRATION REQUEST message the AMF shall include the negotiated DRX parameters IE in the REGISTRATION ACCEPT message and replace any stored negotiated DRX parameter and use it for the downlink transfer of signalling and user data the AMF may set the negotiated DRX parameters IE based on the received requested DRX parameters IE and operator policy if available

if the requested NB-N1 mode DRX parameters IE was included in the REGISTRATION REQUEST message and replace any stored negotiated NB-N1 mode DRX parameters and use it for the downlink transfer of signalling and user data in NB-N1 mode the AMF shall include the negotiated NB-N1 mode DRX parameters IE in the REGISTRATION ACCEPT message the AMF may set the negotiated NB-N1 mode DRX parameters IE based on the received requested NB-N1 mode DRX parameters IE and operator policy if available

the AMF shall include the negotiated extended DRX parameters IE in the REGISTRATION ACCEPT message only if the requested extended DRX parameters IE was included in the REGISTRATION REQUEST message and the AMF supports and accepts the use of eDRX the AMF may set the negotiated extended DRX parameters IE based on the received requested extended DRX parameters IE operator policy information from NG-RAN and the user's subscription context obtained from the UDM if available

if the network cannot derive the UE's identity from the 5G-GUTI because of e.g no matching identity/context in the network failure to validate the UE's identity due to integrity check failure of the received message the AMF may operate as described in subclause 5.5.1.2.4 and include a PDU session status IE indicating all PDU sessions are in 5GSM state PDU SESSION INACTIVE in the AMF if the UE included in the REGISTRATION REQUEST message the UE status IE with the EMM registration status set to "UE is in EMM-REGISTERED state" and the AMF does not support N26 interface the AMF shall operate as described in subclause 5.5.1.2.4

if the UE has indicated support for service gap control in the REGISTRATION REQUEST message a service gap time value is available in the 5GMM context the AMF may include the T3447 value IE set to the service gap time value in the REGISTRATION ACCEPT message

if the UE requests ciphering keys for ciphered broadcast assistance data in the REGISTRATION REQUEST message and the AMF has valid ciphering key data applicable to the UE's subscription and current tracking area then the AMF shall include the ciphering key data in the ciphering key data IE of the REGISTRATION ACCEPT message

if the UE supports WUS assistance information and the AMF supports and accepts the use of WUS assistance information for the UE then the AMF shall determine the negotiated UE paging probability information for the UE store it in the 5GMM context of the UE and if the UE does not have an active emergency PDU session the AMF shall include it in the negotiated WUS assistance information IE in the REGISTRATION ACCEPT message the AMF may consider the UE paging probability information received in the requested WUS assistance information IE when determining the negotiated UE paging probability information for the UE

NOTE 19 besides the UE paging probability information requested by the UE the AMF can take local configuration or previous statistical information for the UE into account when determining the negotiated UE paging probability information for the UE

if the UE sets the NR-PSSI bit to "NR paging subgrouping supported" in the 5GMM capability IE in the REGISTRATION REQUEST message and the AMF supports and accepts the use of PEIPS assistance information for the UE then the AMF shall determine the paging subgroup ID for the UE store it in the 5GMM context of the UE and include it in the negotiated PEIPS assistance information IE in the REGISTRATION ACCEPT message or in the updated PEIPS assistance information IE in the CONFIGURATION UPDATE COMMAND message as part of the registration procedure the AMF may consider the UE paging probability information received in the requested PEIPS assistance information IE when determining the paging subgroup ID for the UE

NOTE 20 besides the UE paging probability information when provided by the UE the AMF can also take local configuration whether the UE is likely to receive IMS voice over PS session calls UE mobility pattern or previous statistical information for the UE or information provided by the NG-RAN into account when determining the paging subgroup ID for the UE

if the UE sets the UN-PER bit to "unavailability period supported" in the 5GMM capability IE in the REGISTRATION REQUEST message and the AMF supports and accepts the use of unavailability period for the UE then the AMF shall set the UN-PER bit to "unavailability period supported" in the 5GS network feature support IE in the REGISTRATION ACCEPT message

if the UE sets the unavailability type to "unavailability due to UE reasons" in the unavailability information IE in the REGISTRATION REQUEST message then the AMF shall

a) set the unavailability period duration and the start of the unavailability period to the value provided by the UE and the AMF shall store the start of unavailability period value and the unavailability period duration when the time of the start of unavailability period arrives the AMF shall consider the UE as unreachable until the UE registers for normal service;

b) store the received unavailability period duration if any and the received start of unavailability period if any;

c) determine whether the UE is required to perform the registration procedure for mobility registration update when the unavailability period has ended and set the EUPR bit to "UE needs to report end of unavailability period" or "UE does not need to report end of unavailability period" in the unavailability configuration IE in the REGISTRATION ACCEPT message; and

d) release the signalling connection immediately after the completion of the registration procedure

if the UE sets the unavailability type to "unavailability due to discontinuous coverage" in the unavailability information IE and the UE provides the unavailability information IE in the REGISTRATION REQUEST message then

a) if the AMF is able to determine an unavailability period duration for the UE based on satellite coverage availability information (see 3GPP TS 23.401 [7]) and the value of the unavailability information IE in the REGISTRATION REQUEST message if available then the AMF shall store the determined unavailability period duration and provide the expected unavailability period duration to the UE by including the unavailability period duration in the unavailability configuration IE in the REGISTRATION ACCEPT message if the AMF is able to determine the start of the unavailability period based on satellite coverage availability information and the value of the unavailability information IE in the REGISTRATION REQUEST message if available then the AMF shall store the determined start of the unavailability period and provide the expected start of the unavailability period to the UE by including the start of the unavailability period in the unavailability configuration IE in the REGISTRATION ACCEPT message;

b1) the AMF shall determine the unavailability period duration value as

1) a value that was provided by the UE; or

2) a value that was determined by the AMF based on satellite coverage availability information;

b2) the AMF shall determine the start of the unavailability period value as

1) a value that was provided by the UE; or

2) a value that was determined by the AMF based on satellite coverage availability information; and

the AMF shall store the unavailability period duration and the start of unavailability period value when the unavailability period starts the AMF shall consider the UE as unreachable until the UE registers for normal service again; and

c) the AMF shall determine whether the UE is required to perform the registration procedure for mobility registration update in NG-RAN satellite access when the unavailability period has ended and set the EUPR bit to "UE needs to report end of unavailability period" or "UE does not need to report end of unavailability period" in the unavailability configuration IE in the REGISTRATION ACCEPT message

the AMF may determine the periodic registration update timer value based on the stored value of the received unavailability period duration if any the received start of unavailability period if any the network determined unavailability period duration if any and the network determined start of unavailability period if any if the UE does not provide the unavailability information IE in the REGISTRATION REQUEST message the AMF shall delete any stored value of the unavailability information IE if exists

if the 5GS registration type IE in the REGISTRATION REQUEST message indicates "periodic registration updating" the AMF shall not incude the unavailability configuration IE in the REGISTRATION ACCEPT message

if the UE receives the unavailability configuration IE with a value of the unavailability period duration in the REGISTRATION ACCEPT message then the UE may either

a) delete a UE determined value and start using the received value; or

b) use a UE determined value

if the UE receives the unavailability configuration IE with a value of the start of the unavailability period in the REGISTRATION ACCEPT message then the UE may either

a) delete a UE determined value and start using the received value; or

b) use a UE determined value

NOTE 20a the UE can consider the received value from the network when determining the value for unavailability period duration and the start of the unavailability period

if the UE has stored a value of the unavailability period duration and receives the unavailability configuration IE without a value of the unavailability period duration in the REGISTRATION ACCEPT message then the UE may use a UE determined value

if the UE has stored a value of the start of the unavailability period and receives the unavailability configuration IE without a value of the start of the unavailability period in the REGISTRATION ACCEPT message then the UE may use a UE determined value

if due to regional subscription restrictions or access restrictions the UE is not allowed to access the TA or due to CAG restrictions the UE is not allowed to access the cell but the UE has an emergency PDU session established the AMF may accept the REGISTRATION REQUEST message and indicate to the SMF to perform a local release of all non-emergency PDU sessions (associated with 3GPP access if it is due to CAG restrictions) and informs the UE via the PDU session status IE in the REGISTRATION ACCEPT message the AMF shall not indicate to the SMF to release the emergency PDU session if the AMF indicated to the SMF to perform a local release of all non-emergency PDU sessions (associated with 3GPP access if it is due to CAG restrictions) the network shall behave as if the UE is registered for emergency services and shall set the emergency registered bit of the 5GS registration result IE to "Registered for emergency services" in the REGISTRATION ACCEPT message

if the REGISTRATION ACCEPT message includes the PDU session reactivation result error cause IE with the 5GMM cause set to #28 "Restricted service area" the UE shall enter the state 5GMM-REGISTERED.NON-ALLOWED-SERVICE and behave as specified in subclause 5.3.5

if the REGISTRATION ACCEPT message includes the SOR transparent container IE and

a) the SOR transparent container IE does not successfully pass the integrity check (see 3GPP TS 33.501 [24]); and

b) if the UE attempts obtaining service on another PLMNs or SNPNs as specified in 3GPP TS 23.122 [5] annex C;

then the UE shall release locally the established NAS signalling connection after sending a REGISTRATION COMPLETE message

if the REGISTRATION ACCEPT message includes the SOR transparent container IE and the SOR transparent container IE successfully passes the integrity check (see 3GPP TS 33.501 [24]) the ME shall store the received SOR counter as specified in annex c and proceed as follows

a) the UE shall proceed with the behaviour as specified in 3GPP TS 23.122 [5] annex C; and

b) if the registration procedure is performed over 3GPP access and the UE attempts obtaining service on another PLMNs or SNPNs as specified in 3GPP TS 23.122 [5] annex c then the UE may release locally the established NAS signalling connection after sending a REGISTRATION COMPLETE message otherwise the UE shall send a REGISTRATION COMPLETE message and not release the current N1 NAS signalling connection locally if an acknowledgement is requested in the SOR transparent container IE of the REGISTRATION ACCEPT message the UE acknowledgement is included in the SOR transparent container IE of the REGISTRATION COMPLETE message in the SOR transparent container IE carrying the acknowledgement the UE shall set the ME support of SOR-CMCI indicator to "SOR-CMCI supported by the ME" additionally if the UE supports access to an SNPN using credentials from a credentials holder and the UE is not operating in SNPN access operation mode the UE may set the ME support of SOR-SNPN-SI indicator to "SOR-SNPN-SI supported by the ME" additionally if the UE supports access to an SNPN providing access for localized services in SNPN the UE shall set the ME support of SOR-SNPN-SI-LS indicator to "SOR-SNPN-SI-LS supported by the ME"

if the SOR transparent container IE successfully passes the integrity check (see 3GPP TS 33.501 [24]) and

a) the SOR transparent container IE indicates a list of preferred PLMN/access technology combinations is provided and the list type indicates "PLMN ID and access technology list" then the ME shall replace the highest priority entries in the "Operator controlled PLMN selector with access Technology" list stored in the ME and shall proceed with the behaviour as specified in 3GPP TS 23.122 [5] annex c

if the SOR-CMCI is present and the store SOR-CMCI in ME indicator is set to "Store SOR-CMCI in ME" then the UE shall store or delete the SOR-CMCI in the non-volatile memory of the ME as described in annex C.1;

b) the list type indicates "secured packet" then the ME shall behave as if a SMS is received with protocol identifier set to SIM data download data coding scheme set to class 2 message and SMS payload as secured packet contents of SOR transparent container IE the SMS payload is forwarded to UICC as specified in 3GPP TS 23.040 [4A]; or

c) the SOR transparent container IE indicates "HPLMN indication that 'no change of the "Operator controlled PLMN selector with access Technology" list stored in the UE is needed and thus no list of preferred PLMN/access technology combinations is provided'" the UE operates in SNPN access operation mode and the SOR transparent container IE includes SOR-SNPN-SI the ME shall replace SOR-SNPN-SI of the selected entry of the "list of subscriber data" or associated with the selected PLMN subscription as specified in 3GPP TS 23.122 [5] with the received SOR-SNPN-SI additionally if the SOR transparent container IE includes SOR-SNPN-SI-LS the ME shall replace SOR-SNPN-SI-LS of the selected entry of the "list of subscriber data" or associated with the selected PLMN subscription as specified in 3GPP TS 23.122 [5] with the received SOR-SNPN-SI-LS

if the SOR-CMCI is present and the store SOR-CMCI in ME indicator is set to "Store SOR-CMCI in ME" then the UE shall store or delete the SOR-CMCI in the non-volatile memory of the ME as described in sbuclause C.1;

and the UE shall proceed with the behaviour as specified in 3GPP TS 23.122 [5] annex c

if the SOR transparent container IE does not pass the integrity check successfully then the UE shall discard the content of the SOR transparent container IE

if required by operator policy the AMF shall include the NSSAI inclusion mode IE in the REGISTRATION ACCEPT message (see table 4.6.2.3.1 of subclause 4.6.2.3) upon receipt of the REGISTRATION ACCEPT message

a) if the message includes the NSSAI inclusion mode IE the UE shall operate in the NSSAI inclusion mode indicated in the NSSAI inclusion mode IE over the current access within the current PLMN and its equivalent PLMN(s) if any or the current SNPN in the current registration area; or

b) otherwise

1) if the UE has NSSAI inclusion mode for the current PLMN or SNPN and access type stored in the UE the UE shall operate in the stored NSSAI inclusion mode;

2) if the UE does not have NSSAI inclusion mode for the current PLMN or SNPN and the access type stored in the UE and if the UE is performing the registration procedure over

i) 3GPP access the UE shall operate in NSSAI inclusion mode d in the current PLMN or SNPN and the current access type;

ii) untrusted non-3GPP access the UE shall operate in NSSAI inclusion mode c in the current PLMN and the current access type; or

iii) trusted non-3GPP access the UE shall operate in NSSAI inclusion mode d in the current PLMN and the current access type; or

3) if the 5G-RG does not have NSSAI inclusion mode for the current PLMN and wireline access stored in the 5G-RG and the 5G-RG is performing the registration procedure over wireline access the 5G-RG shall operate in NSSAI inclusion mode b in the current PLMN and the current access type

the AMF may include operator-defined access category definitions in the REGISTRATION ACCEPT message

if there is a running T3447 timer in the AMF and the uplink data status IE is included or the Follow-on request indicator is set to "Follow-on request pending" in the REGISTRATION REQUEST message the AMF shall ignore the uplink data status IE or that the Follow-on request indicator is set to "Follow-on request pending" and proceed as if the uplink data status IE was not received or the Follow-on request indicator was not set to "Follow-on request pending" except for the following case

- the PDU session indicated by the uplink data status IE is emergency PDU session;

- the UE is configured for high priority access in selected PLMN;

- the REGISTRATION REQUEST message is as a paging response; or

- the UE is establishing an emergency PDU session or performing emergency services fallback

if the UE receives Operator-defined access category definitions IE in the REGISTRATION ACCEPT message and the Operator-defined access category definitions IE contains one or more operator-defined access category definitions the UE shall delete any operator-defined access category definitions stored for the RPLMN and shall store the received operator-defined access category definitions for the RPLMN if the UE receives the Operator-defined access category definitions IE in the REGISTRATION ACCEPT message and the Operator-defined access category definitions IE contains no operator-defined access category definitions the UE shall delete any operator-defined access category definitions stored for the RPLMN if the REGISTRATION ACCEPT message does not contain the Operator-defined access category definitions IE the UE shall not delete the operator-defined access category definitions stored for the RPLMN

if the UE has indicated support for service gap control in the REGISTRATION REQUEST message and

- the REGISTRATION ACCEPT message contains the T3447 value IE then the UE shall store the new T3447 value erase any previous stored T3447 value if exists and use the new T3447 value with the timer T3447 next time it is started; or

- the REGISTRATION ACCEPT message does not contain the T3447 value IE then the UE shall erase any previous stored T3447 value if exists and stop the timer T3447 if running

if the REGISTRATION ACCEPT message contains the truncated 5G-S-TMSI configuration IE then the UE shall store the included truncated 5G-S-TMSI configuration and return a REGISTRATION COMPLETE message to the AMF to acknowledge reception of the truncated 5G-S-TMSI configuration

NOTE 21 the UE provides the truncated 5G-S-TMSI configuration to the lower layers

if the UE is not in NB-N1 mode the UE has set the RACS bit to "RACS supported" in the 5GMM capability IE of the REGISTRATION REQUEST message and the REGISTRATION ACCEPT message includes

a) a UE radio capability ID deletion indication IE set to "Network-assigned UE radio capability IDs deletion requested" the UE shall delete any network-assigned UE radio capability IDs associated with the RPLMN or RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the selected entry of the "list of subscriber data" or the selected PLMN subscription stored at the UE then the UE shall initiate a registration procedure for mobility and periodic registration update as specified in subclause 5.5.1.3.2 over the existing N1 NAS signalling connection; or

b) a UE radio capability ID IE the UE shall store the UE radio capability ID as specified in annex c

if the registration procedure for mobility and periodic registration update was initiated and there is a request from the upper layers to perform "emergency services fallback" pending the UE shall restart the service request procedure after the successful completion of the mobility and periodic registration update

when AMF re-allocation occurs in the registration procedure for mobility and periodic registration update if the new AMF receives in the 5GMM context of the UE the indication that the UE is registered for onboarding services in SNPN the new AMF may start an implementation specific timer for onboarding services when the registration procedure for mobility and periodic registration update is successfully completed

if the UE has included the service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE of the REGISTRATION REQUEST message and the REGISTRATION ACCEPT message contains the service-level-AA pending indication in the Service-level-AA container IE the UE shall return a REGISTRATION COMPLETE message to the AMF to acknowledge reception of the service-level-AA pending indication and the UE shall not attempt to perform another registration procedure for UAS services until the UUAA-MM procedure is completed or to establish a PDU session for USS communication or a PDU session for C2 communication until the UUAA-MM procedure is completed successfully

if the UE has included the service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE of the REGISTRATION REQUEST message and the REGISTRATION ACCEPT message does not contain the service-level-AA pending indication in the Service-level-AA container IE the UE shall consider the UUAA-MM procedure is not triggered

if the UE is registered for onboarding services in SNPN or the network determines that the UE's subscription only allows for configuration of SNPN subscription parameters in PLMN via the user plane the AMF may start an implementation specific timer for onboarding services if not running already when the network considers that the UE is in 5GMM-REGISTERED (i.e the network receives the REGISTRATION COMPLETE message from UE)

NOTE 22 if the AMF considers that the UE is in 5GMM-IDLE when the implementation specific timer for onboarding services expires and the network considers that the UE is still in state 5GMM-REGISTERED the AMF can locally de-register the UE; or if the UE is in 5GMM-CONNECTED the AMF can initiate the network-initiated de-registration procedure (see subclause 5.5.2.3)

NOTE 23 the value of the implementation specific timer for onboarding services needs to be large enough to allow a UE to complete the configuration of one or more entries of the "list of subscriber data" taking into consideration that configuration of SNPN subscription parameters in PLMN via the user plane or onboarding services in SNPN involves third party entities outside of the operator's network

if the UE receives the list of PLMNs to be used in disaster condition IE in the REGISTRATION ACCEPT message and the UE supports MINT the UE shall delete the "list of PLMN(s) to be used in disaster condition" stored in the ME together with the PLMN ID of the RPLMN if any and may store the "list of PLMN(s) to be used in disaster condition" included in the list of PLMNs to be used in disaster condition IE in the ME together with the PLMN ID of the RPLMN

if the UE receives the disaster roaming wait range IE in the REGISTRATION ACCEPT message and the UE supports MINT the UE shall delete the disaster roaming wait range stored in the ME if any and store the disaster roaming wait range included in the disaster roaming wait range IE in the ME

if the UE receives the disaster return wait range IE in the REGISTRATION ACCEPT message and the UE supports MINT the UE shall delete the disaster return wait range stored in the ME if any and store the disaster return wait range stored included in the disaster return wait range IE in the ME

if the 5GS registration type IE is set to "disaster roaming mobility registration updating" and

a) the UE determined PLMN with disaster condition IE is included in the REGISTRATION REQUEST message the AMF shall determine the PLMN with disaster condition in the UE determined PLMN with disaster condition IE;

b) the UE determined PLMN with disaster condition IE is not included in the REGISTRATION REQUEST message and the additional GUTI IE is included in the REGISTRATION REQUEST message and contains 5G-GUTI of a PLMN of the country of the PLMN providing disaster roaming the AMF shall determine the PLMN with disaster condition in the PLMN identity of the 5G-GUTI;

c) the UE determined PLMN with disaster condition IE and the additional GUTI IE are not included in the REGISTRATION REQUEST message and

1) the 5GS mobile identity IE contains 5G-GUTI of a PLMN of the country of the PLMN providing disaster roaming the AMF shall determine the PLMN with disaster condition in the PLMN identity of the 5G-GUTI; or

2) the 5GS mobile identity IE contains SUCI of a PLMN of the country of the PLMN providing disaster roaming the AMF shall determine the PLMN with disaster condition in the PLMN identity of the SUCI; or

d) the UE determined PLMN with disaster condition IE is not included in the REGISTRATION REQUEST message NG-RAN of the PLMN providing disaster roaming broadcasts disaster roaming indication and

- the additional GUTI IE is included in the REGISTRATION REQUEST message and contains 5G-GUTI of a PLMN of a country other than the country of the PLMN providing disaster roaming; or

- the additional GUTI IE is not included and the 5GS mobile identity IE contains 5G-GUTI or SUCI of a PLMN of a country other than the country of the PLMN providing disaster roaming;

the AMF shall determine the PLMN with disaster condition based on the disaster roaming agreement arrangement between mobile network operators

NOTE 24 the disaster roaming agreement arrangement between mobile network operators is out scope of 3GPP

if the AMF determines that a disaster condition applies to the PLMN with disaster condition and the UE is allowed to be registered for disaster roaming services the AMF shall set the disaster roaming registration result value bit in the 5GS registration result IE to "no additional information" in the REGISTRATION ACCEPT message if the AMF determines that the UE can be registered to the PLMN for normal service the AMF shall set the disaster roaming registration result value bit in the 5GS registration result IE to "request for registration for disaster roaming service accepted as registration not for disaster roaming service" in the REGISTRATION ACCEPT message

if the UE indicates "disaster roaming mobility registration updating" in the 5GS registration type IE in the REGISTRATION REQUEST message and the 5GS registration result IE value in the REGISTRATION ACCEPT message is set to

- "request for registration for disaster roaming service accepted as registration not for disaster roaming service" the UE shall consider itself registered for normal service if the PLMN identity of the registered PLMN is a member of the forbidden PLMN list as specified in subclause 5.3.13A any such PLMN identity shall be deleted from the corresponding list(s) if UE supports S1 mode the UE shall initiate the registration procedure for mobility and periodic registration update and indicate that S1 mode is supported as described in subclause 5.5.1.3.2; or

- "no additional information" the UE shall consider itself registered for disaster roaming

if the UE receives the forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" IE in the REGISTRATION ACCEPT message and the TAI(s) included in the IE is not part of the list of "5GS forbidden tracking areas for roaming" the UE shall store the TAI(s) belonging to the serving PLMN or equivalent PLMN(s) and ignore the TAI(s) which do not belong to the serving PLMN or equivalent PLMN(s) included in the IE into the list of "5GS forbidden tracking areas for roaming" and remove the TAI(s) from the stored TAI list if present

if the UE receives the forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service" IE in the REGISTRATION ACCEPT message and the TAI(s) included in the IE is not part of the list of "5GS forbidden tracking areas for regional provision of service" the UE shall store the TAI(s) belonging to the serving PLMN or equivalent PLMN(s) and ignore the TAI(s) which do not belong to the serving PLMN or equivalent PLMN(s) included in the IE into the list of "5GS forbidden tracking areas for regional provision of service" and remove the TAI(s) from the stored TAI list if present

if the ESI bit of the 5GMM capability IE of the REGISTRATION REQUEST message is set to "equivalent SNPNs supported" and the serving SNPN changes the AMF shall indicate the NID of the serving SNPN in the REGISTRATION ACCEPT message the UE shall determine the SNPN identity of the RSNPN from the NID received in the REGISTRATION ACCEPT message and the MCC and the MNC of the new 5G-GUTI

if the UE supporting the reconnection to the network due to RAN timing synchronization status change receives the RAN timing synchronization IE with the RecReq bit set to "Reconnection requested" in the REGISTRATION ACCEPT message the UE shall operate as specified in subclauses 5.3.1.4 5.5.1.3.2 and 5.6.1.1

if the UE supports discontinuous coverage the AMF may include the discontinuous coverage maximum time offset IE in the REGISTRATION ACCEPT message

if the UE receives the discontinuous coverage maximum time offset IE in the REGISTRATION ACCEPT message the UE shall replace any previously received maximum time offset value on the same satellite NG-RAN RAT type and PLMN with the latest received timer value

if the AMF includes unavailability configuration IE in the REGISTRATION ACCEPT message and sets the EUPR bit to "UE does not need to report end of unavailability period" the UE is not required to initiate the registration procedure for mobility registration update when the unavailability period duration has ended if the UE does not receive the unavailability configuration IE or the EUPR bit is set to "UE needs to report end of unavailability period" the UE shall trigger registration procedure for mobility registration update as specified in subclause 5.3.26

if the UE operating as MBSR receives the MBSRAI field of the feature authorization indication IE in the REGISTRATION ACCEPT message the UE NAS layer informs the lower layers of the status of MBSR authorization as specified in subclause 5.35A.4 of 3GPP TS 23.501 [8]

if the UE indicates support of the RAT utilization control in the REGISTRATION REQUEST message over 3GPP access and the network decides to apply the RAT utilization control the AMF shall include the RAT utilization control IE in the REGISTRATION ACCEPT message in the RAT utilization control IE the AMF shall not indicate that the access technology of the NG-RAN cell on which the REGISTRATION REQUEST message was received is restricted if the REGISTRATION ACCEPT message received over 3GPP access contains the RAT utilization control IE the UE shall store the received RAT utilization control information together with the PLMN identity of the current PLMN in the list of "PLMNs with associated RAT restrictions" and replace the previously stored one associated with the current PLMN if any with the newly received RAT utilization control information otherwise if the UE indicated support of the RAT utilization control in the REGISTRATION REQUEST message and the REGISTRATION ACCEPT message does not contain the RAT utilization control IE the UE shall delete the stored RAT utilization control information associated with the current PLMN if any

##### 5.5.1.3.5 mobility and periodic registration update not accepted by the network

if the mobility and periodic registration update request cannot be accepted by the network the AMF shall send a REGISTRATION REJECT message to the UE including an appropriate 5GMM cause value

if the mobility and periodic registration update request is rejected due to general NAS level mobility management congestion control the network shall set the 5GMM cause value to #22 "congestion" and assign a value for back-off timer T3346

if the mobility and periodic registration update request is rejected due to general NAS level mobility management congestion control for an SNPN providing access localized services in SNPN the network may set an appropriate cause value other than 5GMM cause value to #22 "congestion" and does not assign a value for back-off timer T3346

in NB-N1 mode if the mobility and periodic registration update request is rejected due to operator determined barring (see 3GPP TS 29.503 [20AB]) the network shall set the 5GMM cause value to #22 "congestion" and assign a value for back-off timer T3346

when the UE performs inter-system change from S1 mode to N1 mode if the AMF is informed that verification of the integrity protection of the TRACKING AREA UPDATE REQUEST message included by the UE in the EPS NAS message container IE of the REGISTRATION REQUEST message has failed in the MME then

a) if the AMF can retrieve the current 5G NAS security context as indicated by the ngKSI and 5G-GUTI sent by the UE the AMF shall proceed as specified in subclause 5.5.1.3.4;

b) if the AMF cannot retrieve the current 5G NAS security context as indicated by the ngKSI and 5G-GUTI sent by the UE or the ngKSI or 5G-GUTI was not sent by the UE the AMF may initiate the identification procedure by sending the IDENTITY REQUEST message with the "Type of identity" of the 5GS identity type IE set to "SUCI" before taking actions as specified in subclause 4.4.4.3; or

c) if the AMF needs to reject the mobility and periodic registration update procedure the AMF shall send REGISTRATION REJECT message including 5GMM cause #9 "UE identity cannot be derived by the network"

if the REGISTRATION REJECT message with 5GMM cause #76 or #78 was received without integrity protection then the UE shall discard the message if the REGISTRATION REJECT message with 5GMM cause #62 was received without integrity protected the behaviour of the UE is specified in subclause 5.3.20.2

based on operator policy if the mobility and periodic registration update request is rejected due to core network redirection for CIoT optimizations the network shall set the 5GMM cause value to #31 "Redirection to EPC required"

NOTE 1 the network can take into account the UE's S1 mode capability the EPS CIoT network behaviour supported by the UE or the EPS CIoT network behaviour supported by the EPC to determine the rejection with the 5GMM cause value #31 "Redirection to EPC required"

if the mobility and periodic registration update request is rejected because

a) all the S-NSSAI(s) included in the requested NSSAI (i.e requested NSSAI IE or requested mapped NSSAI IE) are rejected;

b) the UE set the NSSAA bit in the 5GMM capability IE to

1) "Network slice-specific authentication and authorization supported" and;

i) void;

ii) all default S-NSSAIs are not allowed; or

iii) network slice-specific authentication and authorization has failed or been revoked for all default S-NSSAIs and based on network local policy the network decides not to initiate the network slice-specific re-authentication and re-authorization procedures for any default S-NSSAI requested by the UE; or

2) "Network slice-specific authentication and authorization not supported" and all subscribed default S-NSSAIs marked as default are either not allowed or are subject to network slice-specific authentication and authorization; and

i) void; or

ii) void; and

c) no emergency PDU session has been established for the UE;

the network shall set the 5GMM cause value of the REGISTRATION REJECT message to #62 "No network slices available" and shall include in the rejected NSSAI of the REGISTRATION REJECT message all the S-NSSAI(s) which were included in the requested NSSAI

if the UE has set the ER-NSSAI bit to "Extended rejected NSSAI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message the rejected S-NSSAI(s) shall be included in the extended rejected NSSAI IE of the REGISTRATION REJECT message otherwise the rejected S-NSSAI(s) shall be included in the rejected NSSAI IE of the REGISTRATION REJECT message

in roaming scenarios if the extended rejected NSSAI IE is included in the REGISTRATION REJECT message the AMF shall provide mapped S-NSSAI(s) for the rejected NSSAI

if the UE supports extended rejected NSSAI and the AMF determines that maximum number of UEs reached for one or more S-NSSAI(s) in the requested NSSAI as specified in subclause 4.6.2.5 the AMF shall include the rejected NSSAI containing one or more S-NSSAIs with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" in the extended rejected NSSAI IE in the REGISTRATION REJECT message in addition the AMF may include a back-off timer value for each S-NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" in the extended rejected NSSAI IE of the REGISTRATION REJECT message

if the mobility and periodic registration update request from a UE supporting CAG is rejected due to CAG restrictions the network shall set the 5GMM cause value to #76 "Not authorized for this CAG or authorized for CAG cells only" and should include the "CAG information list" in the CAG information list IE or the extended CAG information list IE in the REGISTRATION REJECT message

NOTE 2 the network cannot be certain that "CAG information list" stored in the UE is updated as result of sending of the REGISTRATION REJECT message with the CAG information list IE or the extended CAG information list IE as the REGISTRATION REJECT message is not necessarily delivered to the UE (e.g due to abnormal radio conditions)

NOTE 3 the "CAG information list" can be provided by the AMF and include no entry if no "CAG information list" exists in the subscription

NOTE 3A if the UE supports extended CAG information list the CAG information list can be included either in the CAG information list IE or extended CAG information list IE

NOTE 3B it is unexpected for network to send REGISTRATION REJECT message to the UE with 5GMM cause value #76 in non-CAG cell and not indicate "Indication that the UE is only allowed to access 5GS via CAG cells" for the serving PLMN in the extended CAG information list or the CAG information list

if the UE does not support extended CAG information list the CAG information list shall not be included in the extended CAG information list IE

if the mobility and periodic registration update request from a UE not supporting CAG is rejected due to CAG restrictions the network shall operate as described in bullet i) of subclause 5.5.1.3.8

if the UE's mobility and periodic registration update request is via a satellite NG-RAN cell and the network determines that the UE is in a location where the network is not allowed to operate see 3GPP TS 23.502 [9] the network shall set the 5GMM cause value in the REGISTRATION REJECT message to #78 "PLMN not allowed at the present UE location"

NOTE 4 when the UE is accessing network for emergency services it is up to operator and regulatory policies whether the network needs to determine if the UE is in a location where network is not allowed to operate

NOTE 4A while location determination is ongoing to ensure that operator and regulatory policies are met the AMF can perform DNN-based or S-NSSAI based congestion control as specified in subclauses 5.3.10 and 5.3.11 to prevent the UE from accessing network

if the AMF receives the mobility and periodic registration update request including the service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE and the AMF determines that the UE is not allowed to use UAS services via 5GS based on the user's subscription data and the operator policy the AMF shall return a REGISTRATION REJECT message with 5GMM cause #79 “UAS services not allowed”

if the mobility and periodic registration update request from a UE supporting MINT is rejected due to a disaster condition no longer being applicable in the current location of the UE the network shall set the 5GMM cause value to #11 "PLMN not allowed" or #13 "Roaming not allowed in this tracking area" and may include a disaster return wait range in the disaster return wait range IE in the REGISTRATION REJECT message

if the UE initiates the registration procedure for disaster roaming and the AMF determines that it does not support providing disaster roaming services for the determined PLMN with disaster condition to the UE then the AMF shall send a REGISTRATION REJECT message with 5GMM cause #80 “Disaster roaming for the determined PLMN with disaster condition not allowed”

if the AMF receives the mobility and periodic registration update request over non-3GPP access and detects that the N3IWF used by the UE is not compatible with the allowed NSSAI and the UE has indicated its support for slice-based N3IWF selection in the REGISTRATION REQUEST message the AMF may send a REGISTRATION REJECT message with 5GMM cause #81 "Selected N3IWF is not compatible with the allowed NSSAI" and may provide information for a suitable N3IWF in the REGISTRATION REJECT message indicating the suitable N3IWF that is compatible with the requested NSSAI

if the AMF receives the mobility and periodic registration update request over non-3GPP access and detects that the TNGF used by the UE is not compatible with the allowed NSSAI and the UE has indicated its support for slice-based TNGF selection in the REGISTRATION REQUEST message the AMF may send a REGISTRATION REJECT message with 5GMM cause #82 "Selected TNGF is not compatible with the allowed NSSAI" and may provide information for a suitable TNAN in the TNAN information IE in the REGISTRATION REJECT message indicating the suitable TNGF that is compatible with the requested NSSAI

if the AMF received multiple TAIs from the satellite NG-RAN as described in 3GPP TS 23.501 [8] and determines that by UE subscription and operator's preferences all of the received TAIs are forbidden for roaming or for regional provision of service the AMF shall include the TAI(s) in

a) the forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" IE; or

b) the forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service" IE; or

c) both;

in the REGISTRATION REJECT message

regardless of the 5GMM cause value received in the REGISTRATION REJECT message via satellite NG-RAN

- if the UE receives the forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" IE in the REGISTRATION REJECT message and if the TAI(s) included in the IE is not part of the list of "5GS forbidden tracking areas for roaming" the UE shall store the TAI(s) belonging to the serving PLMN or equivalent PLMN(s) and ignore the TAI(s) which do not belong to the serving PLMN or equivalent PLMN(s) included in the IE if not already stored into the list of "5GS forbidden tracking areas for roaming"; and

- if the UE receives the forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service" IE in the REGISTRATION REJECT message and if the TAI(s) included in the IE is not part of the list of "5GS forbidden tracking areas for regional provision of service" the UE shall store the TAI(s) belonging to the serving PLMN or equivalent PLMN(s) and ignore the TAI(s) which do not belong to the serving PLMN or equivalent PLMN(s) included in the IE if not already stored into the list of "5GS forbidden tracking areas for regional provision of service"

in a shared network the UE shall construct the TAI of the cell from one of the PLMN identities as specified in 3GPP TS 23.122 [5] and the TAC received on the broadcast system information whenever a REGISTRATION REJECT message is received by the UE

- with the 5GMM cause #11 "PLMN not allowed" #36 "IAB-node operation not authorized" or #73 "Serving network not authorized" the chosen PLMN identity shall be stored in the "forbidden PLMN list" and if the UE is configured to use timer T3245 (see 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22]) then the UE shall start timer T3245 and proceed as described in subclause 5.3.19A;

- with the 5GMM cause #12 "tracking area not allowed" #13 "roaming not allowed in this tracking area" #15 "no suitable cells in tracking Area" or #62 "No network slices available" the constructed TAI shall be stored in the suitable list; or

- as a response to registration procedure for mobility registration update initiated in 5GMM-CONNECTED mode the UE need not update forbidden lists with the selected PLMN identity or the constructed TAI respectively

in a shared network the UE shall construct the TAI of the cell from one of the SNPN identities as specified in 3GPP TS 23.122 [5] constructing the TAI from the PLMN identity part of the SNPN identity and the TAC received on the broadcast system information whenever a REGISTRATION REJECT message is received by the UE

- with the 5GMM cause #36 "IAB-node operation not authorized" or #74 "Temporarily not authorized for this SNPN" the chosen SNPN identity shall be stored in the "temporarily forbidden SNPNs" list "temporarily forbidden SNPNs for access for localized services in SNPN" list if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) or "temporarily forbidden SNPNs for onboarding services in SNPN" list if the UE is registered for onboarding services in SNPN and if the UE is configured to use timer T3245 (see 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22]) then the UE shall start timer T3245 and proceed as described in subclause 5.3.19A;

- with the 5GMM cause #75 "Permanently not authorized for this SNPN" the chosen SNPN identity shall be stored in the "permanently forbidden SNPNs" "permanently forbidden SNPNs for access for localized services in SNPN" list if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) for the selected entry of the "list of subscriber data" or the selected PLMN subscription or "permanently forbidden SNPNs for onboarding services in SNPN" if the UE is registered for onboarding services in SNPN and if the UE is configured to use timer T3245 (see 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22]) then the UE shall start timer T3245 and proceed as described in subclause 5.3.19A;

- with the 5GMM cause #12 "tracking area not allowed" #13 "roaming not allowed in this tracking area" #15 "no suitable cells in tracking Area" or #62 "No network slices available" the constructed TAI shall be stored in the suitable list; or

- as a response to registration procedure for mobility registration update initiated in 5GMM-CONNECTED mode the UE need not update forbidden lists with the selected SNPN identity or the constructed TAI respectively

if

a) the UE indicates support of the RAT utilization control in the REGISTRATION REQUEST message over 3GPP access;

b) the network decides to apply the RAT utilization control based on the operator policy and

c) the secure exchange of NAS messages via a NAS signalling connection is established between the UE and the AMF;

the AMF shall send the integrity protected REGISTRATION REJECT message with the 5GMM cause value set to #15 "No suitable cells in tracking area" and include the RAT utilization control IE in the RAT utilization control IE the AMF shall indicate that the access technology of the NG-RAN cell on which the REGISTRATION REQUEST message was received is restricted

NOTE 4B other restricted access technologies can be indicated in the RAT utilization control IE if any

furthermore the UE shall take the following actions depending on the 5GMM cause value received in the REGISTRATION REJECT message

#3 (Illegal UE); or

#6 (Illegal ME)

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list and ngKSI

in case of PLMN the UE shall consider the USIM as invalid for 5GS services until switching off the UICC containing the USIM is removed or the timer T3245 expires as described in subclause 5.3.19a.1

in case of SNPN if the UE is not registered for onboarding services in SNPN and the UE does not support access to an SNPN using credentials from a credentials holder and does not support equivalent SNPNs the UE shall consider the selected entry of the "list of subscriber data" with the SNPN identity of the current SNPN as invalid until the UE is switched off the entry is updated or the timer T3245 expires as described in subclause 5.3.19a.2 in case of SNPN if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the UE shall consider the selected entry of the "list of subscriber data" as invalid for 3GPP access until the UE is switched off the entry is updated or the timer T3245 expires as described in subclause 5.3.19a.2 additionally if EAP based primary authentication and key agreement procedure using EAP-AKA' or 5G AKA based primary authentication and key agreement procedure was performed in the current SNPN the UE shall consider the USIM as invalid for the current SNPN until switching off the UICC containing the USIM is removed or the timer T3245 expires as described in subclause 5.3.19a.2

if the UE is not registered for onboarding services in SNPN the UE shall delete the list of equivalent PLMNs (if any) or the list of equivalent SNPNs (if any) and shall move to 5GMM-DEREGISTERED.NO-SUPI state if the message has been successfully integrity checked by the NAS then the UE shall

1) set the counter for "SIM/USIM considered invalid for GPRS services" events and the counter for "USIM considered invalid for 5GS services over non-3GPP access" events to UE implementation-specific maximum value in case of PLMN if the UE maintains these counters;

2) set the counter for "the entry for the current SNPN considered invalid for 3GPP access" events and the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events to UE implementation-specific maximum value in case of SNPN if the UE maintains these counters; and

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall handle the EMM parameters EMM state EPS update status 4G-GUTI last visited registered TAI TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the normal tracking area updating procedure is rejected with the EMM cause with the same value the USIM shall be considered as invalid also for non-EPS services until switching off or the UICC containing the USIM is removed or the timer T3245 expires as described in subclause 5.3.7a of 3GPP TS 24.301 [15] if the UE is in EMM-REGISTERED state the UE shall move to EMM-DEREGISTERED state if the message has been successfully integrity checked by the NAS and the UE maintains a counter for "SIM/USIM considered invalid for non-GPRS services" then the UE shall set this counter to UE implementation-specific maximum value

if the UE is registered for onboarding services in SNPN the UE shall reset the registration attempt counter store the SNPN identity in the "permanently forbidden SNPNs for onboarding services in SNPN" list enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection or an SNPN selection for onboarding services according to 3GPP TS 23.122 [5] if the message has been successfully integrity checked by the NAS the UE shall set the SNPN-specific attempt counter for the current SNPN to the UE implementation-specific maximum value

if the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access the UE shall in addition handle 5GMM parameters and 5GMM state for this access as described for this 5GMM cause value

#7 (5GS services not allowed)

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list and ngKSI

in case of PLMN the UE shall consider the USIM as invalid for 5GS services until switching off the UICC containing the USIM is removed or the timer T3245 expires as described in subclause 5.3.19a.1;

in case of SNPN if the UE is not registered for onboarding services in SNPN and the UE does not support access to an SNPN using credentials from a credentials holder and does not support equivalent SNPNs the UE shall consider the selected entry of the "list of subscriber data" with the SNPN identity of the current SNPN as invalid for 5GS services until the UE is switched off the entry is updated or the timer T3245 expires as described in subclause 5.3.19a.2 in case of SNPN if the UE is not registered for onboarding services in SNPN and the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the UE shall consider the selected entry of the "list of subscriber data" as invalid for 3GPP access until the UE is switched off the entry is updated or the timer T3245 expires as described in subclause 5.3.19a.2 additionally if EAP based primary authentication and key agreement procedure using EAP-AKA' or 5G AKA based primary authentication and key agreement procedure was performed in the current SNPN the UE shall consider the USIM as invalid for the current SNPN until switching off or the UICC containing the USIM is removed or the timer T3245 expires as described in subclause 5.3.19a.2

if the UE is not registered for onboarding services in SNPN the UE shall move to 5GMM-DEREGISTERED.NO-SUPI state if the message has been successfully integrity checked by the NAS then the UE shall

1) set the counter for "SIM/USIM considered invalid for GPRS services" events and the counter for "USIM considered invalid for 5GS services over non-3GPP access" events to UE implementation-specific maximum value in case of PLMN if the UE maintains these counters;

2) set the counter for "the entry for the current SNPN considered invalid for 3GPP access" events and the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events to UE implementation-specific maximum value in case of SNPN if the UE maintains these counters; and

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall handle the EMM parameters EMM state EPS update status 4G-GUTI last visited registered TAI TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the normal tracking area updating procedure is rejected with the EMM cause with the same value

if the UE is registered for onboarding services in SNPN the UE shall reset the registration attempt counter store the SNPN identity in the "permanently forbidden SNPNs for onboarding services in SNPN" list enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection or an SNPN selection for onboarding services according to 3GPP TS 23.122 [5] if the message has been successfully integrity checked by the NAS the UE shall set the SNPN-specific attempt counter for the current SNPN to the UE implementation-specific maximum value

if the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access the UE shall in addition handle 5GMM parameters and 5GMM state for this access as described for this 5GMM cause value

#9 (UE identity cannot be derived by the network)

the UE shall set the 5GS update status to 5U2 NOT UPDATED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list and ngKSI the UE shall enter the state 5GMM-DEREGISTERED

if the UE has initiated the registration procedure in order to enable performing the service request procedure for emergency services fallback the UE shall attempt to select an E-UTRA cell connected to EPC or 5GCN according to the domain priority and selection rules specified in 3GPP TS 23.167 [6] if the UE finds a suitable E-UTRA cell it then proceeds with the appropriate EMM or 5GMM procedures if the UE operating in single-registration mode has changed to S1 mode it shall disable the N1 mode capability for 3GPP access

if the rejected request was neither for initiating an emergency PDU session nor for emergency services fallback the UE shall subsequently automatically initiate the initial registration procedure

NOTE 5 user interaction is necessary in some cases when the UE cannot re-establish the PDU session(s) automatically

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall handle the EMM parameters EMM state EPS update status 4G-GUTI last visited registered TAI TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the normal tracking area updating procedure is rejected with the EMM cause with the same value

#10 (implicitly de-registered)

the UE shall enter the state 5GMM-DEREGISTERED.NORMAL-SERVICE the UE shall delete any mapped 5G NAS security context or partial native 5G NAS security context

if the UE has initiated the registration procedure in order to enable performing the service request procedure for emergency services fallback the UE shall attempt to select an E-UTRA cell connected to EPC or 5GCN according to the domain priority and selection rules specified in 3GPP TS 23.167 [6] if the UE finds a suitable E-UTRA cell it then proceeds with the appropriate EMM or 5GMM procedures if the UE operating in single-registration mode has changed to S1 mode it shall disable the N1 mode capability for 3GPP access

if the rejected request was neither for initiating an emergency PDU session nor for emergency services fallback the UE shall perform a new registration procedure for initial registration

NOTE 6 user interaction is necessary in some cases when the UE cannot re-establish the PDU session(s) automatically

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall handle the EMM state as specified in 3GPP TS 24.301 [15] for the case when the normal tracking area updating procedure is rejected with the EMM cause with the same value

#11 (PLMN not allowed)

this cause value received from a cell belonging to an SNPN and the UE is operating in SNPN access operation mode is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.3.7

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list and ngKSI the UE shall store the PLMN identity in the forbidden PLMN list as specified in subclause 5.3.13A and if the UE is configured to use timer T3245 then the UE shall start timer T3245 and proceed as described in subclause 5.3.19a.1 delete the list of equivalent PLMNs reset the registration attempt counter for 3GPP access the UE shall enter the state 5GMM-DEREGISTERED.PLMN-SEARCH and perform a PLMN selection according to 3GPP TS 23.122 [5] for non-3GPP access the UE shall enter state 5GMM-DEREGISTERED.LIMITED-SERVICE and perform network selection as defined in 3GPP TS 24.502 [18] if the message has been successfully integrity checked by the NAS and the UE maintains the PLMN-specific attempt counter and the PLMN-specific attempt counter for non-3GPP access for that PLMN the UE shall set the PLMN-specific attempt counter and the PLMN-specific attempt counter for non-3GPP access for that PLMN to the UE implementation-specific maximum value

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall in addition handle the EMM parameters EMM state EPS update status 4G-GUTI last visited registered TAI TAI list eKSI and tracking area updating attempt counter as specified in 3GPP TS 24.301 [15] for the case when the normal tracking area updating procedure is rejected with the EMM cause with the same value

if the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access to the same PLMN the UE shall in addition handle 5GMM parameters and 5GMM state for this access as described for this 5GMM cause value

if the UE receives the disaster return wait range IE in the REGISTRATION REJECT message and the UE supports MINT the UE shall delete the disaster return wait range stored in the ME if any and store the disaster return wait range included in the disaster return wait range IE in the ME

#12 (Tracking area not allowed)

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete last visited registered TAI and TAI list if the UE is not registering or has not registered to the same PLMN over both 3GPP access and non-3GPP access the UE shall additionally delete 5G-GUTI and ngKSI additionally the UE shall reset the registration attempt counter

if

1) the UE is not operating in SNPN access operation mode and the forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service" IE is not included in the REGISTRATION REJECT message the UE shall store the current TAI in the list of "5GS forbidden tracking areas for regional provision of service" and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE if the REGISTRATION REJECT message is not integrity protected the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for regional provision of service" for non-integrity protected NAS reject message; or

2) the UE is operating in SNPN access operation mode the UE shall store the current TAI in the list of "5GS forbidden tracking areas for regional provision of service" for the current SNPN and the selected entry of the "list of subscriber data" or the selected PLMN subscription and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE if the REGISTRATION REJECT message is not integrity protected the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for regional provision of service" for the current SNPN and the selected entry of the "list of subscriber data" or the selected PLMN subscription for non-integrity protected NAS reject message if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5] subclause 3.9) the UE shall store the current TAI in the list of "5GS forbidden tracking areas for regional provision of service" for the current SNPN and the selected entry of the "list of subscriber data" or the selected PLMN subscription along with the GIN(s) broadcasted by the SNPN if any

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall handle the EMM parameters EMM state EPS update status 4G-GUTI last visited registered TAI TAI list eKSI and tracking area updating attempt counter as specified in 3GPP TS 24.301 [15] for the case when the normal tracking area updating procedure is rejected with the EMM cause with the same value

#13 (Roaming not allowed in this tracking area)

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) if the UE is not registering or has not registered to the same PLMN over both 3GPP access and non-3GPP access the UE shall delete the list of equivalent PLMNs (if available) or the list of equivalent SNPNs (if available) the UE shall reset the registration attempt counter for 3GPP acess the UE shall change to state 5GMM-REGISTERED.PLMN-SEARCH and for non-3GPP access the UE shall change to state 5GMM-REGISTERED.LIMITED-SERVICE

if the UE is registered in S1 mode and operating in dual-registration mode the PLMN that the UE chooses to register in is specified in subclause 4.8.3 otherwise if

1) the UE is not operating in SNPN access operation mode and the forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" IE is not included in the REGISTRATION REJECT message the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" and shall remove the current TAI from the stored TAI list if present if the REGISTRATION REJECT message is not integrity protected the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for non-integrity protected NAS reject message; or

2) the UE is operating in SNPN access operation mode the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and the selected entry of the "list of subscriber data" or the selected PLMN subscription if the REGISTRATION REJECT message is not integrity protected the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and the selected entry of the "list of subscriber data" or the selected PLMN subscription for non-integrity protected NAS reject message if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5] subclause 3.9) the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and the selected entry of the "list of subscriber data" or the selected PLMN subscription along with the GIN(s) broadcasted by the SNPN if any

for 3GPP access the UE shall perform a PLMN selection or SNPN selection according to 3GPP TS 23.122 [5] and for non-3GPP access the UE shall perform network selection as defined in 3GPP TS 24.502 [18]

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall handle the EMM parameters EMM state EPS update status and tracking area updating attempt counter as specified in 3GPP TS 24.301 [15] for the case when the normal tracking area updating procedure is rejected with the EMM cause with the same value

if the UE receives the disaster return wait range IE in the REGISTRATION REJECT message and the UE supports MINT the UE shall delete the disaster return wait range stored in the ME if any and store the disaster return wait range included in the disaster return wait range IE in the ME

#15 (No suitable cells in tracking area)

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) the UE shall reset the registration attempt counter additionally the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and

1) if the extended 5GMM cause IE with value "Satellite NG-RAN not allowed in PLMN" is included in the REGISTRATION REJECT message

i) the message has been successfully integrity checked by the NAS and the UE is configured for "Satellite disabling allowed for 5GMM cause #15" as specified in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22] then the UE shall disable satellite NG-RAN capability (see subclause 4.9.4); or

ii) otherwise the UE shall ignore the extended 5GMM cause IE;

2) if the RAT utilization control IE is included in the REGISTRATION REJECT message

i) the message has been successfully integrity checked by the NAS; the UE shall store the received RAT utilization control information together with the PLMN identity of the current PLMN in the list of "PLMNs with associated RAT restrictions" and replace the previously stored one associated with the current PLMN if any with the newly received RAT utilization control information; or

ii) otherwise the UE shall ignore the RAT utilization control IE; and

3) if the UE has initiated the registration procedure in order to enable performing the service request procedure for emergency services fallback the UE shall attempt to select an E-UTRA cell connected to the EPC or the 5GCN according to the emergency services support indicator (see 3GPP TS 36.331 [25A]) if the UE finds a suitable E-UTRA cell it then proceeds with the appropriate EMM or 5GMM procedures if the UE operating in single-registration mode has changed to S1 mode it shall disable the N1 mode capability for 3GPP access;

otherwise the UE shall search for a suitable cell in another tracking area according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C]

if

1) the UE is not operating in SNPN access operation mode and the forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" IE is not included in the REGISTRATION REJECT message the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" and shall remove the current TAI from the stored TAI list if present if the REGISTRATION REJECT message is not integrity protected the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for non-integrity protected NAS reject message; or

2) the UE is operating in SNPN access operation mode the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and the selected entry of the "list of subscriber data" or the selected PLMN subscription and shall remove the current TAI from the stored TAI list if present if the REGISTRATION REJECT message is not integrity protected the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and the selected entry of the "list of subscriber data" or the selected PLMN subscription for non-integrity protected NAS reject message if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5] subclause 3.9) the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and the selected entry of the "list of subscriber data" or the selected PLMN subscription along with the GIN(s) broadcasted by the SNPN if any

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall handle the EMM parameters EMM state EPS update status and tracking area updating attempt counter as specified in 3GPP TS 24.301 [15] for the case when the normal tracking area updating procedure is rejected with the EMM cause with the same value

if received over non-3GPP access the cause shall be considered as an abnormal case and the behaviour of the UE for this case is specified in subclause 5.5.1.3.7

#22 (Congestion)

if the T3346 value IE is present in the REGISTRATION REJECT message and the value indicates that this timer is neither zero nor deactivated the UE shall proceed as described below otherwise it shall be considered as an abnormal case and the behaviour of the UE for this case is specified in subclause 5.5.1.3.7

the UE shall abort the registration procedure for mobility and periodic registration update if the rejected request was not for initiating an emergency PDU session the UE shall set the 5GS update status to 5U2 NOT UPDATED reset the registration attempt counter and change to state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE

the UE shall stop timer T3346 if it is running

if the REGISTRATION REJECT message is integrity protected the UE shall start timer T3346 with the value provided in the T3346 value IE

if the REGISTRATION REJECT message is not integrity protected the UE shall start timer T3346 with a random value from the default range specified in 3GPP TS 24.008 [12]

the UE stays in the current serving cell and applies the normal cell reselection process the registration procedure for mobility and periodic registration update is started if still necessary when timer T3346 expires or is stopped

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall handle the EMM parameters EMM state EPS update status and tracking area updating attempt counter as specified in 3GPP TS 24.301 [15] for the case when the normal tracking area updating procedure is rejected with the EMM cause with the same value

if the registration procedure for mobility and periodic registration update was initiated for an MO MMTEL voice call (i.e access category 4) or an MO MMTEL video call (i.e access category 5) or an MO IMS registration related signalling (i.e access category 9) or for NAS signalling connection recovery during an ongoing MO MMTEL voice call (i.e access category 4) or during an ongoing MO MMTEL video call (i.e access category 5) or during an ongoing MO IMS registration related signalling (i.e access category 9) then a notification that the request was not accepted due to network congestion shall be provided to upper layers

NOTE 8 upper layers specified in 3GPP TS 24.173 [13C] and 3GPP TS 24.229 [14] handle the notification that the request was not accepted due to network congestion

if the UE is registered for onboarding services in SNPN the UE may enter the state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection or an SNPN selection for onboarding services according to 3GPP TS 23.122 [5]

#27 (N1 mode not allowed)

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) additionally the UE shall reset the registration attempt counter and shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE if the message has been successfully integrity checked by the NAS the UE shall set

1) the PLMN-specific N1 mode attempt counter for 3GPP access and the PLMN-specific N1 mode attempt counter for non-3GPP access for that PLMN in case of PLMN; or

2) the SNPN-specific attempt counter for 3GPP access for the current SNPN and the SNPN-specific attempt counter for non-3GPP access for the current SNPN in case of SNPN;

to the UE implementation-specific maximum value

the UE shall disable the N1 mode capability for the specific access type for which the message was received (see subclause 4.9)

if the message has been successfully integrity checked by the NAS the UE shall disable the N1 mode capability also for the other access type (see subclause 4.9)

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall in addition set the EPS update status to EU3 ROAMING NOT ALLOWED additionally the UE shall reset the tracking area updating attempt counter and enter the state EMM-REGISTERED

#31 (Redirection to EPC required)

5GMM cause #31 received by a UE that has not indicated support for CIoT optimizations or not indicated support for S1 mode or received by a UE over non-3GPP access is considered an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.3.7

this cause value received from a cell belonging to an SNPN and the UE is operating in SNPN access operation mode is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.3.7

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) the UE shall reset the registration attempt counter and enter the state 5GMM- REGISTERED.LIMITED-SERVICE

the UE shall enable the E-UTRA capability if it was disabled and disable the N1 mode capability for 3GPP access (see subclause 4.9.2)

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall handle the EMM parameters EMM state EPS update status and tracking area updating attempt counter as specified in 3GPP TS 24.301 [15] for the case when the normal tracking area updating procedure is rejected with the EMM cause with the same value

#36 (IAB-node operation not authorized)

this cause value is only applicable when received over 3GPP access by a UE operating as an IAB-node this cause value received from a 5G access network other than 3GPP access or received by a UE not operating as an IAB-node is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.3.7

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list and ngKSI

if

1) the UE is not operating in SNPN access operation mode

i) the UE shall delete the list of equivalent PLMNs and reset the registration attempt counter and store the PLMN identity in the forbidden PLMN list as specified in subclause 5.3.13A and if the UE is configured to use timer T3245 then the UE shall start timer T3245 and proceed as described in subclause 5.3.19a.1 the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform a PLMN selection according to 3GPP TS 23.122 [5] if the message has been successfully integrity checked by the NAS and the UE maintains the PLMN-specific attempt counter for 3GPP access for that PLMN the UE shall set the PLMN-specific attempt counter for 3GPP access for that PLMN to the UE implementation-specific maximum value; and

ii) if the UE is operating in single-registration mode the UE shall in addition handle the EMM parameters EMM state EPS update status 4G-GUTI last visited registered TAI TAI list eKSI and attach attempt counter as specified in 3GPP TS 24.301 [15] for the case when the normal tracking area updating procedure is rejected with the EMM cause with the same value; or

2) the UE is operating in SNPN access operation mode

i) the UE shall delete the list of equivalent SNPNs (if available) the UE shall reset the registration attempt counter store the SNPN identity in the "temporarily forbidden SNPNs" list or "temporarily forbidden SNPNs for access for localized services in SNPN" list if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) for 3GPP access and the selected entry of the "list of subscriber data" or the selected PLMN subscription or in the "temporarily forbidden SNPNs for onboarding services in SNPN" list if the UE is registered for onboarding services in SNPN for 3GPP access if the UE supports access to an SNPN using credentials from a credentials holder the UE shall store the SNPN identity in the "temporarily forbidden SNPNs" list along with the GIN(s) broadcasted by the SNPN if any for the selected entry of the "list of subscriber data" or the selected PLMN subscription if the UE supports access to an SNPN providing access for localized services in SNPN and the access for localized services in SNPN has been enabled the UE shall store the SNPN identity in the list of "temporarily forbidden SNPNs for access for localized services in SNPN" (if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) along with the GIN(s) broadcasted by the SNPN if any for the selected entry of the "list of subscriber data" or the selected PLMN subscription the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection according to 3GPP TS 23.122 [5] if the message has been successfully integrity checked by the NAS the UE shall set the SNPN attempt counter for 3GPP access for the current SNPN to the UE implementation-specific maximum value

#62 (No network slices available)

the UE shall abort the registration procedure for mobility and periodic registration update procedure set the 5GS update status to 5U2 NOT UPDATED and enter state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE additionally the UE shall reset the registration attempt counter

the UE receiving the rejected NSSAI in the REGISTRATION REJECT message takes the following actions based on the rejection cause in the rejected S-NSSAI(s)

"S-NSSAI not available in the current PLMN or SNPN"

the UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current PLMN or SNPN as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current PLMN or SNPN over any access until switching off the UE the UICC containing the USIM is removed an entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated or the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2

"S-NSSAI not available in the current registration area"

the UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current registration area as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current registration area over the current access until switching off the UE the UE moving out of the current registration area the UICC containing the USIM is removed an entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated or the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2

"S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization"

the UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the failed or revoked NSSAA as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN or SNPN over any access until switching off the UE the UICC containing the USIM is removed the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated or the rejected S-NSSAI(s) are removed as described in subclause 4.6.1 and 4.6.2.2

"S-NSSAI not available due to maximum number of UEs reached"

unless the back-off timer value received along with the S-NSSAI is zero the UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the maximum number of UEs reached as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN or SNPN over the current access until switching off the UE the UICC containing the USIM is removed the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated or the rejected S-NSSAI(s) are removed as described in subclauses 4.6.1 and 4.6.2.2

NOTE 8 if the back-off timer value received along with the S-NSSAI in the rejected NSSAI for the maximum number of UEs reached is zero as specified in subclause 10.5.7.4a of 3GPP TS 24.008 [12] the UE does not consider the S-NSSAI as the rejected S-NSSAI

if there is one or more S-NSSAIs in the rejected NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" then for each S-NSSAI the UE shall behave as follows

a) stop the timer T3526 associated with the S-NSSAI if running;

b) start the timer T3526 with

1) the back-off timer value received along with the S-NSSAI if a back-off timer value is received along with the S-NSSAI that is neither zero nor deactivated; or

2) an implementation specific back-off timer value if no back-off timer value is received along with the S-NSSAI; and

c) remove the S-NSSAI from the rejected NSSAI for the maximum number of UEs reached when the timer T3526 associated with the S-NSSAI expires

if the UE has an allowed NSSAI or configured NSSAI and

1) at least S-NSSAI of the allowed NSSAI or configured NSSAI is not included in the rejected NSSAI the UE may stay in the current serving cell apply the normal cell reselection process and start a registration procedure for mobility and periodic registration update with a requested NSSAI that includes any S-NSSAI from the allowed S-NSSAI or the configured NSSAI that is not in the rejected NSSAI

2) all the S-NSSAI(s) in the allowed NSSAI and configured NSSAI are rejected and at least one S-NSSAI is rejected due to "S-NSSAI not available in the current registration area" and

i) the REGISTRATION REJECT message is integrity protected the UE is not operating in SNPN access operation mode and the forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" IE is not included in the REGISTRATION REJECT message and the REGISTRATION REJECT message is received from one of the TAI(s) in the current registration area the UE shall store the TAI(s) belonging to the registration area in the list of "5GS forbidden tracking areas for roaming" if the REGISTRATION REJECT message is received from a TAI not in the current registration area the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE the UE shall search for a suitable cell in another tracking area according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C]; or

ii) the REGISTRATION REJECT message is integrity protected and the UE is operating in SNPN access operation mode and the REGISTRATION REJECT message is received from one of the TAI(s) in the current registration area the UE shall store the TAI(s) belonging to current registration area in the list of "5GS forbidden tracking areas for roaming" for the current SNPN if the REGISTRATION REJECT message is received from a TAI not in the current registration area the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the selected entry of the "list of subscriber data" or the selected PLMN subscription and enter the state 5GMM-REGISTERED.LIMITED-SERVICE the UE shall search for a suitable cell in another tracking area according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C]

3) otherwise the UE may perform a PLMN selection or SNPN selection according to 3GPP TS 23.122 [5] and additionally the UE may disable the N1 mode capability for the current PLMN or SNPN if the UE does not have an allowed NSSAI and each S-NSSAI in the configured NSSAI if available was rejected with cause "S-NSSAI not available in the current PLMN or SNPN" or "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization" as described in subclause 4.9

if the UE has neither allowed NSSAI for the current PLMN or SNPN nor configured NSSAI for the current PLMN or SNPN and

1) if at least one S-NSSAI in the default configured NSSAI is not rejected the UE may stay in the current serving cell apply the normal cell reselection process and start a registration procedure for mobility and periodic registration update with a requested NSSAI with that default configured NSSAI; or

2) if all the S-NSSAI(s) in the default configured NSSAI are rejected and at least one S-NSSAI is rejected due to "S-NSSAI not available in the current registration area"

i) if the REGISTRATION REJECT message is integrity protected and the UE is not operating in SNPN access operation mode and the REGISTRATION REJECT message is received from one of the TAI(s) in the current registration area the UE shall store the TAI(s) belonging to current registration area in the list of "5GS forbidden tracking areas for roaming" if the REGISTRATION REJECT message is received from a TAI not in the current registration area the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" the UE shall memorize the TAI(s) was stored in the list of "5GS forbidden tracking areas for roaming" for S-NSSAI is rejected due to "S-NSSAI not available in the current registration area" and enter the state 5GMM-REGISTERED.LIMITED-SERVICE the UE shall search for a suitable cell in another tracking area according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C]; or

ii) if the REGISTRATION REJECT message is integrity protected and the UE is operating in SNPN access operation mode and the REGISTRATION REJECT message is received from one of the TAI(s) in the current registration area the UE shall store the TAI(s) belonging to current registration area in the list of "5GS forbidden tracking areas for roaming" if the REGISTRATION REJECT message is received from a TAI not in the current registration area the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" the UE shall memorize the TAI(s) was stored in the list of "5GS forbidden tracking areas for roaming" for S-NSSAI is rejected due to "S-NSSAI not available in the current registration area" for the current SNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the selected entry of the "list of subscriber data" or the selected PLMN subscription and enter the state 5GMM-REGISTERED.LIMITED-SERVICE the UE shall search for a suitable cell in another tracking area according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C]

3) otherwise the UE may perform a PLMN selection or SNPN selection according to 3GPP TS 23.122 [5] and additionally the UE may disable the N1 mode capability for the current PLMN or SNPN if each S-NSSAI in the default configured NSSAI was rejected with cause "S-NSSAI not available in the current PLMN or SNPN" or "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization" as described in subclause 4.9

if

1) the UE has allowed NSSAI for the current PLMN or SNPN or configured NSSAI for the current PLMN or SNPN or both and all the S-NSSAIs included in the allowed NSSAI or the configured NSSAI or both are rejected; or

2) the UE has neither allowed NSSAI for the current PLMN or SNPN nor configured NSSAI for the current PLMN or SNPN and all the S-NSSAIs included in the default configured NSSAI are rejected

and the UE has rejected NSSAI for the maximum number of UEs reached and the UE wants to obtain services in the current serving cell without performing a PLMN selection or SNPN selection the UE may stay in the current serving cell and attempt to use the rejected S-NSSAI(s) for the maximum number of UEs reached in the current serving cell after the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall in addition set the EPS update status to EU2 NOT UPDATED reset the tracking area updating attempt counter and enter the state EMM-REGISTERED

#72 (Non-3GPP access to 5GCN not allowed)

when received over non-3GPP access the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete last visited registered TAI and TAI list if the UE is not registering or has not registered to the same PLMN over both 3GPP access and non-3GPP access the UE shall additionally delete 5G-GUTI and ngKSI additionally the UE shall reset the registration attempt counter and enter the state 5GMM-DEREGISTERED if the message has been successfully integrity checked by the NAS the UE shall set

1) the PLMN-specific N1 mode attempt counter for non-3GPP access for that PLMN in case of PLMN; or

2) the SNPN-specific attempt counter for non-3GPP access for that SNPN in case of SNPN;

to the UE implementation-specific maximum value

NOTE 10 the 5GMM sublayer states the 5GMM parameters and the registration status are managed per access type independently i.e 3GPP access or non-3GPP access (see subclauses 4.7.2 and 5.1.3)

the UE shall disable the N1 mode capability for non-3GPP access (see subclause 4.9.3)

as an implementation option the UE may enter the state 5GMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection according to 3GPP TS 23.122 [5]

if received over 3GPP access the cause shall be considered as an abnormal case and the behaviour of the UE for this case is specified in subclause 5.5.1.3.7

#73 (Serving network not authorized)

this cause value received from a cell belonging to an SNPN and the UE is operating in SNPN access operation mode is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.3.7

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list and ngKSI the UE shall delete the list of equivalent PLMNs reset the registration attempt counter store the PLMN identity in the forbidden PLMN list as specified in subclause 5.3.13A for 3GPP access the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection according to 3GPP TS 23.122 [5] and for non-3GPP access the UE shall enter state 5GMM-DEREGISTERED.LIMITED-SERVICE and perform network selection as defined in 3GPP TS 24.502 [18] if the message has been successfully integrity checked by the NAS the UE shall set the PLMN-specific attempt counter and the PLMN-specific attempt counter for non-3GPP access for that PLMN to the UE implementation-specific maximum value

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall in addition set the EPS update status to EU3 ROAMING NOT ALLOWED and shall delete any 4G-GUTI last visited registered TAI TAI list and eKSI additionally the UE shall reset the tracking area updating attempt counter and enter the state EMM-DEREGISTERED

#74 (Temporarily not authorized for this SNPN)

5GMM cause #74 is only applicable when received from a cell belonging to an SNPN and the UE is operating in SNPN access operation mode 5GMM cause #74 received from a cell not belonging to an SNPN is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.3.7

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list ngKSI and the list of equivalent SNPNs (if available) the UE shall reset the registration attempt counter and store the SNPN identity in the "temporarily forbidden SNPNs" list or "temporarily forbidden SNPNs for access for localized services in SNPN" list if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) for the specific access type for which the message was received and the selected entry of the "list of subscriber data" or the selected PLMN subscription or in the "temporarily forbidden SNPNs for onboarding services in SNPN" list if the UE is registered for onboarding services in SNPN for the specific access type for which the message was received if the UE supports access to an SNPN using credentials from a credentials holder the UE shall store the SNPN identity in the "temporarily forbidden SNPNs" list along with the GIN(s) broadcasted by the SNPN if any for the selected entry of the "list of subscriber data" or the selected PLMN subscription if the UE supports access to an SNPN providing access for localized services in SNPN and the access for localized services in SNPN has been enabled the UE shall store the SNPN identity in the list of "temporarily forbidden SNPNs for access for localized services in SNPN" (if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) along with the GIN(s) broadcasted by the SNPN if any for the selected entry of the "list of subscriber data" or the selected PLMN subscription if the UE is not registered for onboarding services in SNPN for 3GPP access the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection according to 3GPP TS 23.122 [5] and for non-3GPP access the UE shall enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE amd perform network selection as defined in 3GPP TS 24.502 [18] if the UE is registered for onboarding services in SNPN the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection or an SNPN selection for onboarding services according to 3GPP TS 23.122 [5] if the message has been successfully integrity checked by the NAS the UE shall set the SNPN-specific attempt counter for 3GPP access and the SNPN-specific attempt counter for non-3GPP access for the current SNPN to the UE implementation-specific maximum value

if the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access to the same SNPN the UE shall in addition handle 5GMM parameters and 5GMM state for this access as described for this 5GMM cause value

#75 (Permanently not authorized for this SNPN)

5GMM cause #75 is only applicable when received from a cell belonging to an SNPN with a globally-unique SNPN identity and the UE is operating in SNPN access operation mode 5GMM cause #75 received from a cell not belonging to an SNPN or a cell belonging to an SNPN with a non-globally-unique SNPN identity is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.3.7

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list ngKSI and the list of equivalent SNPNs (if available) the UE shall reset the registration attempt counter and store the SNPN identity in the "permanently forbidden SNPNs" or "permanently forbidden SNPNs for access for localized services in SNPN" list if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) list for the specific access type for which the message was received and the selected entry of the "list of subscriber data" or the selected PLMN subscription or in the "permanently forbidden SNPNs for onboarding services in SNPN" list if the UE is registered for onboarding services in SNPN for the specific access type for which the message was received if the UE supports access to an SNPN using credentials from a credentials holder the UE shall store the SNPN identity in the "permanently forbidden SNPNs" list along with the GIN(s) broadcasted by the SNPN if any for the selected entry of the "list of subscriber data" or the selected PLMN subscription if the UE supports access to an SNPN providing access for localized services in SNPN and the access for localized services in SNPN has been enabled the UE shall store the SNPN identity in the list of "permanently forbidden SNPNs for access for localized services in SNPN" (if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) along with the GIN(s) broadcasted by the SNPN if any for the selected entry of the "list of subscriber data" or the selected PLMN subscription if the UE is not registered for onboarding services in SNPN for 3GPP access the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection according to 3GPP TS 23.122 [5] and for non-3GPP access the UE shall enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE amd perform network selection as defined in 3GPP TS 24.502 [18] if the UE is registered for onboarding services in SNPN the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection or an SNPN selection for onboarding services according to 3GPP TS 23.122 [5] if the message has been successfully integrity checked by the NAS the UE shall set the SNPN-specific attempt counter for 3GPP access and the SNPN-specific attempt counter for non-3GPP access for the current SNPN to the UE implementation-specific maximum value

if the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access to the same SNPN the UE shall in addition handle 5GMM parameters and 5GMM state for this access as described for this 5GMM cause value

#76 (Not authorized for this CAG or authorized for CAG cells only)

this cause value received via non-3GPP access or from a cell belonging to an SNPN and the UE is operating in SNPN access operation mode is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.3.7

the UE shall set the 5GS update status to 5U3.ROAMING NOT ALLOWED store the 5GS update status according to subclause 5.1.3.2.2 and reset the registration attempt counter

if 5GMM cause #76 is received from

1) a CAG cell and if the UE receives a "CAG information list" in the CAG information list IE or the extended CAG information list IE included in the REGISTRATION REJECT message the UE shall

i) replace the "CAG information list" stored in the UE with the received CAG information list IE or the extended CAG information list IE when received in the HPLMN or EHPLMN;

ii) replace the serving VPLMN's entry of the "CAG information list" stored in the UE with the serving VPLMN's entry of the received CAG information list IE or the extended CAG information list IE when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN; or

NOTE 10 when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN entries of a PLMN other than the serving VPLMN if any in the received CAG information list IE or the extended CAG information list IE are ignored

iii) remove the serving VPLMN's entry of the "CAG information list" stored in the UE when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN and the CAG information list IE or the extended CAG information list IE does not contain the serving VPLMN's entry

otherwise the UE shall delete the CAG-ID(s) of the cell from the "allowed CAG list" for the current PLMN if the CAG-ID(s) are authorized based on the "Allowed CAG list" in the case the "allowed CAG list" for the current PLMN only contains a range of CAG-IDs how the UE deletes the CAG-ID(s) of the cell from the "allowed CAG list" for the current PLMN is up to UE implementation in addition

i) if the entry in the "CAG information list" for the current PLMN does not include an "indication that the UE is only allowed to access 5GS via CAG cells" or if the entry in the "CAG information list" for the current PLMN includes an "indication that the UE is only allowed to access 5GS via CAG cells" and one or more CAG-ID(s) are authorized based on the updated "allowed CAG list" for the current PLMN then the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C] with the updated "CAG information list";

ii) if the entry in the "CAG information list" for the current PLMN includes an "indication that the UE is only allowed to access 5GS via CAG cells" and no CAG-ID is authorized based on the updated "allowed CAG list" for the current PLMN then the UE shall enter the state 5GMM-REGISTERED.PLMN-SEARCH and shall apply the PLMN selection process defined in 3GPP TS 23.122 [5] with the updated "CAG information list"; or

iii) if the "CAG information list" does not include an entry for the current PLMN then the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C] with the updated "CAG information list"

2) a non-CAG cell and if the UE receives a "CAG information list" in the CAG information list IE or the extended CAG information list IE included in the REGISTRATION REJECT message the UE shall

i) replace the "CAG information list" stored in the UE with the received CAG information list IE or the extended CAG information list IE when received in the HPLMN or EHPLMN;

ii) replace the serving VPLMN's entry of the "CAG information list" stored in the UE with the serving VPLMN's entry of the received CAG information list IE or the extended CAG information list IE when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN; or

NOTE 11 when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN entries of a PLMN other than the serving VPLMN if any in the received CAG information list IE or the extended CAG information list IE are ignored

iii) remove the serving VPLMN's entry of the "CAG information list" stored in the UE when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN and the CAG information list IE or the extended CAG information list IE does not contain the serving VPLMN's entry

otherwise the UE shall store an "indication that the UE is only allowed to access 5GS via CAG cells" in the entry of the "CAG information list" for the current PLMN if any if the "CAG information list" stored in the UE does not include the current PLMN's entry the UE shall add an entry for the current PLMN to the "CAG information list" and store an "indication that the UE is only allowed to access 5GS via CAG cells" in the entry of the "CAG information list" for the current PLMN if the UE does not have a stored "CAG information list" the UE shall create a new "CAG information list" and add an entry with an "indication that the UE is only allowed to access 5GS via CAG cells" for the current PLMN

in addition

i) if one or more CAG-ID(s) are authorized based on the "allowed CAG list" for the current PLMN then the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] with the updated CAG information; or

ii) if no CAG-ID is authorized based on the "allowed CAG list" for the current PLMN then the UE shall enter the state 5GMM-REGISTERED.PLMN-SEARCH and shall apply the PLMN selection process defined in 3GPP TS 23.122 [5] with the updated "CAG information list"

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall in addition set the EPS update status to EU3 ROAMING NOT ALLOWED reset the tracking area updating attempt counter and enter the state EMM-REGISTERED

#77 (Wireline access area not allowed)

5GMM cause #77 is only applicable when received from a wireline access network by the 5G-RG or the W-AGF acting on behalf of the FN-CRG (or on behalf of the N5GC device) 5GMM cause #77 received from a 5G access network other than a wireline access network and 5GMM cause #77 received by the W-AGF acting on behalf of the FN-BRG are considered as abnormal cases and the behaviour of the UE is specified in subclause 5.5.1.3.7

when received over wireline access network the 5G-RG and the W-AGF acting on behalf of the FN-CRG (or on behalf of the N5GC device) shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) shall delete 5G-GUTI last visited registered TAI TAI list and ngKSI shall reset the registration attempt counter shall enter the state 5GMM-DEREGISTERED and shall act as specified in subclause 5.3.23

NOTE 12 the 5GMM sublayer states the 5GMM parameters and the registration status are managed per access type independently i.e 3GPP access or non-3GPP access (see subclauses 4.7.2 and 5.1.3)

#78 (PLMN not allowed to operate at the present UE location)

this cause value received from a non-satellite NG-RAN cell is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.3.7

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete last visited registered TAI and TAI list if the UE is not registering or has not registered to the same PLMN over both 3GPP access and non-3GPP access the UE shall additionally delete the list of equivalent PLMNs 5G-GUTI and ngKSI additionally the UE shall reset the registration attempt counter the UE shall store the PLMN identity and if it is known the current geographical location in the list of "PLMNs not allowed to operate at the present UE location" and shall start a corresponding timer instance (see subclause 4.23.2) the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform a PLMN selection according to 3GPP TS 23.122 [5]

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall handle the EMM parameters EMM state EPS update status and tracking area updating attempt counter as specified in 3GPP TS 24.301 [15] for the case when the normal tracking area updating procedure is rejected with the EMM cause with the same value

#79 (UAS services not allowed)

this cause value received when the UE did not include the service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE of REGISTRATION REQUEST message is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.3.7

the UE shall abort the registration procedure for mobility and periodic registration update procedure set the 5GS update status to 5U2 NOT UPDATED and enter state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE additionally the UE shall reset the registration attempt counter the UE may re-attempt the registration procedure to the current PLMN for services other than UAS services and shall not include the service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE of REGISTRATION REQUEST message unless the UE receives a CONFIGURATION UPDATE COMMAND message including the service-level-AA service status indication in the Service-level-AA container IE with the UAS field set to "UAS services enabled"

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall in addition set the EPS update status to EU2 NOT UPDATED reset the tracking area updating attempt counter and enter the state EMM-REGISTERED

#80 (Disaster roaming for the determined PLMN with disaster condition not allowed)

this cause value received via non-3GPP access or from a cell belonging to an SNPN and the UE is operating in SNPN access operation mode or when the UE did not indicate "disaster roaming mobility registration updating" in the 5GS registration type IE in the REGISTRATION REQUEST message is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.3.7

the UE shall abort the registration procedure for mobility and periodic registration update procedure set the 5GS update status to 5U2 NOT UPDATED and enter state 5GMM-REGISTERED PLMN-SEARCH additionally the UE shall reset the registration attempt counter the UE shall not attempt to register for disaster roaming on this PLMN for the UE determined PLMN with disaster condition for a period in the range of 12 to 24 hours the UE shall not attempt to register for disaster roaming on this PLMN for a period in the range of 3 to 10 minutes the UE shall perform PLMN selection as described in 3GPP TS 23.122 [6] if the message has been successfully integrity checked by the NAS and the UE maintains the PLMN-specific attempt counter of the PLMN which sent the reject message for the UE determined PLMN with disaster condition the UE shall set the PLMN-specific attempt counter of the PLMN which sent the reject message for the UE determined PLMN with disaster condition to the UE implementation-specific maximum value

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall in addition set the EPS update status to EU2 NOT UPDATED reset the tracking area updating attempt counter and enter the state EMM-REGISTERED

#81 (Selected N3IWF is not compatible with the allowed NSSAI)

this cause value received when the UE does not access 5GCN over non-3GPP access using the N3IWF or has not indicated support for slice-based N3IWF selection in the REGISTRATION REQUEST message is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.3.7

the UE shall abort the registration procedure for mobility and periodic registration update procedure set the 5GS update status to 5U2 NOT UPDATED and enter state 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION or 5GMM-DEREGISTERED.PLMN-SEARCH additionally the UE shall reset the registration attempt counter if the N3IWF identifier IE is included in the REGISTRATION REJECT message and the UE supports slice-based N3IWF selection the UE may use the provided N3IWF identifier IE in N3IWF selection as specified in 3GPP TS 24.502 [18] prior to an immediate consecutive initial registration attempt to the network otherwise the UE shall ignore the N3IWF identifier IE additionally if the UE selects a new N3IWF and a new initial registration attempt is performed the UE shall delete any 5G-GUTI last visited registered TAI TAI list and ngKSI

#82 (Selected TNGF is not compatible with the allowed NSSAI)

this cause value received when the UE does not access 5GCN over non-3GPP access using the TNGF or has not indicated support for slice-based TNGF selection in the REGISTRATION REQUEST message is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.3.7

the UE shall abort the registration procedure for mobility and periodic registration update procedure set the 5GS update status to 5U2 NOT UPDATED and enter state 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION or 5GMM-DEREGISTERED.PLMN-SEARCH additionally the UE shall reset the registration attempt counter if the TNAN information IE is included in the REGISTRATION REJECT message and the UE supports slice-based TNGF selection the UE may use the provided TNAN information IE in TNAN selection as specified in 3GPP TS 24.502 [18] prior to an immediate consecutive registration attempt to the network otherwise the UE shall ignore the TNAN information IE additionally if the UE selects a new TNAN and a new initial registration attempt is performed the UE shall delete any 5G-GUTI last visited registered TAI TAI list and ngKSI

other values are considered as abnormal cases the behaviour of the UE in those cases is specified in subclause 5.5.1.3.7

##### 5.5.1.3.6 mobility and periodic registration update for initiating an emergency PDU session not accepted by the network

if the mobility and periodic registration update request for initiating an emergency PDU session cannot be accepted by the network the UE shall perform the procedures as described in subclause 5.5.1.3.5 if the mobility and periodic registration update request for initiating an emergency PDU session fails due to receiving the AUTHENTICATION REJECT message the UE shall perform the procedures as described in subclauses 5.4.1.2.2.11 5.4.1.2.3.1 5.4.1.2.3A.1 or 5.4.1.3.5 then if the UE is in the same selected PLMN where the last mobility and periodic registration update request was attempted the UE shall

a) inform the upper layers of the failure of the procedure; or

NOTE 1 this can result in the upper layers requesting implementation specific mechanisms e.g procedures specified in 3GPP TS 24.229 [14] can result in the emergency call being attempted to another IP-CAN

b) perform de-registration locally if not de-registered already and attempt initial registration for emergency services

if the mobility and periodic registration update request for initiating an emergency PDU session fails due to abnormal case b) in subclause 5.5.1.3.7 the UE shall perform the actions as described in subclause 5.5.1.3.7 and inform the upper layers of the failure to access the network

NOTE 2 this can result in the upper layers requesting implementation specific mechanisms e.g procedures specified in 3GPP TS 24.229 [14] can result in the emergency call being attempted to another IP-CAN

if the mobility and periodic registration update request for initiating an emergency PDU session fails due to abnormal cases c) d) e) or g) in subclause 5.5.1.3.7 the UE shall perform the procedures as described in subclause 5.5.1.3.7 then if the UE is in the same selected PLMN where the last mobility and periodic registration update request was attempted the UE shall

a) inform the upper layers of the failure of the procedure; or

NOTE 3 this can result in the upper layers requesting implementation specific mechanisms e.g procedures specified in 3GPP TS 24.229 [14] can result in the emergency call being attempted to another IP-CAN

b) perform de-registration locally if not de-registered already and attempt initial registration for emergency services

##### 5.5.1.3.6A mobility and periodic registration update for an emergency services fallback not accepted by the network

if the mobility and periodic registration update request triggered upon receiving a request from the upper layers to perform an emergency services fallback

- fails due to an abnormal case described in subclause 5.5.1.3.7 the UE shall perform the procedures as described in subclause 5.5.1.3.7;

- cannot be accepted by the network as described in subclause 5.5.1.3.5 the UE shall perform the procedures as described in subclause 5.5.1.3.5; or

- fails due to receiving the AUTHENTICATION REJECT message the UE shall perform the procedures as described in subclauses 5.4.1.2.2.11 5.4.1.2.3.1 5.4.1.2.3A.1 or 5.4.1.3.5

if the mobility and periodic registration update request triggered upon receiving a request from the upper layers to perform an emergency services fallback fails due to abnormal case b) in subclause 5.5.1.3.7 the UE shall inform the upper layers of the failure to access the network

NOTE 1 this can result in the upper layers requesting implementation specific mechanisms e.g procedures specified in 3GPP TS 24.229 [14] can result in the emergency call being attempted to another IP-CAN

if the mobility and periodic registration update request triggered upon receiving a request from the upper layers to perform an emergency services fallback fails due to abnormal cases c) d) e) or g) cannot be accepted or fails due to receiving the AUTHENTICATION REJECT message and the UE does not attempt to select an E-UTRA cell connected to EPC or 5GCN as described in subclause 5.5.1.3.5 and the UE is camped on NR or E-UTRA cell connected to 5GCN in the same PLMN where the last mobility and periodic registration update request was attempted the UE shall inform the upper layers of the failure of the procedure

NOTE 2 this can result in the upper layers requesting implementation specific mechanisms e.g procedures specified in 3GPP TS 24.229 [14] can result in the emergency call being attempted to another IP-CAN

##### 5.5.1.3.7 abnormal cases in the UE

the following abnormal cases can be identified

a) timer T3346 is running

the UE shall not start the registration procedure for mobility and periodic registration update unless

1) the UE is in 5GMM-CONNECTED mode;

2) the UE received a paging;

3) the UE receives a NOTIFICATION message over non-3GPP access when the UE is in 5GMM-CONNECTED mode over non-3GPP access and in 5GMM-IDLE mode over 3GPP access;

4) the UE is a UE configured for high priority access in selected PLMN or SNPN;

5) the UE has an emergency PDU session established or is establishing an emergency PDU session;

6) the UE receives a request from the upper layers to perform emergency services fallback;

7) the UE receives the CONFIGURATION UPDATE COMMAND message as specified in subclause 5.4.4.3;

8) the UE in NB-N1 mode is requested by the upper layer to transmit user data related to an exceptional event and

- the UE is allowed to use exception data reporting (see the ExceptionDataReportingAllowed leaf of the NAS configuration MO in 3GPP TS 24.368 [17] or the USIM file EFNASCONFIG in 3GPP TS 31.102 [22]); and

- timer T3346 was not started when N1 NAS signalling connection was established with RRC establishment cause set to "mo-ExceptionData";

9) the MUSIM UE needs to request a new 5G-GUTI assignment as specified in subclause 5.5.1.3.2; or

10) the UE needs to report unavailability information due to discontinuous coverage

the UE stays in the current serving cell and applies the normal cell reselection process

NOTE 1 it is considered an abnormal case if the UE needs to initiate a registration procedure for mobility and periodic registration update while timer T3346 is running independent on whether timer T3346 was started due to an abnormal case or a non-successful case

if the registration procedure for mobility and periodic registration update was initiated for an MO MMTEL voice call (i.e access category 4) for an MO MMTEL video call (i.e access category 5) for an MO IMS registration related signalling (i.e access category 9) or for NAS signalling connection recovery during an ongoing MO MMTEL voice call (i.e access category 4) or during an MO MMTEL video call (i.e access category 5) or during an ongoing MO IMS registration related signalling (i.e access category 9) then a notification that the procedure was not initiated due to network congestion shall be provided to upper layers

b) the lower layers indicate that the access attempt is barred

the UE shall not start the registration procedure for mobility and periodic registration update the UE stays in the current serving cell and applies the normal cell reselection process receipt of the access barred indication shall not trigger the selection of a different core network type (EPC or 5GCN)

the registration procedure for mobility and periodic registration update is started if still needed when the lower layers indicate that the barring is alleviated for the access category with which the access attempt was associated

ba) the lower layers indicate that

1) access barring is applicable for all access categories except categories 0 and 2 and the access category with which the access attempt was associated is other than 0 and 2; or

2) access barring is applicable for all access categories except category 0 and the access category with which the access attempt was associated is other than 0

if the REGISTRATION REQUEST message has not been sent the UE shall proceed as specified for case b if the REGISTRATION REQUEST message has been sent the UE shall proceed as specified for case e and additionally the registration procedure for mobility and periodic registration update is started if still needed when the lower layers indicate that the barring is alleviated for the access category with which the access attempt was associated for additional UE requirements for both cases see subclause 4.5.5

c) T3510 timeout

the UE shall abort the registration update procedure and the N1 NAS signalling connection if any shall be released locally

if the UE has initiated the registration procedure in order to enable performing the service request procedure for emergency services fallback,the UE shall inform the upper layers of the failure of the emergency services fallback (see 3GP p TS 24.229 [14]) otherwise the UE shall proceed as described below

d) REGISTRATION REJECT message other 5GMM cause values than those treated in subclause 5.5.1.3.5 and cases of 5GMM cause values #11 #15 #22 #31 #36 #72 #73 #74 #75 #76 #77 #78 #79 #80 #81 and #82 if considered as abnormal cases according to subclause 5.5.1.3.5

upon reception of the 5GMM causes #95 #96 #97 #99 and #111 the UE should set the registration attempt counter to 5

the UE shall proceed as described below

e) lower layer failure release of the NAS signalling connection received from lower layers before the REGISTRATION ACCEPT or REGISTRATION REJECT message is received

the UE shall abort the registration procedure and proceed as described below

e1) lower layer failure the lower layers indicate that the RRC connection has been suspended without a cell change before the REGISTRATION ACCEPT or REGISTRATION REJECT message is received

the registration procedure for mobility and periodic registration update shall be aborted and re-initiated immediately the UE shall set the 5GS update status to 5U2 NOT UPDATED

f) change in the current TAI

if the current TAI is changed before the registration procedure for mobility and periodic registration update is completed the registration procedure for mobility and periodic registration update shall be aborted and re-initiated immediately the UE shall set the 5GS update status to 5U2 NOT UPDATED

g) registration procedure for mobility and periodic registration update and de-registration procedure collision

if the UE receives a DEREGISTRATION REQUEST message without 5GMM cause value #11 #12 #13 #15 #36 #62 #74 #75 or #78 before the registration procedure for mobility and periodic registration update has been completed the registration procedure for mobility and periodic registration update shall be aborted and the de-registration procedure shall be progressed

if the UE receives a DEREGISTRATION REQUEST message with 5GMM cause value #11 #12 #13 #15 #36 #62 #74 #75 or #78 before the registration procedure for mobility and periodic registration update has been completed the registration procedure for mobility and periodic registration update shall be progressed and the de-registration procedure shall be aborted

NOTE 2 the registration procedure for mobility and periodic registration update shall be aborted only if the DEREGISTRATION REQUEST message indicates in the access type that the access in which the registration procedure for mobility and periodic registration update was attempted shall be de-registered otherwise both the procedures shall be progressed

h) void

i) transmission failure of REGISTRATION REQUEST message indication from the lower layers or the lower layers indicate that the RRC connection has been suspended with a cell change

the registration procedure for mobility and periodic registration update shall be aborted and re-initiated immediately the UE shall set the 5GS update status to 5U2 NOT UPDATED

j) transmission failure of REGISTRATION COMPLETE message indication with change in the current TAI

if the current TAI is not in the TAI list the registration procedure for mobility and periodic registration update shall be aborted and re-initiated immediately the UE shall set the 5GS update status to 5U2 NOT UPDATED

if the current TAI is still part of the TAI list it is up to the UE implementation how to re-run the ongoing procedure

k) transmission failure of REGISTRATION COMPLETE message indication without change in the current TAI

it is up to the UE implementation how to re-run the ongoing procedure

l) UE-initiated de-registration required

if the de-registration procedure is triggered due to removal of USIM or entry update in the "list of subscriber data" due to switch off or due to the last running Tsor-cm timer expired or was stopped

the registration procedure for mobility and periodic registration update shall be aborted and the UE initiated de-registration procedure shall be performed the UE shall populate the 5GS mobile identity IE in the DEREGISTRATION REQUEST message with the same UE identity as used in the REGISTRATION REQUEST message for the aborted mobility and periodic registration update procedure;

otherwise

the UE initiated de-registration procedure shall be initiated after successful completion of the registration procedure for mobility and periodic registration update

m) timer T3447 is running

the UE shall not start any registration procedure for mobility and registration update with uplink data status IE or Follow-on request indicator set to "Follow-on request pending" unless

1) the UE received a paging;

2) the UE is a UE configured for high priority access in selected PLMN;

3) the UE has an emergency PDU session established or is establishing an emergency PDU session;

4) the UE receives a request from the upper layers to perform emergency services fallback; or

5) the MUSIM UE needs to request a new 5G-GUTI assignment as specified in subclause 5.5.1.3.2

the UE stays in the current serving cell and applies the normal cell reselection process the mobility and periodic registration update procedure is started if still necessary when timer T3447 expires or timer T3447 is stopped

n) timer T3448 is running

the UE in 5GMM-IDLE mode shall not start any mobility and periodic registration update procedure with Follow-on request indicator set to "Follow-on request pending" unless

1) the UE is a UE configured for high priority access in selected PLMN;

2) the UE which is only using 5GS services with control plane CIoT 5GS optimization received a paging request;

3) the UE in NB-N1 mode is requested by the upper layer to transmit user data related to an exceptional event and the UE is allowed to use exception data reporting (see the ExceptionDataReportingAllowed leaf of the NAS configuration MO in 3GPP TS 24.368 [17] or the USIM file EFNASCONFIG in 3GPP TS 31.102 [22]);

4) the UE has an emergency PDU session established or is establishing an emergency PDU session; or

5) the UE receives a request from the upper layers to perform emergency services fallback

the UE stays in the current serving cell and applies the normal cell reselection process the mobility and periodic registration update procedure is started if still necessary when timer T3448 expires

o) UE is not registered to the access other than the access the REGISTRATION ACCEPT message is received and the 5GS registration result value in the 5GS registration result IE value in the REGISTRATION ACCEPT message is set to "3GPP access and non-3GPP access"

the UE shall consider itself as being registered to only the access where the REGISTRATION ACCEPT message is received

p) access for localized services in current SNPN is no longer allowed

if the mobility and periodic registration update is not for initiating an emergency PDU session the registered SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) and

- access for localized services in SNPN is disabled; or

- the validity information for the selected SNPN is no longer met;

the UE shall reset the registration attempt counter stop T3510 abort the registration procedure for mobility and periodic registration update locally release the NAS signalling connection if any and enter state 5GMM-REGISTERED.LIMITED-SERVICE or 5GMM-REGISTERED.PLMN-SEARCH in order to perform SNPN selection according to 3GPP TS 23.122 [5]

for the cases c d and e the UE shall proceed as follows

timer T3510 shall be stopped if still running

if the registration procedure is not for initiating an emergency PDU session the registration attempt counter shall be incremented unless it was already set to 5

if the registration attempt counter is less than 5

- if the TAI of the current serving cell is not included in the TAI list or the 5GS update status is different to 5U1 UPDATED or if the registration procedure was triggered due to cases c g n v in subclause 5.5.1.3.2 the UE shall start timer T3511 shall set the 5GS update status to 5U2 NOT UPDATED and change to state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE when timer T3511 expires the registration update procedure is triggered again

- if the TAI of the current serving cell is included in the TAI list the 5GS update status is equal to 5U1 UPDATED and the UE is not performing the registration procedure after an inter-system change from S1 mode to N1 mode the UE shall keep the 5GS update status to 5U1 UPDATED and enter state 5GMM-REGISTERED.NORMAL-SERVICE or 5GMM-REGISTERED.NON-ALLOWED-SERVICE (as described in subclause 5.3.5.2) the UE shall start timer T3511 if in addition the REGISTRATION REQUEST message did not include the MICO indication IE or the extended DRX IE and

- the REGISTRATION REQUEST message indicated "periodic registration updating";

- the registration procedure was initiated to recover the NAS signalling connection due to "RRC connection failure" from the lower layers;

- the registration procedure was initiated when the UE in 5GMM-CONNECTED mode over 3GPP access or 5GMM-CONNECTED mode with RRC inactive indication receives a fallback indication from lower layers; or

- the registration procedure was initiated by the UE in 5GMM-CONNECTED mode with RRC inactive indication entering a cell in the current registration area belonging to an equivalent PLMN of the registered PLMN and not belonging to the registered PLMN

and none of the other reasons for initiating the registration updating procedure listed in subclause 5.5.1.3.2 was applicable the timer T3511 may be stopped when the UE enters 5GMM-CONNECTED mode

- if the TAI of the current serving cell is included in the TAI list the 5GS update status is equal to 5U1 UPDATED and the UE is performing the registration procedure after an inter-system change from S1 mode to N1 mode the UE shall change the 5GS update status to 5U2 NOT UPDATED and enter state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE the UE shall start timer T3511

- if the procedure is performed via 3GPP access and the UE is operating in single-registration mode the UE shall in addition handle the EPS update status as specified in 3GPP TS 24.301 [15] for the abnormal cases when a normal or periodic tracking area updating procedure fails and the tracking area attempt counter is less than 5 and the EPS update status is different from EU1 UPDATED

if the registration attempt counter is equal to 5

- the UE shall start timer T3502 if the value of the timer as indicated by the network is not zero shall set the 5GS update status to 5U2 NOT UPDATED

- the UE shall delete the list of equivalent PLMNs (if any) or the list of equivalent SNPNs (if any) if the UE is not registering or has not registered to the same PLMN over both 3GPP access and non-3GPP access and shall change to state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE or optionally to 5GMM-REGISTERED.PLMN-SEARCH in order to perform a PLMN selection SNPN selection or SNPN selection for onboarding services according to 3GPP TS 23.122 [5]

- if the value of T3502 as indicated by the network is zero the UE shall perform the actions defined for the expiry of the timer T3502

NOTE 3 for case e) if the lower layer failure is on a cell which was selected due to network slice-based cell reselection (see 3GPP TS 23.501 [8]) the UE can as an implementation option change the S-NSSAI(s) in the requested NSSAI to try and find a suitable NR cell

- if the procedure is performed via 3GPP access and the UE is operating in single-registration mode

- the UE shall in addition handle the EPS update status as specified in 3GPP TS 24.301 [15] for the abnormal cases when a normal or periodic tracking area updating procedure fails and the tracking area attempt counter is equal to 5; and

- if the UE does not change to state 5GMM-REGISTERED.PLMN-SEARCH the UE shall attempt to select E-UTRAN radio access technology the UE may disable the N1 mode capability as specified in subclause 4.9

##### 5.5.1.3.8 abnormal cases on the network side

the following abnormal cases can be identified

a) lower layer failure

if a lower layer failure occurs before the message REGISTRATION COMPLETE has been received from the UE and timer T3550 is running the AMF shall abort the procedure enter 5GMM-IDLE mode

if a new 5G-GUTI was assigned to the UE in the REGISTRATION ACCEPT message the AMF shall consider both the old and new 5G-GUTIs as valid until the old 5G-GUTI can be considered as invalid by the AMF if a new TAI list was provided in the REGISTRATION ACCEPT message both the old and new TAI lists shall also be considered valid until the old TAI list can be considered invalid by the AMF if the old 5G-GUTI was allocated by an AMF other than the current AMF the current AMF does not need to retain the old 5G-GUTI

additionally if the REGISTRATION ACCEPT message includes

1) negotiated PEIPS assistance information IE

i) containing a new paging subgroup ID and the UE is previously assigned a different paging subgroup ID then the AMF shall consider both the old and new paging subgroup IDs as valid until the old paging subgroup ID can be considered as invalid by the AMF; or

NOTE 0 if the UE was not previously assigned a paging subgroup ID by the AMF then AMF informs RAN about the new PEIPS assistance information i.e. paging subgroup ID and it is up to RAN how to handle the old information at RAN and new information from AMF so that the paging is not missed

ii) containing no paging subgroup ID or no negotiated PEIPS assistance information IE then the AMF shall delete any old paging subgroup ID stored in the 5GMM context of the UE

2) negotiated WUS assistance information IE

i) containing a new UE paging probability information value and the UE is previously assigned a different UE paging probability information value then the AMF shall consider both the old and new UE paging probability information values as valid until the old UE paging probability information value can be considered as invalid by the AMF; or

ii) containing no UE paging probability information value or no negotiated WUS assistance information IE then the AMF shall delete any old UE paging probability information value stored in the 5GMM context of the UE

during this period

1) if the new 5G-GUTI is used by the UE in a subsequent message then

i) the AMF shall consider the old 5G-GUTI as invalid and additionally the old TAI list as invalid if a new TAI list was provided with the new 5G-GUTI in the REGISTRATION ACCEPT message;

ii) if the AMF assigns a new paging subgroup ID to the UE in the REGISTRATION ACCEPT message then the AMF shall consider the new paging subgroup ID as valid and the old paging subgroup ID if any as invalid; and

iii) if the AMF assigns a new UE paging probability information value in the negotiated WUS assistance information IE to the UE in the REGISTRATION ACCEPT message then the AMF shall consider the new UE paging probability information value as valid and the old UE paging probability information value if any as invalid

2) if the old 5G-GUTI is used by the UE in a subsequent message the AMF may use the identification procedure followed by a generic UE configuration update procedure if the AMF in the REGISTRATION ACCEPT message

i) assigns a new paging subgroup ID to the UE then the AMF shall include the PEIPS assistance information; or

ii) does not assign a paging subgroup ID to the UE then the AMF shall not include the PEIPS assistance information;

and initiate the generic UE configuration update procedure; and

3) if the UE needs to be paged

i) if in the REGISTRATION ACCEPT message a new paging subgroup ID in the negotiated PEIPS assistance information IE is assigned to the UE

- that previously has no paging subgroup ID assigned then the AMF shall use the new paging subgroup ID for paging the UE;

- that is same as the old paging subgroup ID then the AMF shall use the same paging subgroup ID for paging the UE; or

- that is different than the old paging subgroup ID then the AMF may first use the old paging subgroup ID followed by the new paging subgroup ID for paging the UE

ii) if in the REGISTRATION ACCEPT message a new UE paging probability information value in the negotiated WUS assistance information IE is assigned to the UE

- that previously has no UE paging probability information value assigned then the AMF shall use the new UE paging probability information value for paging the UE;

- that is same as the old UE paging probability information value then the AMF shall use the same UE paging probability information value for paging the UE; or

- that is different than the old UE paging probability information value then the AMF may first use the old UE paging probability information value followed by the new UE paging probability information value for paging the UE

iii) the AMF selects the 5G-GUTI and TAI list as follows

- the AMF may first use the old 5G-S-TMSI from the old 5G-GUTI for paging within the area defined by the old TAI list for an implementation dependent number of paging attempts using the selected paging subgroup ID or the selected UE paging probability information value in the WUS assistance information IE if a new TAI list was provided in the REGISTRATION ACCEPT message the new TAI list should also be used for paging upon response from the UE the AMF may initiate the generic UE configuration update procedure if the response is received from a tracking area within the old and new TAI list the network shall initiate the generic UE configuration update procedure if in the REGISTRATION ACCEPT message a new paging subgroup ID was assigned to the UE that is different than the old paging subgroup ID then the network shall initiate the generic UE configuration update procedure; and

- if no response is received to the paging attempts using the old 5G-S-TMSI from the old 5G-GUTI and the old paging subgroup ID or the old UE paging probability information value in the WUS assistance information IE the AMF may use the new 5G-S-TMSI from the new 5G-GUTI and the new paging subgroup ID or the new UE paging probability information value in the WUS assistance information IE if any for paging for an implementation dependent number of paging attempts in this case if a new TAI list was provided with the new 5G-GUTI in the REGISTRATION ACCEPT message the new TAI list shall be used instead of the old TAI list

b) protocol error

if the REGISTRATION REQUEST message has been received with a protocol error the AMF shall return a REGISTRATION REJECT message with one of the following 5GMM cause values

#96 invalid mandatory information;

#99 information element non-existent or not implemented;

#100 conditional IE error; or

#111 protocol error unspecified

c) T3550 time out

on the first expiry of the timer the AMF shall retransmit the REGISTRATION ACCEPT message and shall reset and restart timer T3550 the retransmission is performed four times i.e on the fifth expiry of timer T3550 the registration procedure for mobility and periodic registration update procedure is aborted

during this period the AMF acts as described for case a) above

d) REGISTRATION REQUEST with 5GS registration type IE set to "mobility registration updating" or "periodic registration updating" received after the REGISTRATION ACCEPT message has been sent and before the REGISTRATION COMPLETE message is received if the REGISTRATION COMPLETE message is expected

1) if one or more of the information elements in the REGISTRATION REQUEST message differ from the ones received within the previous REGISTRATION REQUEST message the previously initiated registration procedure for mobility and periodic registration update shall be aborted if the REGISTRATION COMPLETE message has not been received and the new registration procedure for mobility and periodic registration update shall be progressed; or

2) if the information elements do not differ then the REGISTRATION ACCEPT message shall be resent and timer T3550 shall be restarted in that case the retransmission counter related to timer T3550 is not incremented

e) more than one REGISTRATION REQUEST message with 5GS registration type IE set to "mobility registration updating" or "periodic registration updating" received and neither REGISTRATION ACCEPT message nor REGISTRATION REJECT message has been sent

1) if one or more of the information elements in the REGISTRATION REQUEST message differs from the ones received within the previous REGISTRATION REQUEST message the previously initiated registration procedure for mobility and periodic registration update shall be aborted and the new registration procedure for mobility and periodic registration update shall be progressed; or

2) if the information elements do not differ then the network shall continue with the previous registration procedure for mobility and periodic registration update and shall not treat any further this REGISTRATION REQUEST message

f) lower layers indication of non-delivered NAS PDU due to handover

if the REGISTRATION ACCEPT message or REGISTRATION REJECT message could not be delivered due to an intra AMF handover and the target TA is included in the TAI list then upon successful completion of the intra AMF handover the AMF shall retransmit the REGISTRATION ACCEPT message or REGISTRATION REJECT message if a failure of the handover procedure is reported by the lower layer and the N1 NAS signalling connection exists the AMF shall retransmit the REGISTRATION ACCEPT message or REGISTRATION REJECT message

g) DEREGISTRATION REQUEST message received before REGISTRATION COMPLETE message is received if the REGISTRATION COMPLETE message is expected

if the De-registration type IE is set to "switch off"

the AMF shall abort the signalling for the registration procedure for mobility and periodic registration update towards the UE and shall progress the de-registration procedure as described in subclause 5.5.2.2

NOTE 1 internally in the AMF before processing the de-registration request the AMF can perform the necessary signalling procedures for the registration procedure for mobility and periodic registration update before progressing the de-registration procedure

if the De-registration type IE is set to other type than "switch off"

the AMF shall proceed with registration procedure for mobility and periodic registration update and shall progress the de-registration procedure after successful completion of the registration procedure for mobility and periodic registration update

h) if the REGISTRATION REQUEST message with 5GS registration type IE indicating "periodic registration updating" is received by the new AMF which does not have the 5GMM context data related to the subscription the new AMF may send the REGISTRATION REJECT message with 5GMM cause #10 "implicitly de-registered"

i) based on operator policy if the mobility and periodic registration update request from a UE not supporting CAG is rejected due to CAG restrictions the network shall reject the mobility and periodic registration update request with a 5GMM cause value other than the 5GMM cause #76 (Not authorized for this CAG or authorized for CAG cells only)

NOTE 2 5GMM cause #7 (5GS services not allowed) 5GMM cause #11 (PLMN not allowed) 5GMM cause #27 (N1 mode not allowed) 5GMM cause #73 (Serving network not authorized) can be used depending on the subscription of the UE and whether the UE roams or not

### 5.5.2 De-registration procedure

#### 5.5.2.1 general

the de-registration procedure is used

a) by the UE to de-register for 5GS services over 3GPP access when the UE is registered over 3GPP access;

b) by the UE to de-register for 5GS services over non-3GPP access when the UE is registered over non-3GPP access;

c) by the UE to de-register for 5GS services over 3GPP access non-3GPP access or both when the UE is registered in the same PLMN over both accesses;

c1) by the UE to de-register for 5GS services over 3GPP access when an event is triggered in the UE that would make the UE unavailable for a certain period of time and the UE is not able to store its 5GMM and 5GSM contexts;

NOTE 1 if the UE is able to store its 5GMM and 5GSM contexts the UE triggers the registration procedure for mobility and periodic registration update

d) by the network to inform the UE that it is deregistered for 5GS services over 3GPP access when the UE is registered over 3GPP access;

e) by the network to inform the UE that it is deregistered for 5GS services over non-3GPP access when the UE is registered over non-3GPP access;

f) by the network to inform the UE that it is deregistered for 5GS services over 3GPP access non-3GPP access or both when the UE is registered in the same PLMN over both accesses;

g) by the network to inform the UE to re-register to the network;

h) by the network to inform the UE supporting UAS service that it is deregistered for UAS services in 5GS; and

i) by the network to inform the UE operating as MBSR that it is deregistered for MBSR in 5GS

the de-registration procedure with appropriate de-registration type shall be invoked by the UE

a) if the UE is switched off;

b) as part of the ecall inactivity procedure defined in subclause 5.5.3; and

c) as part of USIM removal

the de-registration procedure with appropriate de-registration type shall be invoked by the network

a) if the network informs whether the UE should re-register to the network

the de-registration procedure with appropriate access type shall be invoked by the UE

a) to de-register for 5GS services over 3GPP access when the UE is registered over 3GPP access;

b) to de-register for 5GS services over non-3GPP access when the UE is registered over non-3GPP access;

c) to de-register for 5GS services over 3GPP access non-3GPP access or both when the UE is registered in the same PLMN over both accesses; or

d) to de-register for 5GS services over 3GPP access if the UE is registered for disaster roaming over 3GPP access and has successfully registered over non-3GPP access on another PLMN;

e) void

the de-registration procedure with appropriate access type shall be invoked by the network

a) if the network needs to inform the UE that it is deregistered over 3GPP access when the UE is registered over 3GPP access;

b) if the network needs to inform the UE that it is deregistered over non-3GPP access when the UE is registered over non-3GPP access; or

c) if the network needs to inform the UE that it is deregistered over 3GPP access non-3GPP access or both when the UE is registered in the same PLMN over both accesses

if the de-registration procedure is triggered due to USIM removal the UE shall indicate "switch off" in the De-registration type IE

if the de-registration procedure is requested by the network for a UE that has an emergency PDU session the AMF shall not send a DEREGISTRATION REQUEST message to the UE and indicate to the SMF to release all non-emergency PDU sessions as specified in 3GPP TS 23.502 [9]

if the de-registration procedure for 5GS services is performed a local release of the PDU sessions over the indicated access(es) if any for this particular UE is performed if a PDU session that will be released is associated with one or more multicast MBS sessions the UE is considered as removed from the associated multicast MBS sessions

the UE is allowed to initiate the de-registration procedure even if the timer T3346 is running

NOTE 2 when the UE has no PDU sessions over non-3GPP access or the UE moves all the PDU sessions over a non-3GPP access to a 3GPP access the UE and the AMF need not initiate de-registration over the non-3GPP access

the AMF shall provide the UE with a non-3GPP de-registration timer

when the AMF enters the state 5GMM-DEREGISTERED for 3GPP access the AMF shall delete the stored UE radio capability information or the UE radio capability ID if any

when upper layers indicate that emergency services are no longer required the UE if still registered for emergency services may perform UE-initiated de-registration procedure followed by a re-registration to regain normal services if the UE is in or moves to a suitable cell

if the UE is registered for onboarding services in SNPN after completing the configuration of one or more entries of the "list of subscriber data" the UE should perform UE-initiated de-registration procedure to prevent the UE registered for onboarding services in SNPN from staying on the ON-SNPN or to prevent a UE whose subscription only allows for configuration of SNPN subscription parameters in PLMN via the user plane from staying registered indefinitely when an implementation specific timer expires

- if the AMF considers that the UE is in 5GMM-IDLE the AMF shall locally de-registers the UE; or

- if the UE is in 5GMM-CONNECTED the AMF shall initiate the network-initiated de-registration procedure (see subclause 5.5.2.3)

NOTE 3 the value of the implementation specific timer for onboarding services needs to be large enough to allow a UE to complete the configuration of one or more entries of the "list of subscriber data" taking into consideration that configuration of SNPN subscription parameters in PLMN via the user plane or onboarding services in SNPN involves third party entities outside of the operator's network

NOTE 4 how to determine the completion of the configuration of one or more entries of the "list of subscriber data" is UE implementation specific

if the de-registration procedure is not due to switch off and upper layers request establishing an emergency PDU session before the de-registration procedure has been completed the UE shall abort the de-registration procedure perform local de-registration and initiate a registration procedure

if the UE in 5GMM-CONNECTED mode determines to obtain service on a higher priority PLMN due to SOR then based on the conditions as specified in 3GPP TS 23.122 [5] annex c where applicable the UE shall perform UE-initiated de-registration procedure

if the UE is registered for disaster roaming services and the UE receives an indication of whether disaster roaming is enabled in the UE set to "Disaster roaming is disabled in the UE" in a UE parameters update transparent container the UE shall perform UE-initiated de-registration procedure

#### 5.5.2.2 UE-initiated de-registration procedure

##### 5.5.2.2.1 UE-initiated de-registration procedure initiation

the de-registration procedure is initiated by the UE by sending a DEREGISTRATION REQUEST message (see example in figure 5.5.2.2.1) the De-registration type IE included in the message indicates whether the de-registration procedure is due to a "switch off" or not the access type included in the message indicates whether the de-registration procedure is

a) for 5GS services over 3GPP access when the UE is registered over 3GPP access;

b) for 5GS services over non-3GPP access when the UE is registered over non-3GPP access; or

c) for 3GPP access non-3GPP access or both when the UE is registered in the same PLMN over both accesses

if the UE has a valid 5G-GUTI the UE shall populate the 5GS mobile identity IE with the valid 5G-GUTI

NOTE 1 in some abnormal cases the 5G-GUTI can be a 5G-GUTI mapped from a valid native 4G-GUTI (see subclause 5.5.1.2.7 item f and subclause 5.5.1.3.7 item l

if the UE does not have a valid 5G-GUTI the UE shall populate the 5GS mobile identity IE with its SUCI as follows

a) if timer T3519 is not running and the de-registration is not due to USIM removal generate a fresh SUCI as specified in 3GPP TS 33.501 [24] send a DEREGISTRATION REQUEST message with the SUCI start timer T3519 and store the value of the SUCI sent in the DEREGISTRATION REQUEST message; and

b) if timer T3519 is running send a DEREGISTRATION REQUEST message with the stored SUCI

if the UE does not have a valid 5G-GUTI and it does not have a valid SUCI then the UE shall populate the 5GS mobile identity IE with its PEI

NOTE 2 during the initial registration for emergency services when the UE (with no USIM or invalid USIM) is in 5GMM-REGISTERED-INITIATED state the UE has neither a valid 5G-GUTI nor a valid SUCI

if the de-registration request is not due to switch off and the UE is in the state 5GMM-REGISTERED or 5GMM-REGISTERED-INITIATED timer T3521 shall be started in the UE after the DEREGISTRATION REQUEST message has been sent the UE shall enter the state 5GMM-DEREGISTERED-INITIATED

if the UE is to be switched off the UE shall try for a period of 5 seconds to send the DEREGISTRATION REQUEST message during this period the UE may be switched off as soon as the DEREGISTRATION REQUEST message has been sent

if the network indicated support for the unavailability period in the last registration procedure; and an event is triggered in the UE that would make the UE unavailable for a certain period the use of unavailability period is not due to NR satellite access discontinuous coverage and the UE is unable to store its 5GMM and 5GSM contexts the UE shall include the unavailability period duration in the unavailability information IE set the unavailability type to "unavailability due to UE reasons" and set the De-registration type IE to "Normal de-registration" in the DEREGISTRATION REQUEST message the UE shall start the timer T3521 and enter the state 5GMM-DEREGISTERED-INITIATED

if the UE is sending the DEREGISTRATION REQUEST message from 5GMM-IDLE mode and the UE needs to send non-cleartext IEs the UE shall send the DEREGISTRATION REQUEST message including the NAS message container IE as described in subclause 4.4.6

the 5G-RG shall not initiate the de-registration procedure for itself until it successfully de-registers all the AUN3 devices connected to it if any by initiating the de-registration procedure on behalf of the AUN3 device

figure 5.5.2.2.1.1 UE-initiated de-registration procedure

##### 5.5.2.2.2 UE-initiated de-registration procedure completion

when the DEREGISTRATION REQUEST message is received by the AMF the AMF shall send a DEREGISTRATION ACCEPT message to the UE if the De-registration type IE does not indicate "switch off" otherwise the procedure is completed when the AMF receives the DEREGISTRATION REQUEST message

the UE when receiving the DEREGISTRATION ACCEPT message shall stop timer T3521 stop timer T3519 if running and delete any stored SUCI

##### 5.5.2.2.3 UE-initiated de-registration procedure completion for 5GS services over 3GPP access

if the access type in the DEREGISTRATION REQUEST message indicates that the de-registration procedure is for 3GPP access the AMF shall trigger the SMF to perform a local release of the PDU session(s) established over 3GPP access if any for this UE the UE shall perform a local release of the PDU session(s) established over 3GPP access if any if a PDU session is associated with one or more multicast MBS sessions the UE shall locally leave the associated multicast MBS sessions and the SMF shall consider the UE as removed from the associated multicast MBS sessions if there is an MA PDU session with user plane resources established on both 3GPP access and non-3GPP access in the same PLMN or in different PLMNs the AMF shall trigger SMF to perform release of user plane resources on 3GPP access and the UE shall consider the user plane resources on 3GPP access as released if there is an MA PDU session with user plane resources established on 3GPP access only the AMF shall trigger the SMF to perform a local release of the MA PDU session and the UE shall perform a local release of the MA PDU session if the MA PDU session is associated with one or more MBS multicast sessions the UE shall locally leave the associated MBS multicast sessions the UE is marked as inactive in the AMF for 5GS services for 3GPP access the AMF shall enter the state 5GMM-DEREGISTERED for 3GPP access

if the UE supports N1 mode only and the de-registration request is not due to switch off then

a) if the de-registration procedure was performed due to disabling of 5GS services then the UE shall enter the 5GMM-NULL state for 3GPP access;

b) otherwise the UE shall enter the 5GMM-DEREGISTERED state for 3GPP access

NOTE case b) is applicable when the UE is also registered over non-3GPP access

if the access type indicates that the de-registration procedure is for 3GPP access or for 3GPP access and non-3GPP access and the UE is operating in single-registration mode it shall additionally proceed as specified in 3GPP TS 24.301 [15] subclause 5.5.2.2.2 for the case when the UE receives an EMM message DETACH ACCEPT

furthermore if the UE supports A/Gb or iu mode and the de-registration procedure was not performed

- due to the last running Tsor-cm timer expired or was stopped (see 3GPP TS 23.122 [5]) subclause C.4.2);

- as part of ecall inactivity procedure;or

- due to switch off;

the UE shall disable the N1 mode capability for 3GPP access

##### 5.5.2.2.4 UE-initiated de-registration procedure completion for 5GS services over non-3GPP access

if the access type in the DEREGISTRATION REQUEST indicates that the de-registration procedure is for non-3GPP access the AMF shall trigger SMF to perform a local release of the PDU session(s) established over non-3GPP access if any for this UE the UE shall perform a local release of the PDU session(s) established over non-3GPP access if any if there is an MA PDU session with user plane resources established on both 3GPP access and non-3GPP access in the same PLMN or in different PLMNs the AMF shall trigger SMF to perform release of user plane resources on non-3GPP access and the UE shall consider the user plane resources on non-3GPP access as released if there is an MA PDU session with a PDN connection as a user-plane resource and user plane resources established on non-3GPP access the AMF shall trigger SMF to perform release of user plane resources on non-3GPP access and the UE shall consider the user plane resources on non-3GPP access as released if the UE has an MA PDU session with user plane resources established on non-3GPP access only the AMF shall trigger the SMF to perform a local release of the MA PDU session and the UE shall perform a local release of the MA PDU session the UE is marked as inactive in the AMF for 5GS services for non-3GPP access the AMF shall enter the state 5GMM-DEREGISTERED over non-3GPP access

if the de-registration request is not due to switch off the UE shall

a) if the de-registration procedure was performed due to disabling of 5GS services enter the 5GMM-NULL state for non-3GPP access;

b) otherwise enter the 5GMM-DEREGISTERED state for non-3GPP access

NOTE case b) is applicable when the UE is also registered over 3GPP access

##### 5.5.2.2.5 UE-initiated de-registration procedure completion for 5GS services over both 3GPP access and non-3GPP access

if the access type in the DEREGISTRATION REQUEST indicates that the de-registration procedure is for both 3GPP access and non-3GPP access when the UE is registered in the same PLMN over both accesses the descriptions for UE-initiated de-registration procedure completion for 5GS services over 3GPP access and over non-3GPP access as specified in subclauses 5.5.2.2.3 and 5.5.2.2.4 shall be followed

##### 5.5.2.2.6 abnormal cases in the UE

the following abnormal cases can be identified

a) lower layer failure or release of the N1 NAS signalling connection before reception of DEREGISTRATION ACCEPT message

the de-registration procedure shall be aborted and the UE proceeds as follows

1) if the de-registration procedure was performed due to disabling of 5GS services the UE shall enter the 5GMM-NULL state; or

2) if the de-registration type "normal de-registration" was requested for reasons other than disabling of 5GS services the UE shall enter the 5GMM-DEREGISTERED state

b) the lower layers indicate that the access attempt is barred

the UE shall not start the signalling for the de-registration procedure the UE stays in the current serving cell and applies the normal cell reselection process receipt of the access barred indication shall not trigger the selection of a different core network type (EPC or 5GCN)

the UE may perform a local de-registration either immediately or after an implementation-dependent time

the signalling for the de-registration procedure is started if still needed when the lower layers indicate that the barring is alleviated for the access category with which the access attempt was associated

ba) the lower layers indicate that

1) access barring is applicable for all access categories except categories 0 and 2 and the access category with which the access attempt was associated is other than 0 and 2; or

2) access barring is applicable for all access categories except category 0 and the access category with which the access attempt was associated is other than 0

if the DEREGISTRATION REQUEST message has not been sent the UE shall proceed as specified for case b if the DEREGISTRATION REQUEST message has been sent the UE shall proceed as specified for case a

c) T3521 timeout

if the de-registration procedure was performed based on conditions specified in 3GPP TS 23.122 [5] annex c on the expiry of timer T3521 the de-registration procedure shall be aborted and the UE shall locally release the established N1 NAS signalling connection and enter the 5GMM-DEREGISTERED state

otherwise on the first four expiries of the timer the UE shall retransmit the DEREGISTRATION REQUEST message and shall reset and restart timer T3521 on the fifth expiry of timer T3521 the de-registration procedure shall be aborted and the UE proceeds as follows

1) if the de-registration procedure was performed due to disabling of 5GS services the UE shall enter the 5GMM-NULL state; or

2) if the de-registration type "normal de-registration" was requested for reasons other than disabling of 5GS services the UE shall enter the 5GMM-DEREGISTERED state

d) De-registration procedure collision

De-registration containing de-registration type "switch off"

- if the UE receives a DEREGISTRATION REQUEST message before the UE-initiated de-registration procedure has been completed this message shall be ignored and the UE-initiated de-registration procedure shall continue

otherwise

- if the UE receives a DEREGISTRATION REQUEST message before the UE-initiated de-registration procedure has been completed it shall treat the message as specified in subclause 5.5.2.3.2 with the following modification

- if the DEREGISTRATION REQUEST message received by the UE contains de-registration type "re-registration required" and the UE-initiated de-registration procedure is with de-registration type "normal de-registration"

- if the access type included in the DEREGISTRATION REQUEST message sent by the UE is same as access type sent by the network the UE need not initiate the registration procedure for initial registration; or

- if the access type included in the DEREGISTRATION REQUEST message sent by the UE is not same as access type sent by the network the UE shall initiate the registration procedure for initial registration for the access type not indicated in the DEREGISTRATION REQUEST message sent by the UE but indicated by the network

e) De-registration and 5GMM common procedure collision

De-registration containing De-registration type IE indicating "switch off"

- if the UE receives a message used in a 5GMM common procedure before the de-registration procedure has been completed this message shall be ignored and the de-registration procedure shall continue

otherwise

- if the UE receives a CONFIGURATION UPDATE COMMAND message before the de-registration procedure has been completed the UE shall ignore the CONFIGURATION UPDATE COMMAND message and proceed with the de-registration procedure;

- if the UE receives a message used in a 5GMM common procedure other than a CONFIGURATION UPDATE COMMAND message before the de-registration procedure has been completed both the 5GMM common procedure and the de-registration procedure shall continue; or

- if the UE receives a DL NAS TRANSPORT message containing payload container type "Service-level-AA container" before the de-registration procedure has been completed this message shall be ignored and the de-registration procedure shall continue

f) change in the current TAI

if that the current TAI is not in the stored TAI list before the UE-initiated de-registration procedure is completed the UE proceeds as follows

1) if the de-registration procedure was initiated for reasons other than removal of the USIM the UE is to be switched off or due to the last running Tsor-cm timer expired or was stopped (see 3GPP TS 23.122 [5] subclause C.4.2) the de-registration procedure shall be aborted and re-initiated after successfully performing a registration procedure for mobility or periodic update used for mobility (i.e the 5GS registration type IE set to "mobility registration updating" in the REGISTRATION REQUEST message); or

2) if the de-registration procedure was initiated due to removal of the USIM or the UE is to be switched off or due to the last running Tsor-cm timer expired or was stopped (see 3GPP TS 23.122 [5] subclause C.4.2) the UE shall abort the de-registration procedure perform a local de-registration and enter the state 5GMM-DEREGISTERED

g) transmission failure of DEREGISTRATION REQUEST message indication with change in the current TAI

if the current TAI is not in the TAI list the UE proceeds as follows

1) if the de-registration procedure was initiated for reasons other than removal of the USIM the UE is to be switched off or due to the last running Tsor-cm timer expired or was stopped (see 3GPP TS 23.122 [5] subclause C.4.2) the de-registration procedure shall be aborted and re-initiated after successfully performing a registration procedure for mobility or periodic update; or

2) if the de-registration procedure was initiated due to removal of the USIM or the UE is to be switched off or due to the last running Tsor-cm timer expired or was stopped (see 3GPP TS 23.122 [5] subclause C.4.2) the UE shall abort the de-registration procedure perform a local de-registration and enter the state 5GMM-DEREGISTERED

if the current TAI is still part of the TAI list the UE shall restart the de-registration procedure

h) transmission failure of DEREGISTRATION REQUEST message indication without change in the current TAI

the UE shall restart the de-registration procedure

i) the lower layers indicate that the RRC connection has been suspended

De-registration containing De-registration type IE indicating "switch off"

- the UE may perform a local de-registration either immediately or after an implementation-dependent time

otherwise

- the UE shall wait for an implementation-dependent time and shall restart the de-registration procedure if still needed upon expiry of the implementation-dependent time

for the cases a f g and i

- timer T3521 shall be stopped if still running

##### 5.5.2.2.7 abnormal cases in the network side

the following abnormal cases can be identified

a) De-registration request received in a cell belonging to an SNPN with a non-globally-unique SNPN identity for which the UE has no valid subscription

if the UE initiates a de-registration procedure in a cell belonging to an SNPN with a non-globally-unique SNPN identity for which the UE has no valid subscription and the de-registration procedure is not due to "switch off" the network shall initiate the de-registration procedure the AMF shall send a DEREGISTRATION REQUEST message including the 5GMM cause #74 "Temporarily not authorized for this SNPN"

b) De-registration request received in a cell belonging to an SNPN with a globally-unique SNPN identity for which the UE has no valid subscription

if the UE initiates a de-registration procedure in a cell belonging to an SNPN with a globally-unique SNPN identity for which the UE has no valid subscription and the de-registration procedure is not due to "switch off" the network shall initiate the de-registration procedure the AMF shall send a DEREGISTRATION REQUEST message including the 5GMM cause #75 "Permanently not authorized for this SNPN"

c) De-registration request received in a CAG cell and none of the CAG ID broadcasted by the CAG cell is authorized based on the UE's "allowed CAG list" for the current PLMN

if the UE initiates a de-registration procedure in a CAG cell and none of the CAG ID broadcasted by the CAG cell is authorized based on the UE's "allowed CAG list" for the current PLMN and the de-registration procedure is not due to "switch off" the AMF shall initiate the de-registration procedure the AMF shall send a DEREGISTRATION REQUEST message including the 5GMM cause #76 "Not authorized for this CAG or authorized for CAG cells only" if the UE supports CAG otherwise the network shall operate as described in bullet g) of subclause 5.5.2.3.5

d) De-registration request received in a non-CAG cell from a UE whose "CAG information list" includes an entry associated with the current PLMN where the entry contains an "indication that the UE is only allowed to access 5GS via CAG cells"

if the UE initiates a de-registration procedure in a non-CAG cell from a UE whose "CAG information list" includes an entry associated with the current PLMN where the entry contains an "indication that the UE is only allowed to access 5GS via CAG cells" and the de-registration procedure is not due to "switch off" the AMF shall initiate the de-registration procedure the AMF shall send a DEREGISTRATION REQUEST message including the 5GMM cause #76 "Not authorized for this CAG or authorized for CAG cells only" if the UE supports CAG otherwise the network shall operate as described in bullet g) of subclause 5.5.2.3.5

e) De-registration and registration procedure for initial registration collision

if the network receives a REGISTRATION REQUEST message indicating either "initial registration" or "emergency registration" in the 5GS registration type IE from the UE before the UE-initiated de-registration procedure which is not due to switch off has been completed the network shall abort the de-registration procedure and the registration procedure shall be progressed

#### 5.5.2.3 Network-initiated de-registration procedure

##### 5.5.2.3.1 Network-initiated de-registration procedure initiation

the network initiates the de-registration procedure by sending a DEREGISTRATION REQUEST message to the UE (see example in figure 5.5.2.3.1.1)

NOTE 1 if the AMF performs a local de-registration it will inform the UE with a 5GMM messages (e.g SERVICE REJECT message or REGISTRATION REJECT message) with 5GMM cause #10 "implicitly de-registered" only when the UE initiates a 5GMM procedure

the network may include a 5GMM cause IE to specify the reason for the DEREGISTRATION REQUEST message the network shall start timer T3522 the network shall indicate whether re-registration is needed or not in the De-registration type IE the network shall also indicate via the access type whether the de-registration procedure is

a) for 3GPP access only;

b) for non-3GPP access only; or

c) for 3GPP access non-3GPP access or both when the UE is registered in the same PLMN for both accesses

if the network de-registration is triggered due to network slice-specific authentication and authorization failure or revocation as specified in subclause 4.6.2.4 then the network shall set the 5GMM cause value to #62 "No network slices available" in the DEREGISTRATION REQUEST message in addition if the UE supports extended rejected NSSAI the AMF shall include the extended rejected NSSAI IE in the DEREGISTRATION REQUEST message; otherwise the AMF shall include the rejected NSSAI IE in the DEREGISTRATION REQUEST message

in roaming scenarios if the extended rejected NSSAI IE is included in the DEREGISTRATION REQUEST message the AMF shall provide mapped S-NSSAI(s) for the rejected NSSAI

if the UE supports extended rejected NSSAI and the network de-registration is triggered due to mobility management based network slice admission control as specified in subclause 4.6.2.5 then the network shall set the 5GMM cause value to #62 "No network slices available" in the DEREGISTRATION REQUEST message in addition the network may include a back-off timer value for each S-NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" in the extended rejected NSSAI IE of the DEREGISTRATION REQUEST message

if the network de-registration is triggered for a UE supporting CAG due to CAG restrictions the network shall set the 5GMM cause value to #76 "Not authorized for this CAG or authorized for CAG cells only" and should include the "CAG information list" in the CAG information list IE or the extended CAG information list IE in the DEREGISTRATION REQUEST message

NOTE 2 if the UE supports extended CAG information list the CAG information list can be included either in the CAG information list IE or extended CAG information list IE

NOTE 3 it is unexpected for network to send REGISTRATION REJECT message to the UE with 5GMM cause value #76 in non-CAG cell and not indicate "Indication that the UE is only allowed to access 5GS via CAG cells" for the serving PLMN in the extended CAG information list or the CAG information list

if the network de-registration is triggered for a UE not supporting CAG due to CAG restrictions the network shall operate as described in bullet g) of subclause 5.5.2.3.5

if the network de-registration is triggered because the network determines that the UE is in a location where the network is not allowed to operate see 3GPP TS 23.502 [9] the network shall set the 5GMM cause value in the DEREGISTRATION REQUEST message to #78 "PLMN not allowed to operate at the present UE location"

if

a) the UE indicates support of the RAT utilization control in the REGISTRATION REQUEST message over 3GPP access; and

b) the network determines to apply the RAT utilization control based on the operator policy;

the AMF shall send the DEREGISTRATION REJECT message with the 5GMM cause value set to #15 "No suitable cells in tracking area" and include the RAT utilization control IE in the RAT utilization control IE the AMF shall indicate that the access technology of the NG-RAN cell on which the DEREGISTRATION REQUEST message is sent as restricted

NOTE 3A other restricted access technologies can be indicated in the RAT utilization control IE if any

if the network de-registration is triggered due to

a) an unsuccessful outcome of an ongoing UUAA-MM procedure;

b) an UUAA revocation notification received from the UAS-NF for a UE supporting UAS service requesting UAS services; or

c) the UE not allowed to use UAS services via 5GS due to a change of the aerial UE subscription information

then the network shall set the 5GMM cause value in the DEREGISTRATION REQUEST message to #79 "UAS services not allowed"

NOTE 4 if the UE supporting UAS service has requested other services than UAS services or if there are other ongoing network slice-specific authentication and authorization on pending NSSAIs it is then an operator policy or configuration decision whether to keep the UE supporting UAS service registered to the network but that UE supporting UAS services is not allowed to access UAS services via 5GS as specified in 3GPP TS 23.256 [6AB]

if the network de-registration is triggered for a UE supporting MINT due to a disaster condition no longer being applicable in the current location of the UE the network shall set the 5GMM cause value to #11 "PLMN not allowed" and may include a disaster return wait range in the disaster return wait range IE in the DEREGISTRATION REQUEST message

if the network de-registration is triggered because the AMF determines that by UE subscription and operator's preferences all of the TAIs received from the satellite NG-RAN are forbidden for roaming or for regional provision of service the AMF shall include the TAI(s) in

a) the forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" IE; or

b) the forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service" IE; or

c) both;

in the DEREGISTRATION REQUEST message

if the network de-registration is triggered because the AMF determines that the UE operating as an IAB-node by subscription is not authorized for IAB-node operation the AMF shall set the 5GMM cause value to #36 "IAB-node operation not authorized" in the DEREGISTRATION REQUEST message

if the network de-registration is triggered for a UE operating as MBSR due to the UE no longer being allowed to operate as MBSR based on the UE subscription and the local policy and

a) if the UE is allowed to operate as a UE then the network shall indicate "re-registration required" in the De-registration type IE of the DEREGISTRATION REQUEST message; or

b) if the UE is not allowed to operate as a UE then the network shall indicate "re-registration not required" in the De-registration type IE of the DEREGISTRATION REQUEST message based on the local policy

if the network de-registration is triggered due to the UE that was not allowed for MBSR operation becoming allowed to operate as MBSR based on the UE subscription and the local policy then the network shall indicate "re-registration required" in the De-registration type IE of the DEREGISTRATION REQUEST message

the AMF shall trigger the SMF to release locally the PDU session(s) over the indicated access(es) if any for the UE and enter state 5GMM-DEREGISTERED-INITIATED if a PDU session is associated with one or more multicast MBS sessions the SMF shall consider the UE as removed from the associated multicast MBS sessions

figure 5.5.2.3.1.1 Network-initiated de-registration procedure

##### 5.5.2.3.2 Network-initiated de-registration procedure completion by the UE

upon receiving the DEREGISTRATION REQUEST message if the DEREGISTRATION REQUEST message indicates "re-registration required" and the de-registration request is for 3GPP access the UE shall perform a local release of the PDU sessions over 3GPP access if any if a PDU session is associated with one or more multicast MBS sessions the UE shall locally leave the associated multicast MBS sessions if there is an MA PDU session with user plane resources established on both 3GPP access and non-3GPP access in the same PLMN or in different PLMNs the UE shall perform a local release of the user plane resources on 3GPP access if there is an MA PDU session with user plane resources established on 3GPP access only the UE shall perform a local release of the MA PDU session if the MA PDU session is associated with one or more multicast MBS sessions the UE shall locally leave the associated multicast MBS sessions the UE shall stop the timer(s) T3346 T3396 T3584 T3585 and 5GSM back-off timer(s) not related to congestion control (see subclause 6.2.12) if running if the UE is operating in single-registration mode the UE shall also stop the ESM back-off timer(s) not related to congestion control (see subclause 6.3.6 in 3GPP TS 24.301 [15]) if running the UE shall send a DEREGISTRATION ACCEPT message to the network and enter the state 5GMM-DEREGISTERED for 3GPP access furthermore the UE shall after the completion of the de-registration procedure and the release of the existing NAS signalling connection if any Tsor-cm timer(s) were running and have stopped the UE shall attempt to obtain service on a higher priority PLMN (see 3GPP TS 23.122 [5]) on 3GPP access otherwise initiate an initial registration the UE should also re-establish any previously established PDU sessions over 3GPP access for any previously established MA PDU sessions with user plane resources established on both accesses the UE should also re-establish the user plane resources over 3GPP access and for any previously established MA PDU sessions with user plane resources established only on the 3GPP access the UE should re-establish the MA PDU session over 3GPP access

upon receiving the DEREGISTRATION REQUEST message if the DEREGISTRATION REQUEST message indicates "re-registration required" and the de-registration request is for non-3GPP access the UE shall perform a local release of the PDU sessions over non-3GPP access if any if there is an MA PDU session with user plane resources established on both 3GPP access and non-3GPP access in the same PLMN or in different PLMNs the UE shall perform a local release of the user plane resources on non-3GPP access if there is an MA PDU session with a PDN connection as a user-plane resource and user plane resources established on non-3GPP access the UE shall perform a local release of the user plane resources on non-3GPP access if there is an MA PDU session with user plane resources established on non-3GPP access only the UE shall perform a local release of the MA PDU session the UE shall stop the timer(s) T3346 T3396 T3584 and T3585 if it is running the UE shall send a DEREGISTRATION ACCEPT message to the network and enter the state 5GMM-DEREGISTERED for non-3GPP access furthermore the UE shall after the completion of the de-registration procedure and the release of the existing NAS signalling connection initiate an initial registration over non-3GPP the UE should also re-establish any previously established PDU sessions over non-3GPP access for any previously established MA PDU sessions with user plane resources established on both accesses the UE should also re-establish the user plane resources over non-3GPP access and for any previously established MA PDU sessions with user plane resources established only on the non-3GPP access the UE should re-establish the MA PDU session over non-3GPP access and for any previously established MA PDU sessions with a PDN connection as a user-plane resource and user plane resources established on non-3GPP access the UE should re-establish the user plane resources over non-3GPP access

upon receiving the DEREGISTRATION REQUEST message if the DEREGISTRATION REQUEST message indicates "re-registration required" and the de-registration request is for both 3GPP access and non-3GPP access when the UE is registered in the same PLMN for both accesses the UE shall perform a local release of the MA PDU sessions and PDU sessions over both 3GPP access and non-3GPP access if any if an MA PDU session or a PDU sessions is associated with one or more multicast MBS sessions the UE shall locally leave the associated multicast MBS sessions the UE shall stop the timer(s) T3346 T3396 T3584 and T3585 if it is running the UE shall send a DEREGISTRATION ACCEPT message to the network and enter the state 5GMM-DEREGISTERED for both 3GPP access and non-3GPP access furthermore the UE shall after the completion of the de-registration procedure and the release of the existing NAS signalling connection if any Tsor-cm timer(s) were running and have stopped the UE shall attempt to obtain service on a higher priority PLMN (see 3GPP TS 23.122 [5]) on 3GPP access otherwise initiate an initial registration over both 3GPP access and non-3GPP access the UE should also re-establish any previously established PDU sessions over both 3GPP access and non-3GPP access for any previously established MA PDU sessions the UE should also re-establish the MA PDU session and the user plane resources which were established previously

NOTE 1 when the De-registration type IE indicates "re-registration required" user interaction is necessary in some cases when the UE cannot re-establish the PDU session (s) if any automatically

upon receiving the DEREGISTRATION REQUEST message if the DEREGISTRATION REQUEST message indicates "re-registration not required" and the de-registration request is for 3GPP access the UE shall perform a local release of the PDU sessions over 3GPP access if any if a PDU session is associated with one or more multicast MBS sessions the UE shall locally leave the associated multicast MBS sessions if there is an MA PDU session with user plane resources established on both 3GPP access and non-3GPP access in the same PLMN or in different PLMNs the UE shall perform a local release of the user plane resources on 3GPP access if there is an MA PDU session with user plane resources established on 3GPP access only the UE shall perform a local release of the MA PDU session if the MA PDU session is associated with one or more multicast MBS sessions the UE shall locally leave the associated multicast MBS sessions the UE shall send a DEREGISTRATION ACCEPT message to the network and enter the state 5GMM-DEREGISTERED for 3GPP access

upon receiving the DEREGISTRATION REQUEST message if the DEREGISTRATION REQUEST message indicates "re-registration not required" and the de-registration request is for non-3GPP access the UE shall perform a local release of the PDU sessions over non-3GPP access if any if there is an MA PDU session with user plane resources established on both 3GPP access and non-3GPP access in the same PLMN or in different PLMNs the UE shall perform a local release of the user plane resources on non-3GPP access if there is an MA PDU session with a PDN connection as a user-plane resource and user plane resources established on non-3GPP access the UE shall perform a local release of the user plane resources on non-3GPP access if there is an MA PDU session with user plane resources established on non-3GPP access only the UE shall perform a local release of the MA PDU session the UE shall send a DEREGISTRATION ACCEPT message to the network and enter the state 5GMM-DEREGISTERED for non-3GPP access

upon receiving the DEREGISTRATION REQUEST message if the DEREGISTRATION REQUEST message indicates "re-registration not required" and the de-registration request is for both 3GPP access and non-3GPP access when the UE is registered in the same PLMN for both accesses the UE shall perform a local release of the MA PDU sessions and PDU sessions over both 3GPP access and non-3GPP access if any if an MA PDU session or a PDU session is associated with one or more multicast MBS sessions the UE shall locally leave the associated multicast MBS sessions the UE shall send a DEREGISTRATION ACCEPT message to the network and enter the state 5GMM-DEREGISTERED for both 3GPP access and non-3GPP access

upon receiving the DEREGISTRATION REQUEST message if the DEREGISTRATION REQUEST message includes the rejected NSSAI the UE takes the following actions based on the rejection cause in the rejected S-NSSAI(s)

"S-NSSAI not available in the current PLMN or SNPN"

the UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the current PLMN or SNPN as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN or SNPN over any access until switching off the UE the UICC containing the USIM is removed an entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated if the UE does not support access to an SNPN using credentials from a credentials holder and equivalent SNPNs the selected entry of the "list of subscriber data" is updated if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both or the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2

"S-NSSAI not available in the current registration area"

the UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the current registration area as described in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current registration area over the current access until switching off the UE the UE moving out of the current registration area the UICC containing the USIM is removed an entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated or the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2

"S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization"

the UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the failed or revoked NSSAA as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN or SNPN over any access until switching off the UE the UICC containing the USIM is removed the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated or the rejected S-NSSAI(s) are removed as described in subclause 4.6.1 and 4.6.2.2

"S-NSSAI not available due to maximum number of UEs reached"

unless the back-off timer value received along with the S-NSSAI is zero the UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the maximum number of UEs reached as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN or SNPN over the current access until switching off the UE the UICC containing the USIM is removed the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated or the rejected S-NSSAI(s) are removed as described in subclauses 4.6.1 and 4.6.2.2

NOTE 2 if the back-off timer value received along with the S-NSSAI in the rejected NSSAI for the maximum number of UEs reached is zero as specified in subclause 10.5.7.4a of 3GPP TS 24.008 [12] the UE does not consider the S-NSSAI as the rejected S-NSSAI

if there is one or more S-NSSAIs in the rejected NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" then for each S-NSSAI the UE shall behave as follows

a) stop the timer T3526 associated with the S-NSSAI if running;

b) start the timer T3526 with

1) the back-off timer value received along with the S-NSSAI if a back-off timer value is received along with the S-NSSAI that is neither zero nor deactivated; or

2) an implementation specific back-off timer value if no back-off timer value is received along with the S-NSSAI; and

c) remove the S-NSSAI from the rejected NSSAI for the maximum number of UEs reached when the timer T3526 associated with the S-NSSAI expires

upon sending a DEREGISTRATION ACCEPT message the UE shall delete the rejected NSSAI as specified in subclause 4.6.2.2

regardless of the 5GMM cause value received in the DEREGISTRATION REQUEST message via satellite NG-RAN

-- if the UE receives the forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" IE in the DEREGISTRATION REQUEST message the UE shall store the TAI(s) belonging to the serving PLMN or equivalent PLMN(s) and ignore the TAI(s) which do not belong to the serving PLMN or equivalent PLMN(s) included in the IE if not already stored into the list of "5GS forbidden tracking areas for roaming"; and

- if the UE receives the forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service" IE in the DEREGISTRATION REQUEST message the UE shall store the TAI(s) belonging to the serving PLMN or equivalent PLMN(s) and ignore the TAI(s) which do not belong to the serving PLMN or equivalent PLMN(s) included in the IE if not already stored into the list of "5GS forbidden tracking areas for regional provision of service"

upon receiving the DEREGISTRATION REQUEST message for the 5G-RG the 5G-RG shall delete the contexts of the AUN3 devices behind the 5G-RG if any

NOTE 2A the 5G-RG can identify whether the received DEREGISTRATION REQUEST message is targeting the 5G-RG or an AUN3 device behind the 5G-RG via W-CP protocol as specified in 3GPP TS 23.316 [6D]

if the De-registration type IE indicates "re-registration required" then the UE shall ignore the 5GMM cause IE if received

if the De-registration type IE indicates "re-registration not required" the UE shall take the actions depending on the received 5GMM cause value

#3 (Illegal UE);

#6 (Illegal ME)

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list and ngKSI

- in case of PLMN the UE shall consider the USIM as invalid for 5GS services until switching off the UICC containing the USIM is removed or the timer T3245 expires as described in subclause 5.3.19A.1;

in case of SNPN if the UE is not registered for onboarding services in SNPN and the UE does not support access to an SNPN using credentials from a credentials holder and does not support equivalent SNPNs the UE shall consider the selected entry of the "list of subscriber data" with the SNPN identity of the current SNPN as invalid until the UE is switched off the entry is updated or the timer T3245 expires as described in subclause 5.3.19A.2 in case of SNPN if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the UE shall consider the selected entry of the "list of subscriber data" as invalid for 3GPP access until the UE is switched off the entry is updated or the timer T3245 expires as described in subclause 5.3.19A.2 additionally if EAP based primary authentication and key agreement procedure using EAP-AKA' or 5G AKA based primary authentication and key agreement procedure was performed in the current SNPN the UE shall consider the USIM as invalid for the current SNPN until switching off the UICC containing the USIM is removed or the timer T3245 expires as described in subclause 5.3.19A.2

if the UE is not registered for onboarding services in SNPN the UE shall delete the list of equivalent PLMNs (if any) or the list of equivalent SNPNs (if any) and shall enter the state 5GMM-DEREGISTERED.NO-SUPI

if the de-registration request is for 3GPP access only or for both 3GPP access and non-3GPP access and the UE is operating in single-registration mode the UE shall handle the EMM parameters EMM state EPS update status 4G-GUTI TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when a DETACH REQUEST is received with the EMM cause with the same value and with detach type set to "re-attach not required" the USIM shall be considered as invalid also for non-EPS services until switching off or the UICC containing the USIM is removed or the timer T3245 expires as described in subclause 5.3.7a in 3GPP TS 24.301 [15]

if the UE is registered for onboarding services in SNPN the UE shall reset the registration attempt counter store the SNPN identity in the "permanently forbidden SNPN for onboarding services in SNPN" list enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection or an SNPN selection for onboarding services according to 3GPP TS 23.122 [5]

if the UE also supports the registration procedure over the other access the UE shall in addition handle 5GMM parameters and 5GMM state for this access as described for this 5GMM cause value

#7 (5GS services not allowed)

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list and ngKSI

in case of PLMN the UE shall consider the USIM as invalid for 5GS services until switching off the UICC containing the USIM is removed or the timer T3245 expires as described in subclause 5.3.19A.1;

in case of SNPN if the UE is not registered for onboarding services in SNPN and the UE does not support access to an SNPN using credentials from a credentials holder and does not support equivalent SNPNs the UE shall consider the selected entry of the "list of subscriber data" with the SNPN identity of the current SNPN as invalid for 5GS services until the UE is switched off or the entry is updated or the timer T3245 expires as described in subclause 5.3.19A.2 in case of SNPN if the UE is not registered for onboarding services in SNPN and the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the UE shall consider the selected entry of the "list of subscriber data" as invalid for 3GPP access until the UE is switched off the entry is updated or the timer T3245 expires as described in subclause 5.3.19A.2 additionally if EAP based primary authentication and key agreement procedure using EAP-AKA' or 5G AKA based primary authentication and key agreement procedure was performed in the current SNPN the UE shall consider the USIM as invalid for the current SNPN until switching off the UICC containing the USIM is removed or the timer T3245 expires as described in subclause 5.3.19A.2

if the UE is not registered for onboarding services in SNPN the UE shall enter the state 5GMM-DEREGISTERED.NO-SUPI

if the de-registration request is for 3GPP access only or for both 3GPP access and non-3GPP access and and the UE is operating in single-registration mode the UE shall handle the EMM parameters EMM state EPS update status 4G-GUTI last visited registered TAI TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when a DETACH REQUEST is received with the EMM cause with the same value and with detach type set to "re-attach not required"

if the UE is registered for onboarding services in SNPN the UE shall reset the registration attempt counter store the SNPN identity in the "permanently forbidden SNPNs for onboarding services in SNPN" list enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection or an SNPN selection for onboarding services according to 3GPP TS 23.122 [5]

if the UE also supports the registration procedure over the other access the UE shall in addition handle 5GMM parameters and 5GMM state for this access as described for this 5GMM cause value

#11 (PLMN not allowed)

this cause value received from a cell belonging to an SNPN and the UE is operating in SNPN access operation mode is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.2.3.4

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list and ngKSI the UE shall delete the list of equivalent PLMNs shall reset the registration attempt counter for 3GPP access the UE shall enter the state 5GMM-DEREGISTERED.PLMN-SEARCH and for non-3GPP access the UE shall enter state 5GMM-DEREGISTERED.LIMITED-SERVICE

the UE shall store the PLMN identity in the forbidden PLMN list as specified in subclause 5.3.13A and if the UE is configured to use timer T3245 then the UE shall start timer T3245 and proceed as described in subclause 5.3.19A.1

for 3GPP access the UE shall perform a PLMN selection according to 3GPP TS 23.122 [5] and for non-3GPP access the UE shall perform network selection as defined in 3GPP TS 24.502 [18]

if the de-registration request is for 3GPP access only or for both 3GPP access and non-3GPP access and the UE is operating in single-registration mode the UE shall handle the EMM parameters EMM state EPS update status 4G-GUTI last visited registered TAI TAI list eKSI and attach attempt counter as specified in 3GPP TS 24.301 [15] for the case when a DETACH REQUEST is received with the EMM cause with the same value and with detach type set to "re-attach not required"

if the UE also supports the registration procedure over the other access to the same PLMN the UE shall in addition handle 5GMM parameters and 5GMM state for this access as described for this 5GMM cause value

if the UE receives the disaster return wait range IE in the DEREGISTRATION REQUEST message and the UE supports MINT the UE shall delete the disaster return wait range stored in the ME if any and store the disaster return wait range included in the disaster return wait range IE in the ME

#12 (Tracking area not allowed)

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete last visited registered TAI and TAI list if the UE is not registering or has not registered to the same PLMN over both 3GPP access and non-3GPP access the UE shall additionally delete 5G-GUTI and ngKSI the UE shall reset the registration attempt counter and shall enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE

if the UE is not operating in SNPN access operation mode and the forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service" IE is not included in the DEREGISTRATION REQUEST message the UE shall store the current TAI in the list of "5GS forbidden tracking areas for regional provision of service" otherwise the UE shall store the current TAI in the list of "5GS forbidden tracking areas for regional provision of service" for the current SNPN and the selected entry of the "list of subscriber data" or the selected PLMN subscription if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5] subclause 3.9) the UE shall store the current TAI in the list of "5GS forbidden tracking areas for regional provision of service" for the current SNPN and the selected entry of the "list of subscriber data" or the selected PLMN subscription along with the GIN(s) broadcasted by the SNPN if any

if the de-registration request is for 3GPP access only or for both 3GPP access and non-3GPP access and the UE is operating in single-registration mode the UE shall handle the EMM parameters EMM state EPS update status 4G-GUTI last visited registered TAI TAI list eKSI and attach attempt counter as specified in 3GPP TS 24.301 [15] for the case when a DETACH REQUEST is received with the EMM cause with the same value and with detach type set to "re-attach not required"

#13 (Roaming not allowed in this tracking area)

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete last visited registered TAI and TAI list if the UE is not registering or has not registered to the same PLMN over both 3GPP access and non-3GPP access the UE shall additionally delete 5G-GUTI ngKSI and the list of equivalent PLMNs (if available) or the list of equivalent SNPNs (if available) the UE shall reset the registration attempt counter for 3GPP access the UE shall change to state 5GMM-DEREGISTERED.PLMN-SEARCH and for non-3GPP access the UE shall change to state 5GMM-DEREGISTERED.LIMITED-SERVICE

if the UE is not operating in SNPN access operation mode and the forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" IE is not included in the DEREGISTRATION REQUEST message the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" otherwise the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and the selected entry of the "list of subscriber data" or the selected PLMN subscription if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5] subclause 3.9) the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and the selected entry of the "list of subscriber data" or the selected PLMN subscription along with the GIN(s) broadcasted by the SNPN if any

for 3GPP access the UE shall perform a PLMN selection or SNPN selection according to 3GPP TS 23.122 [5] and for non-3GPP access the UE shall perform network selection as defined in 3GPP TS 24.502 [18]

if the de-registration request is for 3GPP access only or for both 3GPP access and non-3GPP access and the UE is operating in single-registration mode the UE shall handle the EMM parameters EMM state EPS update status 4G-GUTI last visited registered TAI TAI list eKSI and attach attempt counter as specified in 3GPP TS 24.301 [15] for the case when a DETACH REQUEST is received with the EMM cause with the same value and with detach type set to "re-attach not required"

#15 (No suitable cells in tracking area)

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any last visited registered TAI and TAI list if the UE is not registering or has not registered to the same PLMN over both 3GPP access and non-3GPP access the UE shall additionally delete 5G-GUTI and ngKSI the UE shall reset the registration attempt counter and shall enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE

if the UE is not operating in SNPN access operation mode and the forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" IE is not included in the DEREGISTRATION REQUEST message the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" otherwise the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and the selected entry of the "list of subscriber data" or the selected PLMN subscription if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5] subclause 3.9) the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and the selected entry of the "list of subscriber data" or the selected PLMN subscription along with the GIN(s) broadcasted by the SNPN if any

if the RAT utilization control IE is present in DEREGISTRATION REQUEST message the UE shall store the received RAT utilization control information together with the PLMN identity of the current PLMN in the list of "PLMNs with associated RAT restrictions" and replace the previously stored one associated with the current PLMN if any with the newly received RAT utilization control information

the UE shall search for a suitable cell in another tracking area according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C]

if the de-registration request is for 3GPP access only or for both 3GPP access and non-3GPP access and the UE is operating in single-registration mode the UE shall handle the EMM parameters EMM state EPS update status 4G-GUTI last visited registered TAI TAI list eKSI and attach attempt counter as specified in 3GPP TS 24.301 [15] for the case when a DETACH REQUEST is received with the EMM cause with the same value and with detach type set to "re-attach not required"

if received over non-3GPP access and de-registration request is for non-3GPP access only the cause shall be considered as an abnormal case and the behaviour of the UE for this case is specified in subclause 5.5.2.3.4

#22 (Congestion)

if the T3346 value IE is present in the DEREGISTRATION REQUEST message and the value indicates that this timer is neither zero nor deactivated the UE shall proceed as described below otherwise it shall be considered as an abnormal case and the behaviour of the UE for this case is specified in subclause 5.5.2.3.4

the UE shall stop timer T3346 if it is running set the 5GS update status to 5U2 NOT UPDATED reset the registration attempt counter and enter the state 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION

the UE shall start timer T3346 with the value provided in the T3346 value IE

if the de-registration request is for 3GPP access only or for both 3GPP access and non-3GPP access and the UE is operating in the single-registration mode the UE shall set the EPS update status to EU2 NOT UPDATED reset the attach attempt counter and shall enter the state EMM-DEREGISTERED

#27 (N1 mode not allowed)

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list and ngKSI additionally the UE shall reset the registration attempt counter and shall enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE

the UE shall disable the N1 mode capability for both 3GPP access and non-3GPP access (see subclause 4.9)

if the de-registration request is for 3GPP access only or for both 3GPP access and non-3GPP access and the UE is operating in single-registration mode the UE shall in addition set the EPS update status to EU3 ROAMING NOT ALLOWED and shall delete any 4G-GUTI last visited registered TAI TAI list and eKSI additionally the UE shall reset the attach attempt counter and enter the state EMM-DEREGISTERED

#36 (IAB-node operation not authorized)

this cause value is only applicable when received over 3GPP access by a UE operating as an IAB-node this cause value received from a 5G access network other than 3GPP access or received by a UE not operating as an IAB-node is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.2.3.4

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list and ngKSI

if

1) the UE is not operating in SNPN access operation mode

i) the UE shall delete the list of equivalent PLMNs and reset the registration attempt counter and store the PLMN identity in the forbidden PLMN list as specified in subclause 5.3.13A and if the UE is configured to use timer T3245 then the UE shall start timer T3245 and proceed as described in subclause 5.3.19a.1 the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform a PLMN selection according to 3GPP TS 23.122 [5]; and

ii) if the UE is operating in single-registration mode the UE shall in addition handle the EMM parameters EMM state EPS update status 4G-GUTI last visited registered TAI TAI list eKSI and attach attempt counter as specified in 3GPP TS 24.301 [15] for the case when DETACH REQUEST is received with the EMM cause with the same value and with detach type set to "re-attach not required"; or

2) the UE is operating in SNPN access operation mode

i) the UE shall reset the registration attempt counter and store the SNPN identity in the "temporarily forbidden SNPNs" list for 3GPP access and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the selected entry of the "list of subscriber data" or the selected PLMN subscription or "temporarily forbidden SNPNs for access for localized services in SNPN" list if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) for 3GPP access and the selected entry of the "list of subscriber data" or the selected PLMN subscription or the selected PLMN subscription or in the "temporarily forbidden SNPNs for onboarding services in SNPN" list if the UE is performing initial registration for onboarding services in SNPN for 3GPP access if the UE supports access to an SNPN using credentials from a credentials holder the UE shall store the SNPN identity in the "temporarily forbidden SNPNs" list along with the GIN(s) broadcasted by the SNPN if any for the selected entry of the "list of subscriber data" or the selected PLMN subscription if the UE supports access to an SNPN providing access for localized services in SNPN and the access for localized services in SNPN has been enabled the UE shall store the SNPN identity in the list of "temporarily forbidden SNPNs for access for localized services in SNPN" (if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) along with the GIN(s) broadcasted by the SNPN if any for the selected entry of the "list of subscriber data" or the selected PLMN subscription the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection according to 3GPP TS 23.122 [5]

#62 (No network slices available)

the UE shall set the 5GS update status to 5U2 NOT UPDATED and enter state 5GMM-DEREGISTERED.NORMAL-SERVICE or 5GMM-DEREGISTERED.PLMN-SEARCH additionally the UE shall reset the registration attempt counter

the UE receiving the rejected NSSAI in the DEREGISTRATION REQUEST message takes the following actions based on the rejection cause in the rejected S-NSSAI(s)

"S-NSSAI not available in the current PLMN or SNPN"

the UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the current PLMN or SNPN as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current PLMN or SNPN over any access until switching off the UE the UICC containing the USIM is removed an entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated or the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2

"S-NSSAI not available in the current registration area"

the UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the current registration area as described in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current registration area over the current access until switching off the UE the UE moving out of the current registration area the UICC containing the USIM is removed the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated or the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2

"S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization"

the UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the failed or revoked NSSAA as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN or SNPN over any access until switching off the UE the UICC containing the USIM is removed the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated or the rejected S-NSSAI(s) are removed as described in subclause 4.6.1 and 4.6.2.2

"S-NSSAI not available due to maximum number of UEs reached"

unless the back-off timer value received along with the S-NSSAI is zero the UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the maximum number of UEs reached as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN or SNPN over the current access until switching off the UE the UICC containing the USIM is removed the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated or the rejected S-NSSAI(s) are removed as described in subclauses 4.6.1 and 4.6.2.2

NOTE 3 if the back-off timer value received along with the S-NSSAI in the rejected NSSAI for the maximum number of UEs reached is zero as specified in subclause 10.5.7.4a of 3GPP TS 24.008 [12] the UE does not consider the S-NSSAI as the rejected S-NSSAI

if there is one or more S-NSSAIs in the rejected NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" then for each S-NSSAI the UE shall behave as follows

a) stop the timer T3526 associated with the S-NSSAI if running;

b) start the timer T3526 with

1) the back-off timer value received along with the S-NSSAI if a back-off timer value is received along with the S-NSSAI that is neither zero nor deactivated; or

2) an implementation specific back-off timer value if no back-off timer value is received along with the S-NSSAI; and

c) remove the S-NSSAI from the rejected NSSAI for the maximum number of UEs reached when the timer T3526 associated with the S-NSSAI expires

if the UE has an allowed NSSAI or configured NSSAI that contains S-NSSAI(s) which are not included in the rejected NSSAI the UE may stay in the current serving cell apply the normal cell reselection process and start an initial registration with a requested NSSAI that includes any S-NSSAI from the allowed NSSAI or the configured NSSAI that is not in the rejected NSSAI otherwise the UE may perform a PLMN selection or SNPN selection according to 3GPP TS 23.122 [5] and additionally the UE may disable the N1 mode capability for the current PLMN or SNPN if the UE does not have an allowed NSSAI and each S-NSSAI in configured NSSAI if available was rejected with cause "S-NSSAI not available in the current PLMN or SNPN" or "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization" as described in subclause 4.9

if the UE has neither allowed NSSAI for the current PLMN or SNPN nor configured NSSAI for the current PLMN or SNPN and

1) if at least one S-NSSAI in the default configured NSSAI is not rejected the UE may stay in the current serving cell apply the normal cell reselection process and start an initial registration with a requested NSSAI with that default configured NSSAI; or

2) if all the S-NSSAI(s) in the default configured NSSAI are rejected and at least one S-NSSAI is rejected due to "S-NSSAI not available in the current registration area"

i) if the UE is not operating in SNPN access operation mode and the forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" IE is not included in the DEREGISTRATION REQUEST message the UE shall store the TAI(s) belonging to current registration area in the list of "5GS forbidden tracking areas for roaming" memorize the TAI(s) belonging to current registration area were stored in the list of "5GS forbidden tracking areas for roaming" for S-NSSAI is rejected due to "S-NSSAI not available in the current registration area" and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE the UE shall search for a suitable cell in another tracking area not belonging to current registration area according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C]; or

ii) if the UE is operating in SNPN access operation mode the UE shall store the TAI(s) belonging to current registration area in the list of "5GS forbidden tracking areas for roaming" memorize the TAI(s) belonging to current registration area were stored in the list of "5GS forbidden tracking areas for roaming" for S-NSSAI is rejected due to "S-NSSAI not available in the current registration area" for the current SNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the selected entry of the "list of subscriber data" or the selected PLMN subscription and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE the UE shall search for a suitable cell in another tracking area not belonging to current registration area according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C]

3) otherwise the UE may perform a PLMN selection or SNPN selection according to 3GPP TS 23.122 [5] and additionally the UE may disable the N1 mode capability for the current PLMN or SNPN if each S-NSSAI in the default configured NSSAI was rejected with cause "S-NSSAI not available in the current PLMN or SNPN" or "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization" as described in subclause 4.9

if

1) the UE has allowed NSSAI for the current PLMN or SNPN or configured NSSAI for the current PLMN or SNPN or both and all the S-NSSAIs included in the allowed NSSAI or the configured NSSAI or both are rejected; or

2) the UE has neither allowed NSSAI for the current PLMN or SNPN nor configured NSSAI for the current PLMN or SNPN and all the S-NSSAIs included in the default configured NSSAI are rejected

and the UE has rejected NSSAI for the maximum number of UEs reached and the UE wants to obtain services in the current serving cell without performing a PLMN selection or SNPN selection the UE may stay in the current serving cell and attempt to use the rejected S-NSSAI(s) for the maximum number of UEs reached in the current serving cell after the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2

if the de-registration request is for 3GPP access only or for both 3GPP access and non-3GPP access and the UE is operating in single-registration mode the UE shall in addition set the EPS update status to EU2 NOT UPDATED reset the attach attempt counter and enter the state EMM-DEREGISTERED

#72 (Non-3GPP access to 5GCN not allowed)

if received over non-3GPP access when the UE is registered over non-3GPP access or received over 3GPP access and de-registration request is for non-3GPP access when the UE is registered in the same PLMN for both accesses the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete 5G-GUTI last visited registered TAI TAI list and ngKSI for non-3GPP access additionally the UE shall reset the registration attempt counter and enter the state 5GMM-DEREGISTERED for non-3GPP access

NOTE 4 the 5GMM sublayer states the 5GMM parameters and the registration status are managed per access type independently i.e 3GPP access or non-3GPP access (see subclauses 4.7.2 and 5.1.3)

the UE shall disable the N1 mode capability for non-3GPP access (see subclause 4.9.3)

as an implementation option if the UE is not currently registered over 3GPP access the UE may enter the state 5GMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection according to 3GPP TS 23.122 [5]

if received over 3GPP access and de-registration request is for 3GPP access only the cause shall be considered as an abnormal case and the behaviour of the UE for this case is specified in subclause 5.5.2.3.4

#74 (Temporarily not authorized for this SNPN)

5GMM cause #74 is only applicable when received from a cell belonging to an SNPN and the UE is operating in SNPN access operation mode 5GMM cause #74 received from a cell not belonging to an SNPN is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.2.3.4

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list ngKSI and the list of equivalent SNPNs (if available) the UE shall reset the registration attempt counter and shall store the SNPN identity in the "temporarily forbidden SNPNs" list or "temporarily forbidden SNPNs for access for localized services in SNPN" list if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) for the specific access type for which the message was received and the selected entry of the "list of subscriber data" or the selected PLMN subscription or in the "temporarily forbidden SNPNs for onboarding services in SNPN" list if the UE is registered for onboarding services in SNPN for the specific access type for which the message was received if the UE supports access to an SNPN using credentials from a credentials holder the UE shall store the SNPN identity in the "temporarily forbidden SNPNs" list along with the GIN(s) broadcasted by the SNPN if any for the selected entry of the "list of subscriber data" or the selected PLMN subscription if the UE supports access to an SNPN providing access for localized services in SNPN and the access for localized services in SNPN has been enabled the UE shall store the SNPN identity in the list of "temporarily forbidden SNPNs for access for localized services in SNPN" (if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) along with the GIN(s) broadcasted by the SNPN if any for the selected entry of the "list of subscriber data" or the selected PLMN subscription if the UE is not registered for onboarding services in SNPN the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection according to 3GPP TS 23.122 [5] if the UE is registered for onboarding services in SNPN the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection or an SNPN selection for onboarding services according to 3GPP TS 23.122 [5]

#75 (Permanently not authorized for this SNPN)

5GMM cause #75 is only applicable when received from a cell belonging to an SNPN with a globally-unique SNPN identity and the UE is operating in SNPN access operation mode 5GMM cause #75 received from a cell not belonging to an SNPN or a cell belonging to an SNPN with a non-globally-unique SNPN identity is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.2.3.4

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list ngKSI and the list of equivalent SNPNs (if available) the UE shall reset the registration attempt counter and store the SNPN identity in the "permanently forbidden SNPNs" list or "permanently forbidden SNPNs for access for localized services in SNPN" list if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) for the specific access type for which the message was received and the selected entry of the "list of subscriber data" or the selected PLMN subscription or in the "permanently forbidden SNPNs for onboarding services in SNPN" list if the UE is registered for onboarding services in SNPN for the specific access type for which the message was received if the UE supports access to an SNPN using credentials from a credentials holder the UE shall store the SNPN identity in the "permanently forbidden SNPNs" list along with the GIN(s) broadcasted by the SNPN if any for the selected entry of the "list of subscriber data" or the selected PLMN subscription if the UE supports access to an SNPN providing access for localized services in SNPN and the access for localized services in SNPN has been enabled the UE shall store the SNPN identity in the list of "permanently forbidden SNPNs for access for localized services in SNPN" (if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) along with the GIN(s) broadcasted by the SNPN if any for the selected entry of the "list of subscriber data" or the selected PLMN subscription if the UE is not registered for onboarding services in SNPN the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection according to 3GPP TS 23.122 [5] if the UE is registered for onboarding services in SNPN the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection or an SNPN selection for onboarding services according to 3GPP TS 23.122 [5]

#76 (Not authorized for this CAG or authorized for CAG cells only)

this cause value received via non-3GPP access or from a cell belonging to an SNPN and the UE is operating in SNPN access operation mode is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.2.3.4

the UE shall set the 5GS update status to 5U3.ROAMING NOT ALLOWED store the 5GS update status according to subclause 5.1.3.2.2 and reset the registration attempt counter

if 5GMM cause #76 is received from

1) a CAG cell and if the UE receives a "CAG information list" in the CAG information list IE or the extended CAG information list IE included in the DEREGISTRATION REQUEST message the UE shall

i) replace the "CAG information list" stored in the UE with the received CAG information list IE or the extended CAG information list IE when received in the HPLMN or EHPLMN;

ii) replace the serving VPLMN's entry of the "CAG information list" stored in the UE with the serving VPLMN's entry of the received CAG information list IE or the extended CAG information list IE when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN; or

NOTE 5 when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN entries of a PLMN other than the serving VPLMN if any in the received CAG information list IE or the extended CAG information list IE are ignored

iii) remove the serving VPLMN's entry of the "CAG information list" stored in the UE when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN and the CAG information list IE or the extended CAG information list IE does not contain the serving VPLMN's entry

otherwise the UE shall delete the CAG-ID(s) of the cell from the "allowed CAG list" for the current PLMN if the CAG-ID(s) are authorized based on the "Allowed CAG list" in the case the "allowed CAG list" for the current PLMN only contains a range of CAG-IDs how the UE deletes the CAG-ID(s) of the cell from the "allowed CAG list" for the current PLMN is up to UE implementation in addition

i) if the entry in the "CAG information list" for the current PLMN does not include an "indication that the UE is only allowed to access 5GS via CAG cells" or if the entry in the "CAG information list" for the current PLMN includes an "indication that the UE is only allowed to access 5GS via CAG cells" and one or more CAG-ID(s) are authorized based on the updated "allowed CAG list" for the current PLMN then the UE shall enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C] with the updated "CAG information list";

ii) if the entry in the "CAG information list" for the current PLMN includes an "indication that the UE is only allowed to access 5GS via CAG cells" and no CAG-ID is authorized based on the updated "allowed CAG list" for the current PLMN then the UE shall enter the state 5GMM-DEREGISTERED.PLMN-SEARCH and shall apply the PLMN selection process defined in 3GPP TS 23.122 [5] with the updated "CAG information list"; or

iii) if the "CAG information list" does not include an entry for the current PLMN then the UE shall enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C] with the updated "CAG information list"

2) a non-CAG cell and if the UE receives a "CAG information list" in the CAG information list IE or the extended CAG information list IE included in the DEREGISTRATION REQUEST message the UE shall

i) replace the "CAG information list" stored in the UE with the received CAG information list IE or the extended CAG information list IE when received in the HPLMN or EHPLMN;

ii) replace the serving VPLMN's entry of the "CAG information list" stored in the UE with the serving VPLMN's entry of the received CAG information list IE or the extended CAG information list IE when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN; or

NOTE 6 when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN entries of a PLMN other than the serving VPLMN if any in the received CAG information list IE or the extended CAG information list IE are ignored

iii) remove the serving VPLMN's entry of the "CAG information list" stored in the UE when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN and the CAG information list IE or the extended CAG information list IE does not contain the serving VPLMN's entry

otherwise the UE shall store an "indication that the UE is only allowed to access 5GS via CAG cells" in the entry of the "CAG information list" for the current PLMN if any if the "CAG information list" stored in the UE does not include the current PLMN's entry the UE shall add an entry for the current PLMN to the "CAG information list" and store an "indication that the UE is only allowed to access 5GS via CAG cells" in the entry of the "CAG information list" for the current PLMN if the UE does not have a stored "CAG information list" the UE shall create a new "CAG information list" and add an entry with an "indication that the UE is only allowed to access 5GS via CAG cells" for the current PLMN

in addition

i) if one or more CAG-ID(s) are authorized based on the "allowed CAG list" for the current PLMN then the UE shall enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] with the updated CAG information; or

ii) if no CAG-ID is authorized based on the "allowed CAG list" for the current PLMN then the UE shall enter the state 5GMM-DEREGISTERED.PLMN-SEARCH and shall apply the PLMN selection process defined in 3GPP TS 23.122 [5] with the updated "CAG information list"

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall in addition set the EPS update status to EU3 ROAMING NOT ALLOWED reset the attach attempt counter and enter the state EMM-DEREGISTERED

#77 (Wireline access area not allowed)

5GMM cause #77 is only applicable when received from a wireline access network by the 5G-RG or the W-AGF acting on behalf of the FN-CRG (or on behalf of the N5GC device) 5GMM cause #77 received from a 5G access network other than a wireline access network and 5GMM cause #77 received by the W-AGF acting on behalf of the FN-BRG are considered as abnormal cases and the behaviour of the UE is specified in subclause 5.5.2.3.4

when received over wireline access network the 5G-RG and the W-AGF acting on behalf of the FN-CRG (or on behalf of the N5GC device) shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) shall delete 5G-GUTI last visited registered TAI TAI list and ngKSI shall reset the registration attempt counter shall enter the state 5GMM-DEREGISTERED and shall act as specified in subclause 5.3.23

NOTE 7 the 5GMM sublayer states the 5GMM parameters and the registration status are managed per access type independently i.e 3GPP access or non-3GPP access (see subclauses 4.7.2 and 5.1.3)

#78 (PLMN not allowed to operate at the present UE location)

this cause value received from a non-satellite NG-RAN cell is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.2.3.4

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete last visited registered TAI and TAI list if the UE is not registering or has not registered to the same PLMN over both 3GPP access and non-3GPP access the UE shall additionally delete the list of equivalent PLMNs 5G-GUTI and ngKSI additionally the UE shall reset the registration attempt counter the UE shall store the PLMN identity and if it is known the current geographical location in the list of "PLMNs not allowed to operate at the present UE location" and shall start a corresponding timer instance (see subclause 4.23.2) the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform a PLMN selection according to 3GPP TS 23.122 [5]

if the de-registration request is for 3GPP access only or for both 3GPP access and non-3GPP access and the UE is operating in single-registration mode the UE shall handle the EMM parameters EMM state EPS update status 4G-GUTI last visited registered TAI TAI list eKSI and attach attempt counter as specified in 3GPP TS 24.301 [15] for the case when a DETACH REQUEST is received with the EMM cause with the same value and with detach type set to "re-attach not required"

#79 (UAS services not allowed)

- a UE which is not a UE supporting UAS services receiving this cause value shall considered it as an abnormal case and the behaviour of the UE is specified in subclause 5.5.2.3.4

a UE supporting UAS service shall set the 5GS update status to 5U2 NOT UPDATED and enter state 5GMM-DEREGISTERED.NORMAL-SERVICE or 5GMM-DEREGISTERED.PLMN-SEARCH additionally the UE shall reset the registration attempt counter if the UE re-attempt the registration procedure to the current PLMN the UE shall not include the service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE of REGISTRATION REQUEST message

if the de-registration request is for 3GPP access only or for both 3GPP access and non-3GPP access and the UE is operating in single-registration mode the UE shall in addition set the EPS update status to EU2 NOT UPDATED reset the attach attempt counter and enter the state EMM-DEREGISTERED

#93 (Onboarding services terminated)

if the UE is not registered for onboarding services in SNPN this cause value received from a cell belonging to an SNPN and the UE is operating in SNPN access operation mode is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.2.3.4

if the UE is not operating in SNPN access operation mode the UE shall enter the state 5GMM-DEREGISTERED.PLMN-SEARCH and perform a PLMN selection according to 3GPP TS 23.122 [5]

if the UE is operating in SNPN access operation mode the UE shall enter the state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection according to 3GPP TS 23.122 [5]

NOTE 8 in case the configuration of one or more entries of the "list of subscriber data" was not completed at the time of network-initiated de-registration procedure the UE can retry registration after the de-registration procedure is completed

##### 5.5.2.3.3 Network-initiated de-registration procedure completion by the network

the network shall stop timer T3522 upon receipt of the DEREGISTRATION ACCEPT message the network shall enter state 5GMM-DEREGISTERED for 3GPP access if the de-registration request is for 3GPP access the network shall enter state 5GMM-DEREGISTERED for non-3GPP access if the de-registration request is for non-3GPP access the network shall enter state 5GMM-DEREGISTERED for both 3GPP access and non-3GPP access if the de-registration request is for both 3GPP access and non-3GPP access

##### 5.5.2.3.4 abnormal cases in the UE

the following abnormal cases can be identified

a) transmission failure of DEREGISTRATION ACCEPT message indication from lower layers

the de-registration procedure shall be progressed and the UE shall send the DEREGISTRATION ACCEPT message

b) DEREGISTRATION REQUEST other 5GMM cause values than those treated in subclause 5.5.2.3.2 cases of 5GMM cause value#11 #15 #22 #36 #72 #74 #75 #76 #77 #78 #79 and #93 that are considered as abnormal cases according to subclause 5.5.2.3.2 or no 5GMM cause IE is included and the De-registration type IE indicates "re-registration not required"

the UE shall delete TAI list last visited registered TAI and list of equivalent PLMNs (if any) or list of equivalent SNPNs (if any) shall set the 5GS update status to 5U2 NOT UPDATED and shall start timer T3502 if the UE is not registering or has not registered to the same PLMN over both 3GPP access and non-3GPP access the UE shall additionally delete 5G-GUTI and ngKSI

a UE not supporting S1 mode may enter the state 5GMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection or SNPN selection according to 3GPP TS 23.122 [5]; otherwise the UE shall enter the state 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION

if the de-registration request is for 3GPP access only or for both 3GPP access and non-3GPP access and the UE is operating in the single-registration mode the UE shall

- enter the state 5GMM-DEREGISTERED and attempt to select E-UTRAN radio access technology and proceed with the appropriate EMM specific procedures in this case the UE may disable the N1 mode capability (see subclause 4.9); or

- enter the state 5GMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection according to 3GPP TS 23.122 [5]

if the message was received via 3GPP access and the UE is operating in the single-registration mode the UE shall set the EPS update status to EU2 NOT UPDATED enter the state EMM-DEREGISTERED and shall delete the EMM parameters 4G-GUTI last visited registered TAI TAI list and eKSI

##### 5.5.2.3.5 abnormal cases in the network side

the following abnormal cases can be identified

a) T3522 time-out

on the first expiry of the timer the network shall retransmit the DEREGISTRATION REQUEST message and shall start timer T3522 this retransmission is repeated four times i.e on the fifth expiry of timer T3522 the de-registration procedure shall be aborted the network shall change to the state 5GMM-DEREGISTERED for the access type which the de-registration procedure is intended for

b) lower layer failure

the de-registration procedure is aborted the network shall change to the state 5GMM-DEREGISTERED for the access type which the de-registration procedure is intended for

c) De-registration procedure collision

if the network receives a DEREGISTRATION REQUEST message with "switch off" indication before the network-initiated de-registration procedure has been completed

- if the access type included in the DEREGISTRATION REQUEST message sent by the UE is same as access type sent by the network both procedures shall be considered completed; or

- if the access type included in the DEREGISTRATION REQUEST message sent by the UE is not same as access type sent by the network the network shall consder UE initiated de-registration completed the network shall re-initiate the de-registration procedure if required for the access type not indicated in the DEREGISTRATION REQUEST message sent by the UE

if the network receives a DEREGISTRATION REQUEST message without "switch off" indication before the network-initiated de-registration procedure has been completed the network shall send a DEREGISTRATION ACCEPT message to the UE

d) De-registration and registration procedure for initial registration collision

if the network receives a REGISTRATION REQUEST message indicating either "initial registration" or "emergency registration" in the 5GS registration type IE before the network-initiated de-registration procedure has been completed the network shall abort the de-registration procedure and the registration procedure shall be progressed after the PDU sessions associated with the access type the REGISTRATION REQUEST message is sent over have been deleted

NOTE 1 the above collision case is valid if the DEREGISTRATION REQUEST message indicates the access type over which the initial registration procedure is attempted otherwise both the procedures are progressed

e) De-registration and registration procedure for mobility and periodic registration update collision

if the network sent a DEREGISTRATION REQUEST message without 5GMM cause value #11 #12 #13 #15 #62 #74 #75 or #78 and the network receives a REGISTRATION REQUEST message indicating either "mobility registration updating" or "periodic registration updating" in the 5GS registration type IE before the network-initiated de-registration procedure has been completed the de-registration procedure shall be progressed i.e the REGISTRATION REQUEST message shall be ignored

if the network sent a DEREGISTRATION REQUEST message with 5GMM cause value #11 #12 #13 #15 #62 #74 #75 or #78 and the network receives a REGISTRATION REQUEST message indicating either "mobility registration updating" or "periodic registration updating" in the 5GS registration type IE before the network-initiated de-registration procedure has been completed the de-registration procedure shall be aborted and the registration procedure shall be progressed

NOTE 2 the above collision case is valid if the DEREGISTRATION REQUEST message indicates the access type over which the mobility and periodic registration procedure is attempted otherwise both the procedures are progressed

f) De-registration and service request procedure collision

if the network receives a SERVICE REQUEST message or a CONTROL PLANE SERVICE REQUEST message before the network-initiated de-registration procedure has been completed (e.g the DEREGISTRATION REQUEST message is pending to be sent to the UE) the network shall progress the de-registration procedure

NOTE 3 the above collision case is valid if the DEREGISTRATION REQUEST message indicates the access type over which the service request procedure is attempted otherwise both the procedures are progressed

g) De-registration requested for a UE not supporting CAG due to CAG restrictions

based on operator policy if the network-initiated de-registration procedure is triggered for a UE not supporting CAG due to CAG restrictions the network shall send the DEREGISTRATION REQUEST message including a 5GMM cause value other than the 5GMM cause #76 (Not authorized for this CAG or authorized for CAG cells only)

NOTE 4 5GMM cause #7 (5GS services not allowed) 5GMM cause #11 (PLMN not allowed) 5GMM cause #27 (N1 mode not allowed) 5GMM cause #73 (Serving network not authorized) can be used depending on the subscription of the UE and whether the UE roams or not

### 5.5.3 ecall inactivity procedure

the ecall inactivity procedure is performed only in 3GPP access and applicable only to a UE configured for ecall only mode as specified in 3GPP TS 31.102 [22] the procedure shall be started when

a) the UE is in any 5GMM-REGISTERED substate except substates 5GMM-REGISTERED.PLMN-SEARCH or 5GMM-REGISTERED.NO-CELL-AVAILABLE;

b) the UE is in 5GMM-IDLE mode or 5GMM-CONNECTED mode with RRC inactive indication; and

c) one of the following conditions applies

1) timer T3444 expires or is found to have already expired and timer T3445 is not running;

2) timer T3445 expires or is found to have already expired and timer T3444 is not running; or

3) timers T3444 and T3445 expire or are found to have already expired

the UE shall then perform the following actions

a) all NAS timers are stopped and associated procedures aborted except for timers T3245 the timer TF the timer TG (see 3GPP TS 23.122 [5]) and the timer instance associated with the entry in the list of "PLMNs not allowed to operate at the present UE location" the UE shall reset the registration attempt counter and service request attempt counter;

b) if the UE is currently registered to the network for 5GS services perform a de-registration procedure;

c) delete any 5G-GUTI TAI list last visited registered TAI list of equivalent PLMNs and ngKSI; and

d) enter 5GMM-DEREGISTERED.eCALL-INACTIVE state

if the UE is configured for ecall only mode as specified in 3GPP TS 31.102 [23] and moves from GERAN or UTRAN to NG-RAN the UE shall

a) if timer T3242 is running start timer T3444 with the time left on T3242 and stop timer T3242;

b) if timer T3243 is running start timer T3445 with the time left on T3243 and stop timer T3243; and

c) if timer T3242 or timer T3243 is running perform an initial registration procedure for 5GS services

NOTE timers T3242 and T3243 are specified in 3GPP TS 24.008 [12]

### 5.5.4 authentication and key agreement procedure for 5G ProSe UE-to-network relay and 5G ProSe UE-to-UE relay

#### 5.5.4.1 general

the purpose of the authentication and key agreement procedure

a) for 5G ProSe UE-to-network relay is to perform the authentication for 5G ProSe remote UE initiated by the 5G ProSe UE-to-network relay UE and to agree on the KAUSF\_P and KNR\_ProSe when the security for 5G ProSe communication via 5G ProSe UE-to-network relay is performed over control plane as specified in 3GPP TS 33.503 [56]; or

b) for 5G ProSe UE-to-UE relay is to perform the authentication for 5G ProSe end UE initiated by the 5G ProSe UE-to-UE relay UE and to agree on the KAUSF\_P and KNR\_ProSe when the security for 5G ProSe communication via 5G ProSe UE-to-UE relay is performed over control plane as specified in 3GPP TS 33.503 [56]

the procedure as shown in figure 5.5.4.1.1 is initiated by the UE when the UE receives the ProSe direct link establishment request including the SUCI or the CP-PRUK ID of

a) the 5G ProSe remote UE from the 5G ProSe remote UE; or

b) the 5G ProSe end UE from the 5G ProSe end UE

for establishing secure PC5 unicast link as specified in 3GPP TS 24.554 [19E]

if the network decides to process the relay key request message the EAP based authentication and key agreement procedure is initiated and controlled by the network the exchanges of EAP messages between

a) the 5G ProSe remote UE and the network; or

b) the 5G ProSe end UE and the network

are relayed by the UE

figure 5.5.4.1.1 authentication and key agreement procedure for 5G ProSe UE-to-network relay and 5G ProSe UE-to-UE relay

#### 5.5.4.2 ProSe relay transaction identity (PRTI)

upon receiving a ProSe direct link establishment request from a 5G ProSe remote UE or a 5G ProSe end UE for establishing a secure PC5 unicast link as specified in 3GPP TS 24.554 [19E] the UE shall allocate an available PRTI value for the authentication and key agreement procedure for 5G ProSe UE-to-network relay or 5G ProSe UE-to-UE relay and associate this PRTI value with the 5G ProSe remote UE or the 5G ProSe end UE

the UE shall release the PRTI value allocated to the authentication and key agreement procedure for 5G ProSe UE-to-network relay or 5G ProSe UE-to-UE relay when the authentication and key agreement procedure for 5G ProSe UE-to-network relay or 5G ProSe UE-to-UE relay completes or is aborted

#### 5.5.4.3 UE-initiated authentication and key agreement procedure initiation

upon receiving a ProSe direct link establishment request from the 5G ProSe remote UE or the 5G ProSe end UE including the SUCI or the CP-PRUK ID of the 5G ProSe remote UE or the 5G ProSe end UE for establishing a secure PC5 unicast link as specified in 3GPP TS 24.554 [19E] when the security for 5G ProSe communication via 5G ProSe UE-to-network relay or 5G ProSe UE-to-UE relay is performed over control plane as specified in 3GPP TS 33.503 [56] the UE shall

a) allocate a PRTI value as specified in subclause 5.5.4.2;

b) create a RELAY KEY REQUEST message;

c) set the PRTI IE of the RELAY KEY REQUEST message to the allocated PRTI value;

d) set the relay key request parameters IE of the RELAY KEY REQUEST message with SUCI or the CP-PRUK ID relay service code and nonce\_1 received from the of the 5G ProSe remote UE or the 5G ProSe end UE;

e) send the RELAY KEY REQUEST message; and

f) start the timer T3527 upon sending the RELAY KEY REQUEST message

#### 5.5.4.4 UE-initiated authentication and key agreement procedure accepted by the network

upon receiving the RELAY KEY REQUEST message the AMF processes the message and interacts with the AUSF of the 5G ProSe remote UE or the 5G ProSe end UE as specified in 3GPP TS 33.503 [56] if EAP-AKA' authentication for the 5G ProSe remote UE or the 5G ProSe end UE is initiated by the network the AMF shall

a) create a RELAY AUTHENTICATION REQUEST message;

b) set the PRTI IE of the RELAY AUTHENTICATION REQUEST message to the PRTI value of the received RELAY KEY REQUEST message;

c) set the EAP message IE of the RELAY AUTHENTICATION REQUEST message to EAP request message received from the AUSF; and

d) send the RELAY AUTHENTICATION REQUEST message to the UE

upon receiving the RELAY AUTHENTICATION REQUEST message the UE stops the timer T3527 and forwards the EAP message to the 5G ProSe remote UE or the 5G ProSe end UE as specified in 3GPP TS 24.554 [19E]

upon receiving the EAP response message from the 5G ProSe remote UE or the 5G ProSe end UE as specified in 3GPP TS 24.554 [19E] the UE shall

a) create a RELAY AUTHENTICATION RESPONSE message;

b) set the PRTI IE of the RELAY AUTHENTICATION RESPONSE message to the PRTI value of the received RELAY AUTHENTICATION REQUEST message;

c) set the EAP message IE of the RELAY AUTHENTICATION RESPONSE message to EAP response message received from the 5G ProSe remote UE or the 5G ProSe end UE; and

d) start a timer T3527 upon sending the RELAY AUTHENTICATION RESPONSE message to the AMF

after receiving the RELAY AUTHENTICATION RESPONSE message the AMF may send a new RELAY AUTHENTICATION REQUEST message carrying EAP request message according to further handling of EAP-AKA' authentication from the AUSF as specified in 3GPP TS 33.503 [56] the UE repeats the handling of the RELAY AUTHENTICATION REQUEST message as described above

upon receiving the message from the AUSF that the authentication is successful the AMF shall

a) create a RELAY KEY ACCEPT message;

b) set the PRTI IE of the RELAY KEY ACCEPT message to the PRTI value of the RELAY KEY REQUEST message;

c) include the EAP message IE of the RELAY KEY ACCEPT message set to EAP-success message received from the AUSF if any;

d) include the relay key response parameters IE of the RELAY KEY ACCEPT message set to KNR\_ProSe and nonce\_2 received from AUSF; and

e) include the CP-PRUK ID in the relay key response parameters IE of the RELAY KEY ACCEPT message

upon receiving the RELAY KEY ACCEPT message the UE shall forward the EAP-success message if any and nonce\_2 to the 5G ProSe remote UE or the 5G ProSe end UE as specified in 3GPP TS 24.554 [19E] and consider the authentication as completed successfully the UE shall store the CP-PRUK ID to be used in the remote UE report procedure as specified in subclause 6.6.2.2

#### 5.5.4.5 UE-initiated authentication and key agreement procedure not accepted by the network

if the UE-initiated authentication and key agreement procedure is not accepted by the network the AMF shall

a) create a RELAY KEY REJECT message;

b) set the PRTI IE of the RELAY KEY REJECT message to the PRTI value of the received RELAY KEY REQUEST message if the network decides to reject the RELAY KEY REQUEST message; or

NOTE the network decides to reject the RELAY KEY REQUEST message when e.g the CP-PRUK is not found in the network

set the PRTI IE of the RELAY KEY REJECT message to the PRTI value of the received RELAY AUTHENTICATION RESPONSE message and include the EAP message IE set with EAP-failure message if the AMF receives an EAP-failure message from the AUSF; and

c) send the RELAY KEY REJECT message to the UE

upon receiving the RELAY KEY REJECT message the UE shall consider the authentication has failed and perform the PC5 signalling protocol procedure as specified in subclause 7.2.2.5 of 3GPP 24.554 [19E]

#### 5.5.4.6 abnormal cases in the UE

the following abnormal cases in the UE can be identified

a) transmission failure of RELAY KEY REQUEST message or RELAY KEY AUTHENTICATION RESPONSE message indication from lower layers

the UE shall abort the authentication and key agreement procedure for 5G ProSe UE-to-network relay and perform the PC5 signalling protocol procedure as specified in subclause 7.2.2.5 of 3GPP 24.554 [19E]

b) expiry of timer T3527

the UE shall on the first expiry of the timer T3527 retransmit the RELAY KEY REQUEST message or the RELAY KEY AUTHENTICATION RESPONSE message and shall reset and start timer T3527 this retransmission is repeated four times i.e on the fifth expiry of timer T3527 the procedure shall be aborted

c) collision between the authentication and key agreement procedure for 5G ProSe UE-to-network relay or 5G ProSe UE-to-UE relay and de-registration procedure

the UE shall abort the authentication and key agreement procedure for 5G ProSe UE-to-network relay or 5G ProSe UE-to-UE relay proceed with the network initiated de-registration procedure and perform the PC5 signalling protocol procedure as specified in subclause 7.2.2.5 of 3GPP 24.554 [19E]

#### 5.5.4.7 abnormal cases on the network side

the following abnormal cases on the network side can be identified

a) lower layer failure before the RELAY KEY AUTHENTICATION RESPONSE message is received

the network shall abort the authentication and key agreement procedure for 5G ProSe UE-to-network relay or 5G ProSe UE-to-UE relay

b) collision between the authentication and key agreement procedure for 5G ProSe UE-to-network relay or 5G ProSe UE-to-UE relay and de-registration procedure

the network shall abort the authentication and key agreement procedure for 5G ProSe UE-to-network relay or 5G ProSe UE-to-UE relay and proceed with the UE-initiated de-registration procedure

c) collision between the authentication and key agreement procedure for 5G ProSe UE-to-network relay or 5G ProSe UE-to-UE relay and other 5GMM procedures other than in item b

the network shall progress both procedures

## 5.6 5GMM connection management procedures

### 5.6.1 service request procedure

#### 5.6.1.1 general

the purpose of the service request procedure is to

a) change the 5GMM mode from 5GMM-IDLE to 5GMM-CONNECTED mode;

b) request the establishment of user-plane resources for PDU sessions which are established without user-plane resources if the UE is not using 5GS services with control plane CIoT 5GS optimization and the 5GMM mode is the 5GMM-IDLE mode or the 5GMM-CONNECTED mode; or

c) initiate transfer of user data via the control plane if the UE is using 5GS services with control plane CIoT 5GS optimization and the 5GMM mode is 5GMM-IDLE mode

NOTE 1 the lower layer indicates when the user-plane resources for PDU sessions are successfully established or released

this procedure is used when

- the network has downlink signalling pending over 3GPP access and the UE is in 5GMM-IDLE mode over 3GPP access;

- the network has downlink signalling pending over non-3GPP access the UE is in 5GMM-IDLE mode over non-3GPP access and in 5GMM-IDLE or 5GMM-CONNECTED mode over 3GPP access;

- the UE has uplink signalling pending over 3GPP access and the UE is in 5GMM-IDLE mode over 3GPP access;

- the network has downlink user data pending over 3GPP access and the UE is in 5GMM-IDLE mode over 3GPP access;

- the network has downlink user data pending over non-3GPP access the UE is in 5GMM-IDLE mode over non-3GPP access and in 5GMM-IDLE or 5GMM-CONNECTED mode over 3GPP access;

- the UE has user data pending over 3GPP access and the UE is in 5GMM-IDLE or 5GMM-CONNECTED mode over 3GPP access;

- the UE has user data pending over non-3GPP access and the UE is in 5GMM-CONNECTED mode over non-3GPP access;

- the UE in 5GMM-IDLE mode over non-3GPP access receives an indication from the lower layers of non-3GPP access that the access stratum connection is established between the UE and the network if T3346 is not running;

- the UE in 5GMM-IDLE or 5GMM-CONNECTED mode over 3GPP access receives a request from the upper layers to perform emergency services fallback and performs emergency services fallback as specified in subclause 4.13.4.2 of 3GPP TS 23.502 [9];

- the UE has to request resources for V2X communication over PC5;

- the UE has to request resources for 5G ProSe direct discovery over PC5 or 5G ProSe direct communication over PC5;

- the UE has to request resources for A2X communication over PC5;

NOTE 2 the purpose for the UE to request resources for V2X communication over PC5 5G ProSe direct discovery over PC5 and 5G ProSe direct communication over PC5 can be to perform the ranging and sidelink positioning service over PC5

- the MUSIM UE in 5GMM-IDLE mode requests the network to remove the paging restriction;

- the MUSIM UE requests the release of the NAS signalling connection or rejects the paging request from the network; or

- the UE supporting the reconnection to the network due to RAN timing synchronization status change receives an indication of a change in the RAN timing synchronization status

this procedure shall not be used for

a) initiating user data transfer or CIoT user data via the control plane; or

b) PDU session management related signalling other than for performing UE-requested PDU session release procedure related to a PDU session for LADN or for performing the UE-requested PDU session modification procedure to indicate a change of 3GPP PS data off UE status;

when the UE is located outside the LADN service area

in NB-N1 mode this procedure shall not be used to request the establishment of user-plane resources

a) for a number of PDU sessions that exceeds the UE' s maximum number of supported user-plane resources if there is currently

1) no user-plane resources established for the UE;

2) user-plane resources established for

i) one PDU session and the multiple user-plane resources support bit was set to "Multiple user-plane resources not supported" in the 5GMM capability IE; or

ii) two PDU sessions and the multiple user-plane resources support bit was set to "Multiple user-plane resources supported" in the 5GMM capability IE; or

b) for additional PDU sessions if the number of PDU sessions for which user-plane resources are currently established is equal to the UE's maximum number of supported user-plane resources

the service request procedure is initiated by the UE however it can be triggered by the network by means of

- the paging procedure (see subclause 5.6.2) for the transfer of downlink signalling or user data pending over 3GPP access to a UE in 5GMM-IDLE mode over 3GPP access;

- the paging procedure (see subclause 5.6.2) for the transfer of downlink signalling or user data pending over non-3GPP access to a UE in 5GMM-IDLE mode over 3GPP access and in 5GMM-IDLE mode over non-3GPP access;

- the notification procedure (see subclause 5.6.3) for the transfer of downlink signalling or user data pending over non-3GPP access to a UE in 5GMM-CONNECTED mode over 3GPP access and in 5GMM-IDLE mode over non-3GPP access; or

- the notification procedure (see subclause 5.6.3) for the transfer of downlink signalling or user data pending over 3GPP access to a UE in 5GMM-IDLE mode over 3GPP access and in 5GMM-CONNECTED mode over non-3GPP access

NOTE 3 in case the UE is in 5GMM-IDLE mode over 3GPP access and in 5GMM-CONNECTED mode over non-3GPP access and downlink signalling or user data pending over 3GPP access needs to be transferred the AMF can trigger either the notification procedure or the paging procedure based on implementation

the UE shall invoke the service request procedure when

a) the UE in 5GMM-IDLE mode over 3GPP access receives a paging request from the network;

NOTE 4 as an implementation option the MUSIM UE is allowed to not invoke service request to respond to paging based on the information available in the paging message e.g voice service indication

b) the UE in 5GMM-CONNECTED mode over 3GPP access receives a notification from the network with access type indicating non-3GPP access;

c) the UE in 5GMM-IDLE mode over 3GPP access has uplink signalling pending (except in case i);

d) the UE in 5GMM-IDLE mode over 3GPP access has uplink user data pending (except in case j);

e) the UE in 5GMM-CONNECTED mode or in 5GMM-CONNECTED mode with RRC inactive indication has user data pending due to no user-plane resources established for PDU session(s) used for user data transport;

f) the UE in 5GMM-IDLE mode over non-3GPP access with T3346 not active or upon expiry of T3346 receives or has already received an indication from the lower layers of non-3GPP access that the access stratum connection is established between the UE and the network;

g) the UE in 5GMM-IDLE mode over 3GPP access receives a notification from the network with access type indicating 3GPP access when the UE is in 5GMM-CONNECTED mode over non-3GPP access;

h) the UE in 5GMM-IDLE 5GMM-CONNECTED mode over 3GPP access or 5GMM-CONNECTED mode with RRC inactive indication receives a request from the upper layers to perform emergency services fallback and performs emergency services fallback as specified in subclause 4.13.4.2 of 3GPP TS 23.502 [9];

i) the UE in 5GMM-CONNECTED mode over 3GPP access or in 5GMM-CONNECTED mode with RRC inactive indication receives a fallback indication from the lower layers (see subclauses 5.3.1.2 and 5.3.1.4) and the UE has a pending NAS procedure other than a registration service request or de-registration procedure; the UE in 5GMM-CONNECTED mode over 3GPP access receives a "RRC connection failure" from the lower layers and the UE has a pending NAS procedure other than a registration service request or de-registration procedure;

j) the UE in 5GMM-CONNECTED mode over 3GPP access or in 5GMM-CONNECTED mode with RRC inactive indication receives a fallback indication from the lower layers (see subclauses 5.3.1.2 and 5.3.1.4) and the UE has pending uplink user data for PDU session(s) with user-plane resources already established but no pending NAS procedure; the UE in 5GMM-CONNECTED mode over 3GPP access receives a "RRC connection failure" indication from the lower layers and the UE has pending uplink user data for PDU session(s) with user-plane resources already established but no pending NAS procedure;

k) the UE in 5GMM-CONNECTED mode and has a NAS signalling connection only is using 5GS services with control plane CIoT 5GS optimization and has pending user data to be sent via user-plane resources;

l) the UE in 5GMM-IDLE mode over 3GPP access has to request resources for V2X communication over PC5 (see 3GPP TS 23.287 [6C]);

la) the UE in 5GMM-IDLE mode over 3GPP access has to request resources for A2X communication over PC5 (see 3GPP TS 23.256 [6AB]);

m) the network supports the paging restriction and the MUSIM UE in 5GMM-IDLE mode is requesting the network to remove the paging restriction;

n) the UE in 5GMM-IDLE mode over 3GPP access

- has to request resources for 5G ProSe direct discovery over PC5 or 5G ProSe direct communication over PC5 (see 3GPP TS 23.304 [6E]); or

- acts as a 5G ProSe layer-2 UE-to-network relay UE and receives a trigger from lower layers to establish the NAS signalling connection (see 3GPP TS 23.304 [6E]);

o) the network supports the N1 NAS signalling connection release the MUSIM UE

- is in 5GMM-CONNECTED mode requests the network to release the NAS signalling connection and if the network supports the paging restriction optionally includes paging restriction;

- is in 5GMM-CONNECTED mode with RRC inactive indication requests the network to release the NAS signalling connection and if the network supports the paging restriction optionally includes paging restriction; or

- is in 5GMM-CONNECTED mode with RRC inactive indication rejects the RAN paging requests the network to release the NAS signalling connection and if the network supports the paging restriction optionally includes paging restriction;

p) the network supports the reject paging request the MUSIM UE in 5GMM-IDLE mode when responding to paging rejects the paging request from the network requests the network to release the NAS signalling connection and if the network supports the paging restriction optionally includes paging restriction; or

q) the UE supporting the reconnection to the network due to RAN timing synchronization status change has been requested to reconnect to the network upon receiving an indication of a change in the RAN timing synchronization status (see subclauses 5.4.4.2 5.5.1.2.4 and 5.5.1.3.4) and the UE in 5GMM-IDLE mode receives an indication of a change in the RAN timing synchronization status;

if one of the above criteria to invoke the service request procedure is fulfilled then the service request procedure shall only be initiated by the UE when the following conditions are fulfilled

- its 5GS update status is 5U1 UPDATED and the TAI of the current serving cell is included in the TAI list; and

- no 5GMM specific procedure is ongoing

the UE shall not invoke the service request procedure when the UE is in the state 5GMM-SERVICE-REQUEST-INITIATED

the MUSIM UE shall not initiate service request procedure for requesting the network to release the N1 NAS signalling connection if the UE is registered for emergency services or if the UE has an emergency PDU session established to enable the emergency call back the UE shall not initiate service request procedure for requesting the network to release the NAS signalling connection for a UE implementation-specific duration of time after the completion of the emergency services

the UE supporting S-NSSAI location validity information shall not invoke the service request procedure to establish user-plane resources for PDU sessions associated to an S-NSSAI when the UE is not in the NS-AoS of the S-NSSAI

figure 5.6.1.1.1 service request procedure (Part 1)

figure 5.6.1.1.2 service request procedure (Part 2)

a service request attempt counter is used to limit the number of service request attempts and no response from the network the service request attempt counter shall be incremented as specified in subclause 5.6.1.7

the service request attempt counter shall be reset when

- a registration procedure for mobility and periodic registration update is successfully completed;

- a service request procedure is successfully completed;

- a service request procedure is rejected as specified in subclause 5.6.1.5 or subclause 5.3.20; or

- the UE moves to 5GMM-DEREGISTERED state

#### 5.6.1.2 service request procedure initiation

##### 5.6.1.2.1 UE is not using 5GS services with control plane CIoT 5GS optimization

the UE initiates the service request procedure by sending a SERVICE REQUEST message to the AMF the UE shall start timer T3517 and enter the state 5GMM-SERVICE-REQUEST-INITIATED

if the UE is sending the SERVICE REQUEST message from 5GMM-IDLE mode and the UE needs to send non-cleartext IEs the UE shall send the SERVICE REQUEST message including the NAS message container IE as described in subclause 4.4.6

for cases a) b) and g) in subclause 5.6.1.1 the service type IE in the SERVICE REQUEST message shall be set to "mobile terminated services"

for cases c) d) e) f) i) j) l) la m) n) and q) in subclause 5.6.1.1 if the UE is a UE configured for high priority access in selected PLMN or SNPN the service type IE in the SERVICE REQUEST message shall be set to "high priority access"

for case a) in subclause 5.6.1.1

a) if the paging request includes an indication for non-3GPP access type the allowed PDU session status IE shall be included in the SERVICE REQUEST message if the UE has PDU session(s) over non-3GPP access where

1) the associated S-NSSAI(s) are included in the allowed NSSAI for 3GPP access or the partially allowed NSSAI for 3GPP access and the current TAI is in the list of TAs for which the S-NSSAI is allowed; and

2) the UE is currently located inside the NS-AoS of the S-NSSAI if the S-NSSAI location validity information is available

the UE shall indicate the PDU session(s) for which the UE allows the user-plane resources to be re-established over 3GPP access in the allowed PDU session status IE; otherwise the UE shall not indicate any PDU session(s) in the allowed PDU session status IE; and

b) if the UE has uplink user data pending to be sent over 3GPP access the uplink data status IE shall be included in the SERVICE REQUEST message to indicate the PDU session(s) for which the UE has pending user data to be sent otherwise the uplink data status IE shall not be included in the SERVICE REQUEST message

for case b) in subclause 5.6.1.1

a) the allowed PDU session status IE shall be included in the SERVICE REQUEST message if the UE has PDU session(s) over non-3GPP access where

1) the associated S-NSSAI(s) are included in the allowed NSSAI for 3GPP access or the partially allowed NSSAI for 3GPP access and the current TAI is in the list of TAs for which the S-NSSAI is allowed; and

2) the UE is currently located inside the NS-AoS of the S-NSSAI if the S-NSSAI location validity information is available

the UE shall indicate the PDU session(s) for which the UE allows the user-plane resources to be re-established over 3GPP access in the allowed PDU session status IE; otherwise the UE shall not indicate any PDU session(s) in the allowed PDU session status IE; and

b) if the UE has uplink user data pending to be sent over 3GPP access the uplink data status IE shall be included in the SERVICE REQUEST message to indicate the PDU session(s) for which the UE has pending user data to be sent otherwise the uplink data status IE shall not be included in the SERVICE REQUEST message

for cases a) and b) in subclause 5.6.1.1 if the UE is in a non-allowed area or the UE is not in an allowed area the UE shall set the allowed PDU session status IE as specified in subclause 5.3.5.2

when the allowed PDU session status IE is included in the SERVICE REQUEST message the UE shall indicate that a PDU session is not allowed to be transferred to the 3GPP access if the 3GPP PS data off UE status is "activated" for the corresponding PDU session and the UE is not using the PDU session to send uplink IP packets for any of the 3GPP PS data off exempt services (see subclause 6.2.10)

for case c) in subclause 5.6.1.1 the uplink data status IE shall not be included in the SERVICE REQUEST message except if the UE has one or more active always-on PDU sessions associated with the access type over which the SERVICE REQUEST message is sent if the UE is not a UE configured for high priority access in selected PLMN or SNPN and

a) if the SERVICE REQUEST message is triggered by a request for emergency services from the upper layer the UE shall set the service type IE in the SERVICE REQUEST message to "emergency services"; or

b) otherwise the UE shall set the service type IE to "signalling"

when the UE is in a non-allowed area or is not in an allowed area as specified in subclause 5.3.5 and

a) if the uplink signalling pending is to indicate a change of 3GPP PS data off UE status for a PDU session the UE shall set the service type IE in the SERVICE REQUEST message to "elevated signalling" and shall not include the uplink data status IE in the SERVICE REQUEST message even if the UE has one or more active always-on PDU sessions associated with the access type over which the SERVICE REQUEST message is sent; or

b) otherwise the UE shall not initiate service request procedure except for emergency services high priority access or responding to paging or notification

for cases d) and e) in subclause 5.6.1.1 the uplink data status IE shall be included in the SERVICE REQUEST message to indicate the PDU session(s) the UE has pending user data to be sent if the UE is not a UE configured for high priority access in selected PLMN or SNPN

a) if there exists an emergency PDU session which is indicated in the uplink data status IE the service type IE in the SERVICE REQUEST message shall be set to "emergency services"; or

b) otherwise the service type IE in the SERVICE REQUEST message shall be set to "data"

NOTE 1 for a UE in NB-N1 mode the uplink data status IE cannot be used to request the establishment of user-plane resources such that there will be user-plane resources established for a number of PDU sessions that exceeds the UE's maximum number of supported user-plane resources

for case f) in subclause 5.6.1.1

a) if the UE has uplink user data pending to be sent the uplink data status IE shall be included in the SERVICE REQUEST message to indicate the PDU session(s) the UE has pending user data to be sent if the UE is not a UE configured for high priority access in selected PLMN or SNPN the service type IE in the SERVICE REQUEST message shall be set to "data";

b) otherwise if the UE is not a UE configured for high priority access in selected PLMN or SNPN the service type IE in the SERVICE REQUEST message shall be set to "signalling"

for case g) in subclause 5.6.1.1 if the UE has uplink user data pending to be sent the uplink data status IE shall be included in the SERVICE REQUEST message to indicate the PDU session(s) the UE has pending user data to be sent

for case h) in subclause 5.6.1.1 the UE shall send a SERVICE REQUEST message with service type set to "emergency services fallback" and without an uplink data status IE

for case i) in subclause 5.6.1.1 if the UE is not configured for high priority access in selected PLMN or SNPN the UE shall set the service type IE in the SERVICE REQUEST message as follows

a) if the pending message is an UL NAS TRANSPORT message with the request type IE set to "initial emergency request" or "existing emergency PDU session" the UE shall set the service type IE in the SERVICE REQUEST message to "emergency services"; or

b) otherwise the UE shall set the service type IE in the SERVICE REQUEST message to "signalling"

for case j) in subclause 5.6.1.1

a) the UE shall include the uplink data status IE in the SERVICE REQUEST message indicating the PDU session(s) for which the UE has uplink user data pending and the PDU session(s) for which user-plane resources were active prior to receiving the fallback indication or "RRC connection failure" indication from the lower layers if any; and

b) if the UE is not a UE configured for high priority access in selected PLMN or SNPN the UE shall set the service type IE in the SERVICE REQUEST message as follows

1) if there is an emergency PDU session which is indicated in the uplink data status IE the UE shall set the service type IE in the SERVICE REQUEST message to "emergency services"; or

2) if there is no emergency PDU session which is indicated in the uplink data status IE the UE shall set the service type IE in the SERVICE REQUEST message to "data"

for cases l) la n) and q) in subclause 5.6.1.1 if the UE is not a UE configured for high priority access in selected PLMN or SNPN

a) if there exists an emergency PDU session which is indicated in the uplink data status IE the service type IE in the SERVICE REQUEST message shall be set to "emergency services"; or

b) otherwise the service type IE in the SERVICE REQUEST message shall be set to "signalling"

for case m) in subclause 5.6.1.1 the UE shall not include the paging restriction IE in the SERVICE REQUEST message and set service type to "signalling" the UE may include the UE request type IE and set request type to "NAS signalling connection release" to remove the paging restriction and request the release of the NAS signalling connection at the same time if the UE requests the release of the NAS signalling connection the UE shall not include the uplink data status IE in the SERVICE REQUEST message

for cases o) and p) in subclause 5.6.1.1 the UE shall not include the uplink data status IE and the allowed PDU session status IE in the SERVICE REQUEST message further

- for case o in subclause 5.6.1.1 the UE shall set request type to "NAS signalling connection release" in the UE request type IE and service type to "signalling";

- for case p in subclause 5.6.1.1 the UE shall set request type to "Rejection of paging" in the UE request type IE and service type to "mobile terminated services"; and

may include its paging restriction preference in the paging restriction IE in the SERVICE REQUEST message

the UE shall include a valid 5G-S-TMSI in the 5G-S-TMSI IE of the SERVICE REQUEST message

for all cases except cases o) and p) in subclause 5.6.1.1 if the UE has one or more active always-on PDU sessions associated with the access type over which the SERVICE REQUEST message is sent and the user-plane resources for these PDU sessions are not established the UE shall include the uplink data status IE in the SERVICE REQUEST message and indicate that the UE has pending user data to be sent for those PDU sessions

if the UE has one or more active PDU sessions which are not accepted by the network as always-on PDU sessions and no uplink user data pending to be sent for those PDU sessions the UE shall not include those PDU sessions in the uplink data status IE in the SERVICE REQUEST message

the uplink data status IE may be included in the SERVICE REQUEST message to indicate which PDU session(s) associated with the access type the SERVICE REQUEST message is sent over have pending user data to be sent or are associated with active multicast MBS session(s) if the UE is located outside the LADN service area of a PDU session the UE shall not include the PDU session for LADN in the uplink data status IE

if the UE is in a non-allowed area or the UE is not in an allowed area the UE shall apply the restrictions for the inclusion of the uplink data status IE specified in subclause 5.3.5.2

the PDU session status information element may be included in the SERVICE REQUEST message to indicate

- the single access PDU session(s) not in 5GSM state PDU SESSION INACTIVE in the UE associated with the access type the SERVICE REQUEST message is sent over; and

- the MA PDU session(s) not in 5GSM state PDU SESSION INACTIVE and having the corresponding user plane resources being established or established in the UE on the access the SERVICE REQUEST message is sent over

if the SERVICE REQUEST message includes a NAS message container IE the AMF shall process the SERVICE REQUEST message that is obtained from the NAS message container IE as described in subclause 4.4.6

if the UE has an emergency PDU session over the non-current access it shall not initiate the SERVICE REQUEST message with the service type IE set to "emergency services" over the current access unless the SERVICE REQUEST message has to be initiated to perform handover of an existing emergency PDU session from the non-current access to the current access

NOTE 2 transfer of an existing emergency PDU session between 3GPP access and non-3GPP access is needed e.g if the UE determines that the current access is no longer available

##### 5.6.1.2.2 UE is using 5GS services with control plane CIoT 5GS optimization

the UE shall send a CONTROL PLANE SERVICE REQUEST message start T3517 and enter the state 5GMM-SERVICE-REQUEST-INITIATED

for case a) and case b) in subclause 5.6.1.1 the control plane service type of the CONTROL PLANE SERVICE REQUEST message shall indicate "mobile terminating request" if

a) the UE only has uplink CIoT user data or SMS to be sent the UE shall

1) if the data size is not more than 254 octets and there is no other optional IE to be included in the message

i) for sending CIoT user data set the data type field to "control plane user data" include the PDU session ID data and downlink data expected (DDX) (if available) in the CIoT small data container IE; and

ii) for sending SMS set the data type field to "SMS" include SMS in the CIoT small data container IE; and

2) otherwise if the data size is more than 254 octets or there are other optional IEs to be included in the message

i) for sending CIoT user data set the payload container type IE to "CIoT user data container" include the PDU session ID in the PDU session ID IE and include data in the payload container IE as described in subclause 5.4.5.2.2; and

ii) for sending SMS set the payload container type IE to "SMS" and include data in the payload container IE as described in subclause 5.4.5.2.2; and

b) the paging request or the notification includes an indication for non-3GPP access type the UE has at least one PDU session that is not associated with control plane only indication the allowed PDU session status IE shall be included in the CONTROL PLANE SERVICE REQUEST message if the UE is in a non-allowed area or the UE is not in an allowed area the UE shall set the allowed PDU session status IE as specified in subclause 5.3.5.2 if the UE has PDU session(s) over non-3GPP access where

1) the associated S-NSSAI(s) are included in the allowed NSSAI for 3GPP access or the partially allowed NSSAI for 3GPP access and the current TAI is in the list of TAs for which the S-NSSAI is allowed; and

2) the UE is currently located inside the NS-AoS of the S-NSSAI if the S-NSSAI location validity information is available

the UE shall indicate the PDU session(s) for which the UE allows the user-plane resources to be re-established over 3GPP access in the allowed PDU session status IE; otherwise the UE shall not indicate any PDU session(s) in the allowed PDU session status IE

NOTE 1 the term DDX used in the present document corresponds to the term NAS RAI used in 3GPP TS 23.502 [9]

for case c) and case d) when the UE is located outside the LADN service area the UE shall not perform the service request procedure to send CIoT user data via the control plane for a PDU session for LADN

for case c) and case d) if the UE has pending CIoT user data that is to be sent via the control plane in subclause 5.6.1.1 the UE shall set the control plane service type of the CONTROL PLANE SERVICE REQUEST message to "mobile originating request" if the UE has only uplink CIoT user data SMS or location services message to be sent the UE shall

a) if the data size is not more than 254 octets there is no other optional IE to be included in the CONTROL PLANE SERVICE REQUEST message and the data being sent is

1) CIoT user data set the data type field to "control plane user data" include the PDU session ID data and downlink data expected (DDX) (if available) in the CIoT small data container IE;

2) location services message set the data type field to "Location services message container" and downlink data expected (DDX) if available in the CIoT small data container IE and

i) if routing information is provided by upper layers

A) set the length of additional information field in the CIoT small data container IE to the length of routing information provided by upper layer location services application (see subclause 9.11.3.67) and set the additional information field in the CIoT small data container IE to the routing information provided by upper layer location services application (see subclause 9.11.3.67); or

B) otherwise set the length of additional information field in the CIoT small data container IE to zero in this case the additional information field of the CIoT small data container IE shall not be included; and

ii) set the data contents field of the CIoT small data container IE to the location services message payload; or

3) SMS set the data type field to "SMS" include SMS in the CIoT small data container IE; or

b) otherwise if the data size is more than 254 octets or there are other optional IEs to be included in the CONTROL PLANE SERVICE REQUEST message and the data being sent is

1) CIoT user data set the payload container type IE to "CIoT user data container" include the PDU session ID in the PDU session ID IE and include data in the payload container IE as described in subclause 5.4.5.2.2;

2) location services message set the payload container type IE to "Location services message container" include data in the payload container IE as described in subclause 5.4.5.2.2 if the upper layer location services application provides the routing information set the additional information IE to the routing information as described in subclause 5.4.5.2.2; or

3) SMS set the payload container type IE to "SMS" and include data in the payload container IE as described in subclause 5.4.5.2.2

for case a) and case b) in subclause 5.6.1.1 if the UE has pending user data that is to be sent via the user plane the UE shall set the control plane service type of the CONTROL PLANE SERVICE REQUEST message to "mobile terminating request" the UE shall include the uplink data status IE in the CONTROL PLANE SERVICE REQUEST message to indicate which PDU session(s) have pending user data to be sent via user-plane resources

for case c) in subclause 5.6.1.1 if the UE is in WB-N1 mode and the CONTROL PLANE SERVICE REQUEST message is triggered by a request for emergency services from the upper layer the UE shall set the control plane service type of the CONTROL PLANE SERVICE REQUEST message to "emergency services"

for cases d) and k) if the UE has pending user data that is to be sent via the user plane in subclause 5.6.1.1

a) and if there exists an emergency PDU session which is indicated in the uplink data status IE the UE shall set the control plane service type of the CONTROL PLANE SERVICE REQUEST message to "emergency services"; or

b) otherwise the UE shall set the control plane service type to "mobile originating request"

the UE shall include the uplink data status IE in the CONTROL PLANE SERVICE REQUEST message to indicate which PDU session(s) have pending user data to be sent via user-plane resources or are associated with active multicast MBS session(s)

NOTE 2 for a UE in NB-N1 mode the uplink data status IE cannot be used to request the establishment of user-plane resources such that there will be user-plane resources established for a number of PDU sessions that exceeds the UE's maximum number of supported user-plane resources

for case h) in subclause 5.6.1.1 if the UE is in WB-N1 mode and the UE does not have any PDU session that is associated with control plane only indication the UE shall send a CONTROL PLANE SERVICE REQUEST message with the control plane service type set to "emergency services fallback" and without an uplink data status IE

for case i) in subclause 5.6.1.1 the control plane service type of the CONTROL PLANE SERVICE REQUEST message shall indicate "mobile originating request" if the pending message is an UL NAS TRANSPORT message with the payload container type IE set to

a) "SMS" "Location services message container" or "CIoT user data container" the UE shall send the CONTROL PLANE SERVICE REQUEST and include the SMS location services message or CIoT user data as described in this subclause; or

b) otherwise the UE shall send the CONTROL PLANE SERVICE REQUEST

1) without including the CIoT small data container IE and without including the NAS message container IE if the UE has no other optional IE to be sent; or

2) with the NAS message container IE if the UE has an optional IE to be sent as described in this subclause

for case j) in subclause 5.6.1.1 the control plane service type of the CONTROL PLANE SERVICE REQUEST message shall indicate "mobile originating request" the UE shall include the uplink data status IE in the CONTROL PLANE SERVICE REQUEST message indicating the PDU session(s) for which user-plane resources were active prior to receiving the fallback indication if any

for cases o) and p) in subclause 5.6.1.1 the UE shall not include the uplink data status IE and the allowed PDU session status IE in the CONTROL PLANE SERVICE REQUEST message further

- for case o) in subclause 5.6.1.1 the UE shall set request type to "NAS signalling connection release" in the UE request type IE and control plane service type to "mobile originating request";

- for case p) in subclause 5.6.1.1 the UE shall set request type to "Rejection of paging" in the UE request type IE and control plane service type to "mobile terminating request"; and

may include its paging restriction preferences in the paging restriction IE in the CONTROL PLANE SERVICE REQUEST message

for case m) in subclause 5.6.1.1 the control plane service type of the CONTROL PLANE SERVICE REQUEST message shall indicate "mobile originating request" the UE shall not include the paging restriction IE in the CONTROL PLANE SERVICE REQUEST message the UE may include the UE request type IE and set request type to "NAS signalling connection release" to remove the paging restriction and request the release of the NAS signalling connection at the same time if the UE requests the release of the NAS signalling connection the UE shall not include the uplink data status IE in the SERVICE REQUEST message for all cases if the UE includes the uplink data status IE and the UE is located outside the LADN service area of a PDU session the UE shall not include the PDU session for LADN in the uplink data status IE

if the UE is in a non-allowed area or the UE is not in an allowed area the UE shall apply the restrictions for the inclusion of the uplink data status IE specified in subclause 5.3.5.2

the UE may include the PDU session status IE in the CONTROL PLANE SERVICE REQUEST message to indicate which PDU session(s) associated with the access type the CONTROL PLANE SERVICE REQUEST message is sent over are active in the UE

#### 5.6.1.3 common procedure initiation

upon receipt of the SERVICE REQUEST or CONTROL PLANE SERVICE REQUEST message the AMF may initiate the common procedures e.g the 5G AKA based primary authentication and key agreement procedure or the EAP based primary authentication and key agreement procedure

#### 5.6.1.4 service request procedure accepted by the network

##### 5.6.1.4.1 UE is not using 5GS services with control plane CIoT 5GS optimization

for cases other than h) in subclause 5.6.1.1 the UE shall treat the reception of the SERVICE ACCEPT message as successful completion of the procedure the UE shall reset the service request attempt counter stop timer T3517 and enter the state 5GMM-REGISTERED

for case h) in subclause 5.6.1.1

a) the UE shall treat the indication from the lower layers when the UE has changed to S1 mode or E-UTRA connected to 5GCN (see 3GPP TS 23.502 [9]) as successful completion of the procedure and stop timer T3517;

b) if a UE operating in single-registration mode has changed to S1 mode it shall disable the N1 mode capability for 3GPP access (see subclause 4.9.2); and

c) the AMF shall not check for CAG restrictions

if the PDU session status information element is included in the SERVICE REQUEST message then

a) for single access PDU sessions the AMF shall

1) perform a local release of all those PDU sessions which are not in 5GSM state PDU SESSION INACTIVE on the AMF side associated with the access type the SERVICE REQUEST message is sent over but are indicated by the UE as being in 5GSM state PDU SESSION INACTIVE; and

2) request the SMF to perform a local release of all those PDU sessions if any of those PDU sessions is associated with one or more multicast MBS sessions the SMF shall consider the UE as removed from the associated multicast MBS sessions; and

b) for MA PDU sessions the AMF shall

1) for MA PDU sessions having user plane resources established in the AMF only on the access the SERVICE REQUEST message is sent over but are indicated by the UE as no user plane resources established

i) for all those MA PDU sessions without a PDN connection established as a user-plane resource perform a local release of all those MA PDU sessions and request the SMF to perform a local release of all those MA PDU sessions if the MA PDU session is associated with one or more multicast MBS sessions the SMF shall consider the UE as removed from the associated multicast MBS sessions; and

ii) for all those MA PDU sessions with a PDN connection established as a user-plane resource perform a local release of user plane resources of all those PDU sessions on the access the SERVICE REQUEST message is sent over and request the SMF to perform a local release of user plane resources of all those PDU sessions on the access type the SERVICE REQUEST message is sent over; and

2) for MA PDU sessions having user plane resources established on both accesses in the AMF but are indicated by the UE as no user plane resources established

i) perform a local release of user plane resources of all those PDU sessions on the access the SERVICE REQUEST message is sent over; and

ii) request the SMF to perform a local release of user plane resources of all those PDU sessions on the access type the SERVICE REQUEST message is sent over if the SERVICE REQUEST message is sent over 3GPP access and the MA PDU session is associated with one or more multicast MBS sessions the SMF shall consider the UE as removed from the associated multicast MBS sessions

if the AMF needs to initiate PDU session status synchronization or a PDU session status IE was included in the SERVICE REQUEST message the AMF shall include a PDU session status IE in the SERVICE ACCEPT message to indicate

- which single access PDU sessions associated with the access type the SERVICE ACCEPT message is sent over are not in 5GSM state PDU SESSION INACTIVE in the AMF; and

- which MA PDU sessions are not in 5GSM state PDU SESSION INACTIVE and having user plane resources established in the AMF on the access the SERVICE ACCEPT message is sent over

if the PDU session status information element is included in the SERVICE ACCEPT message then

a) for single access PDU sessions the UE shall perform a local release of all those PDU sessions which are not in 5GSM state PDU SESSION INACTIVE or PDU SESSION ACTIVE PENDING on the UE side associated with the access type the SERVICE ACCEPT message is sent over but are indicated by the AMF as in 5GSM state PDU SESSION INACTIVE if a locally released PDU session is associated with one or more multicast MBS sessions the UE shall locally leave the associated multicast MBS sessions; and

b) for MA PDU sessions for all those PDU sessions which are not in 5GSM state PDU SESSION INACTIVE or PDU SESSION ACTIVE PENDING and have user plane resources established on the UE side associated with the access the SERVICE ACCEPT message is sent over but are indicated by the AMF as no user plane resources established

1) for MA PDU sessions having user plane resources established only on the access type the SERVICE ACCEPT message is sent over the UE shall perform a local release of those MA PDU sessions if a locally released MA PDU session is associated with one or more multicast MBS sessions the UE shall locally leave the associated multicast MBS sessions; and

2) for MA PDU sessions having user plane resources established on both accesses the UE shall perform a local release on the user plane resources on the access type the SERVICE ACCEPT message is sent over if the user plane resources over 3GPP access are released and the MA PDU session is associated with one or more multicast MBS sessions the UE shall locally leave the associated multicast MBS sessions

if the uplink data status IE is included in the SERVICE REQUEST message and the UE is

a) not in NB-N1 mode; or

b) in NB-N1 mode and the UE does not indicate a request to have user-plane resources established for a number of PDU sessions that exceeds the UE's maximum number of supported user-plane resources;

the AMF shall

a) indicate the SMF to re-establish the user-plane resources for the corresponding PDU sessions;

b) include the PDU session reactivation result IE in the SERVICE ACCEPT message to indicate the user-plane resources re-establishment result of the PDU sessions for which the UE requested to re-establish the user-plane resources; and

c) determine the UE presence in LADN service area (see subclause 6.2.6) and forward the UE presence in LADN service area towards the SMF if the corresponding PDU session is a PDU session for LADN

if the allowed PDU session status IE is included in the SERVICE REQUEST message the AMF shall

a) for a 5GSM message from each SMF that has indicated pending downlink signalling only forward the received 5GSM message via 3GPP access to the UE after the SERVICE ACCEPT message is sent;

b) for each SMF that has indicated pending downlink data only

1) notify the SMF that reactivation of the user-plane resources for the corresponding PDU session(s) associated with non-3GPP access cannot be performed if the corresponding PDU session ID(s) are not indicated in the allowed PDU session status IE; and

2) notify the SMF that reactivation of the user-plane resources for the corresponding PDU session(s) associated with non-3GPP access can be performed if

i) for a UE not in NB-N1 mode the corresponding PDU session ID(s) are indicated in the allowed PDU session status IE; or

ii) for a UE in NB-N1 mode the corresponding PDU session ID(s) are indicated in the allowed PDU session status IE and the resulting number of PDU sessions with established user-plane resources does not exceed the UE's maximum number of supported user-plane resources;

c) for each SMF that have indicated pending downlink signalling and data

1) notify the SMF that reactivation of the user-plane resources for the corresponding PDU session(s) associated with non-3GPP access cannot be performed if the corresponding PDU session ID(s) are not indicated in the allowed PDU session status IE;

2) notify the SMF that reactivation of the user-plane resources for the corresponding PDU session(s) associated with non-3GPP access can be performed if

i) for a UE not in NB-N1 mode the corresponding PDU session ID(s) are indicated in the allowed PDU session status IE; or

ii) for a UE in NB-N1 mode the corresponding PDU session ID(s) are indicated in the allowed PDU session status IE and the resulting number of PDU sessions with established user-plane resources does not exceed the UE's maximum number of supported user-plane resources; and

3) discard the received 5GSM message for PDU session(s) associated with non-3GPP access; and

d) include the PDU session reactivation result IE in the SERVICE ACCEPT message to indicate the successfully re-established user-plane resources for the corresponding PDU sessions if any

if due to regional subscription restrictions or access restrictions the UE is not allowed to access the TA or due to CAG restrictions the UE is not allowed to access the cell but the UE has an emergency PDU session established the AMF may accept the SERVICE REQUEST message and indicate to the SMF to perform a local release of all non-emergency PDU sessions (associated with 3GPP access if it is due to CAG restrictions) and informs the UE via the PDU session status IE in the SERVICE ACCEPT message the AMF shall not indicate to the SMF to release the emergency PDU session if the AMF indicated to the SMF to perform a local release of all non-emergency PDU sessions (associated with 3GPP access if it is due to CAG restrictions) the network shall behave as if the UE is registered for emergency services

if the PDU session reactivation result IE is included in the SERVICE ACCEPT message indicating that the user-plane resources have been successfully reactivated for a PDU session that was indicated by the UE in the allowed PDU session status IE as allowed to be re-established over 3GPP access the UE considers the corresponding PDU session to be associated with the 3GPP access if the user-plane resources of a PDU session have been successfully reactivated over the 3GPP access the AMF and SMF update the associated access type of the corresponding PDU session

if the user-plane resources cannot be established for a PDU session the AMF shall include the PDU session reactivation result IE in the SERVICE ACCEPT message indicating that user-plane resources for the corresponding PDU session cannot be re-established and

a) if the user-plane resources cannot be established because the SMF indicated to the AMF that the UE is located out of the LADN service area (see 3GPP TS 29.502 [20A]) the AMF shall include the PDU session reactivation result error cause IE with the 5GMM cause set to #43 "LADN not available";

b) if the user-plane resources cannot be established because the SMF indicated to the AMF that only prioritized services are allowed (see 3GPP TS 29.502 [20A]) the AMF shall include the PDU session reactivation result error cause IE with the 5GMM cause set to #28 "restricted service area";

c) if the user-plane resources cannot be established because the SMF indicated to the AMF that the resource is not available in the UPF (see 3GPP TS 29.502 [20A]) the AMF shall include the PDU session reactivation result error cause IE with the 5GMM cause set to #92 "insufficient user-plane resources for the PDU session";

d) if the user-plane resources cannot be established because the SMF indicated to the AMF that the S-NSSAI associated with the PDU session is unavailable due to NSAC (see 3GPP TS 29.502 [20A]) the AMF shall include the PDU session reactivation result error cause IE with the 5GMM cause set to #69 "insufficient resources for specific slice";

e) if the user-plane resources cannot be established because the AMF determines that the UE is outside the NS-AoS of the S-NSSAI associated with the PDU session the AMF may include the PDU session reactivation result error cause IE with the 5GMM cause set to #69 "insufficient resources for specific slice" to indicate the cause of failure to re-establish the user-plane resources; or

f) otherwise the AMF may include the PDU session reactivation result error cause IE to indicate the cause of failure to re-establish the user-plane resources

NOTE 1 it is up to UE implementation when to re-send a request for user-plane re-establishment for the associated PDU session after receiving a PDU session reactivation result error cause IE with a 5GMM cause set to #92 "insufficient user-plane resources for the PDU session"

NOTE 2 the UE can locally start a back-off timer after receiving a PDU session reactivation result error cause IE with a 5GMM cause set to #69 "insufficient resources for specific slice" the value of the back-off timer is up to UE implementation upon expiry of the back-off timer the UE can re-send a request for user-plane re-establishment for the associated PDU session

NOTE 3 if the UE that does not support S-NSSAI location validity information is outside the NS-AoS of the S-NSSAI associated with the PDU session the AMF may perform congestion control and indicate PDU session reactivation result error cause IE with the 5GMM cause set to #69 "insufficient resources for specific slice"

for case a b and e

- if the AMF has a service area list or LADN information which is applicable to the current TAI of the UE and was not yet provided to the UE before sending the SERVICE ACCEPT message the AMF shall initiate the generic UE configuration update procedure and include the service area list or LADN information or both in the CONFIGURATION UPDATE COMMAND message;

- if timer T3540 is not started (see subclause 5.3.1.3 item f) and the UE did not receive a CONFIGURATION UPDATE COMMAND message during the service request procedure the UE may initiate a registration procedure for mobility or periodic registration update if timer T3540 is started and the UE does not receive a CONFIGURATION UPDATE COMMAND message before the established N1 NAS signalling connection is released by the network or timer T3540 expires or is stopped as specified in subclause 5.3.1.3 the UE may initiate the registration procedure for mobility or periodic registration update upon release of the N1 NAS signalling connection; and

- if the AMF has S-NSSAI location validity information that is applicable to the current cell of the UE and was not yet provided to the UE before sending the SERVICE ACCEPT message the AMF shall initiate the generic UE configuration update procedure and include the S-NSSAI location validity information in the CONFIGURATION UPDATE COMMAND message

if the PDU session reactivation result IE is included in the SERVICE ACCEPT message indicating that the user-plane resources cannot be established for a PDU session that was indicated by the UE in the allowed PDU session status IE as allowed to be re-established over 3GPP access the UE considers the corresponding PDU session to be associated with the non-3GPP access

if the MUSIM UE does not include the paging restriction IE in the SERVICE REQUEST message the AMF shall delete any stored paging restriction for the UE and stop restricting paging

for case m in subclause 5.6.1.1 when the MUSIM UE sets the request type to "NAS signalling connection release" in the SERVICE REQUEST message the AMF shall initiate the release of the N1 NAS signalling connection after the completion of the service request procedure

for cases o and p in subclause 5.6.1.1 when the MUSIM UE sets the request type to "NAS signalling connection release" or to "Rejection of paging" in the UE request type IE in the SERVICE REQUEST message and if the UE requests restriction of paging by including the paging restriction IE the AMF

- if accepts the paging restriction shall include the 5GS additional request result IE in the SERVICE ACCEPT message and set the paging restriction decision to "paging restriction is accepted" the AMF shall store the paging restriction of the UE and enforce these restrictions in the paging procedure as described in subclause 5.6.2; or

- if rejects the paging restriction shall include the 5GS additional request result IE in the SERVICE ACCEPT message and set the paging restriction decision to "paging restriction is rejected" and shall discard the received paging restriction the AMF shall delete any stored paging restriction for the UE and stop restricting paging; and

the AMF shall initiate the release of the N1 NAS signalling connection as follows

- for case o in subclause 5.6.1.1 after the completion of the service request procedure;

- for case p in subclause 5.6.1.1 after the completion of the generic UE configuration update procedure that is triggered after the completion of the service request procedure

if the SERVICE REQUEST message is for emergency services fallback the AMF triggers the emergency services fallback procedure as specified in subclause 4.13.4.2 of 3GPP TS 23.502 [9]

if the UE having an emergency PDU session associated with 3GPP access sent the SERVICE REQUEST message via

a) a CAG cell and none of the CAG-ID(s) of the CAG cell are authorized based on the "Allowed CAG list" for the current PLMN in the UE's subscription; or

b) a non-CAG cell in a PLMN for which the UE's subscription contains an "indication that the UE is only allowed to access 5GS via CAG cells";

the network shall accept the SERVICE REQUEST message and release all non-emergency PDU sessions associated with 3GPP access locally the emergency PDU session associated with 3GPP access and PDU sessions associated with non-3GPP access shall not be released

if the AMF received the list of TAIs from the satellite NG-RAN as described in 3GPP TS 23.501 [8] and determines that by UE subscription and operator's preferences any but not all TAIs in the received list of TAIs is forbidden for roaming or for regional provision of service the AMF shall include the TAI(s) in

a) the forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" IE; or

b) the forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service" IE; or

c) both;

in the SERVICE ACCEPT message

NOTE 9 void

if the UE receives the forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" IE in the SERVICE ACCEPT message and the TAI(s) included in the IE is not part of the list of "5GS forbidden tracking areas for roaming" the UE shall store the TAI(s) belonging to the serving PLMN or equivalent PLMN(s) and ignore the TAI(s) which do not belong to the serving PLMN or equivalent PLMN(s) included in the IE into the list of "5GS forbidden tracking areas for roaming" and remove the TAI(s) from the stored TAI list if present

if the UE receives the forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service" IE in the SERVICE ACCEPT message and the TAI(s) included in the IE is not part of the list of "5GS forbidden tracking areas for regional provision of service" the UE shall store the TAI(s) belonging to the serving PLMN or equivalent PLMN(s) and ignore the TAI(s) which do not belong to the serving PLMN or equivalent PLMN(s) included in the IE into the list of "5GS forbidden tracking areas for regional provision of service" and remove the TAI(s) from the stored TAI list if present

##### 5.6.1.4.2 UE is using 5GS services with control plane CIoT 5GS optimization

for case a in subclause 5.6.1.1 upon receipt of the CONTROL PLANE SERVICE REQUEST message with control plane service type indicating "mobile terminating request" after completion of the 5GMM common procedures (if initiated) according to subclause 5.6.1.3 the AMF shall send a SERVICE ACCEPT message

for cases c d and m in subclause 5.6.1.1 upon receipt of the CONTROL PLANE SERVICE REQUEST message with control plane service type indicating "mobile originating request" after completion of the 5GMM common procedures (if initiated) according to subclause 5.6.1.3 the AMF shall send a SERVICE ACCEPT message except for case d when the DDX field of the release assistance indication IE or the DDX field of the CIoT small data container IE indicates "No further uplink and no further downlink data transmission subsequent to the uplink data transmission is expected"

for case a c and d

a) if the CIoT small data container IE is included in the message the AMF shall decipher the value part of the CIoT small data container IE and

1) if the data type field indicates "control plane user data" extract the PDU session ID and data content from the CIoT small data container IE look up a PDU session routing context for the UE and the PDU session ID and forward the content of the CIoT small data container IE to the SMF associated with the UE if the corresponding PDU session is a PDU session for LADN the AMF determines the UE presence in LADN service area (see subclause 6.2.6) and forwards the UE presence in LADN service area towards the SMF;

2) if the data type field indicates "SMS" forward the content of the CIoT small data container IE to the SMSF associated with the UE; or

3) if the data type field indicates "Location services message container" and if

i) length of additional information field in the CIoT small data container IE is zero forward the value of data type field and the content of the CIoT small data container IE to the to the location services application; or

ii) otherwise forward the value of data type field and the content of the CIoT small data container IE to the LMF associated with the routing information that is included in the additional information field of the CIoT small data container IE; or

NOTE 1 if the AMF determines there is no pending data or signalling for the UE the AMF provides an indication of control plane CIoT 5GS optimisation to the LMF as specified in 3GPP TS 29.518 [20B]

b) otherwise the AMF shall decipher the value part of NAS message container IE and

1) if the payload container IE is included in the CONTROL PLANE SERVICE REQUEST message and if the payload container type IE is set to "CIoT user data container" the AMF shall look up a PDU session routing context for the UE and the PDU session ID and forward the content of the payload container IE to the SMF associated with the UE if the corresponding PDU session is a PDU session for LADN the AMF determines the UE presence in LADN service area (see subclause 6.2.6) and forwards the UE presence in LADN service area towards the SMF;

2) if the payload container IE is included in the CONTROL PLANE SERVICE REQUEST message and if the payload container type IE is set to "SMS" the AMF shall forward the content of the payload container IE to the SMSF associated with the UE;

3) if the PDU session status IE is included in the CONTROL PLANE SERVICE REQUEST message or the AMF needs to perform a PDU session status synchronization the AMF shall include a PDU session status IE in the SERVICE ACCEPT message to indicate which PDU sessions associated with the access type the SERVICE ACCEPT message is sent over are active in the AMF;

4) if the uplink data status IE is included in the CONTROL PLANE SERVICE REQUEST message and the UE is

i) not in NB-N1 mode; or

ii) in NB-N1 mode and the UE does not indicate a request to have user-plane resources established for a number of PDU sessions that exceeds the UE's maximum number of supported user-plane resources;

the AMF shall

i) indicate the SMF to re-establish the user-plane resources for the corresponding PDU sessions; and

ii) include the PDU session reactivation result IE in the SERVICE ACCEPT message to indicate the user-plane resources re-establishment result of the PDU sessions for which the UE requested to re-establish the user-plane resources;

5) if the uplink data status IE is included in the CONTROL PLANE SERVICE REQUEST the UE is in NB-N1 mode and the UE indicates a request to have user-plane resources established for a number of PDU sessions that exceeds the UE's maximum number of supported user-plane resources the AMF shall not indicate to the SMF to re-establish the user-plane resources for the corresponding PDU sessions; or

6) otherwise if the payload container IE is included in the message and if the payload container type IE is set to "Location services message container" the AMF shall forward the payload container type and the content of the payload container IE to the LMF associated with the routing information included in the additional information IE of the CONTROL PLANE SERVICE REQUEST message

NOTE 2 if the AMF determines there is no pending data or signalling for the UE the AMF provides an indication of control plane CIoT 5GS optimisation to the LMF as specified in 3GPP TS 29.518 [20B]

for case k) in subclause 5.6.1.1 if the uplink data status IE is included in the CONTROL PLANE SERVICE REQUEST message and the UE is

a) not in NB-N1 mode; or

b) in NB-N1 mode and the UE does not indicate a request to have user-plane resources established for a number of PDU sessions that exceeds the UE's maximum number of supported user-plane resources

the AMF shall

a) indicate the SMF to re-establish the user-plane resources for the corresponding PDU sessions; and

b) include the PDU session reactivation result IE in the SERVICE ACCEPT message to indicate the user-plane resources re-establishment result of the PDU sessions for which the UE requested to re-establish the user-plane resources

if the allowed PDU session status IE is included in the CONTROL PLANE SERVICE REQUEST message the AMF shall

a) for a 5GSM message from each SMF that has indicated pending downlink signalling only forward the received 5GSM message via 3GPP access to the UE after the SERVICE ACCEPT message is sent;

b) for each SMF that has indicated pending downlink data only

1) notify the SMF that reactivation of the user-plane resources for the corresponding PDU session(s) associated with non-3GPP access cannot be performed if the corresponding PDU session ID(s) are not indicated in the allowed PDU session status IE; and

2) notify the SMF that reactivation of the user-plane resources for the corresponding PDU session(s) associated with non-3GPP access can be performed if

i) for a UE not in NB-N1 mode the corresponding PDU session ID(s) are indicated in the allowed PDU session status IE; or

ii) for a UE in NB-N1 mode the corresponding PDU session ID(s) are indicated in the allowed PDU session status IE and the resulting number of PDU sessions with established user-plane resources does not exceed the UE's maximum number of supported user-plane resources;

c) for each SMF that have indicated pending downlink signalling and data

1) notify the SMF that reactivation of the user-plane resources for the corresponding PDU session(s) associated with non-3GPP access cannot be performed if the corresponding PDU session ID(s) are not indicated in the allowed PDU session status IE;

2) notify the SMF that reactivation of the user-plane resources for the corresponding PDU session(s) associated with non-3GPP access can be performed if

i) for a UE not in NB-N1 mode the corresponding PDU session ID(s) are indicated in the allowed PDU session status IE; or

ii) for a UE in NB-N1 mode the corresponding PDU session ID(s) are indicated in the allowed PDU session status IE and the resulting number of PDU sessions with established user-plane resources does not exceed the UE's maximum number of supported user-plane resources; and

3) discard the received 5GSM message for PDU session(s) associated with non-3GPP access; and

d) include the PDU session reactivation result IE in the SERVICE ACCEPT message to indicate the successfully re-established user-plane resources for the corresponding PDU sessions if any

if the DDX field in the CIoT small data container IE or the DDX field of the release assistance indication IE indicates

1) "No further uplink and no further downlink data transmission subsequent to the uplink data transmission is expected" and if there is no downlink signalling or downlink data for the UE; or

2) "Only a single downlink data transmission and no further uplink data transmission subsequent to the uplink data transmission is expected" and upon subsequent delivery of the next received downlink data transmission to the UE and if there is no additional downlink signalling or downlink data for the UE

the AMF initiates the release of the N1 NAS signalling connection (see 3GPP TS 23.502 [9])

if the MUSIM UE does not include the paging restriction IE in the CONTROL PLANE SERVICE REQUEST message the AMF shall delete any stored paging restriction for the UE and stop restricting paging

for case m in subclause 5.6.1.1 when the MUSIM UE sets the request type to "NAS signalling connection release" in the CONTROL PLANE SERVICE REQUEST message the AMF shall initiate the release of the N1 NAS signalling connection after the completion of the service request procedure

for cases o and p in subclause 5.6.1.1 when the MUSIM UE sets the request type to "NAS signalling connection release" or to "Rejection of paging" in the UE request type IE in the CONTROL PLANE SERVICE REQUEST message and if the UE requests restriction of paging by including the paging restriction IE the AMF

- if accepts the paging restriction shall include the 5GS additional request result IE in the SERVICE ACCEPT message and set the paging restriction decision to "paging restriction is accepted" the AMF shall store the paging restriction of the UE and enforce these restrictions in the paging procedure as described in subclause 5.6.2; or

- if rejects the paging restriction shall include the 5GS additional request result IE in the SERVICE ACCEPT message and set the paging restriction decision to "paging restriction is rejected" and shall discard the received paging restriction the AMF shall delete any stored paging restriction for the UE and stop restricting paging; and

the AMF shall send the SERVICE ACCEPT message and initiate the release of the N1 NAS signalling connection as follows

- for case o in subclause 5.6.1.1 after the completion of the service request procedure;

- for case p in subclause 5.6.1.1 after the completion of the generic UE configuration update procedure that is triggered after the completion of the service request procedure

upon successful completion of the procedure the UE shall reset the service request attempt counter stop the timer T3517 and enter the state 5GMM-REGISTERED

if the PDU session status information element is included in the CONTROL PLANE SERVICE REQUEST message then the AMF

a) shall perform a local release of all those PDU sessions which are not in 5GSM state PDU SESSION INACTIVE on the AMF side associated with the access type the CONTROL PLANE SERVICE REQUEST message is sent over but are indicated by the UE as being inactive and

b) request the SMF to perform a local release of all those PDU sessions if any of those PDU sessions is associated with one or more multicast MBS sessions the SMF shall consider the UE as removed from the associated multicast MBS sessions

if the PDU session status information element is included in the SERVICE ACCEPT message then the UE shall perform a local release of all those PDU sessions which are not in 5GSM state PDU SESSION INACTIVE or PDU SESSION ACTIVE PENDING on the UE side associated with the 3GPP access but are indicated by the AMF as being inactive if a locally released PDU session

a) is associated with one or more multicast MBS sessions the UE shall locally leave the associated multicast MBS sessions; or

b) has the same PDU session identity value as that used by the UE in the CONTROL PLANE SERVICE REQUEST message and the message contained CIoT user data then the UE determines that the CIoT user data was not successfully sent

if the user-plane resources cannot be established for a PDU session the AMF shall include the PDU session reactivation result IE in the SERVICE ACCEPT message indicating that user-plane resources for the corresponding PDU session cannot be re-established and

a) if the user-plane resources cannot be established because the SMF indicated to the AMF that the UE is located out of the LADN service area (see 3GPP TS 29.502 [20A]) the AMF shall include the PDU session reactivation result error cause IE with the 5GMM cause set to #43 "LADN not available";

b) if the user-plane resources cannot be established because the SMF indicated to the AMF that only prioritized services are allowed (see 3GPP TS 29.502 [20A]) the AMF shall include the PDU session reactivation result error cause IE with the 5GMM cause set to #28 "restricted service area";

c) if the user-plane resources cannot be established because

1) the SMF indicated to the AMF that the resource is not available in the UPF (see 3GPP TS 29.502 [20A]); or

2) the UE is in NB-N1 mode and the result will lead to user-plane resources established for more than two PDU sessions (see 3GPP TS 23.502 [9])

the AMF shall include the PDU session reactivation result error cause IE with the 5GMM cause set to #92 "insufficient user-plane resources for the PDU session"

NOTE 3 for a UE that is not in NB-N1 mode it is up to UE implementation when to re-send a request for user-plane re-establishment for the associated PDU session after receiving a PDU session reactivation result error cause IE with a 5GMM cause set to #92 "insufficient user-plane resources for the PDU session"; or

d) if the user-plane resources cannot be established because the AMF determines that the UE is outside the NS-AoS of the S-NSSAI associated with the PDU session the AMF may include the PDU session reactivation result error cause IE with the 5GMM cause set to #69 "insufficient resources for specific slice" to indicate the cause of failure to re-establish the user-plane resources

NOTE 4 if the UE that does not support S-NSSAI location validity information is outside the NS-AoS of the S-NSSAI associated with the PDU session the AMF may perform congestion control and indicate PDU session reactivation result error cause IE with the 5GMM cause set to #69 "insufficient resources for specific slice"

for case a b and d

- if the AMF has a service area list or LADN information which is applicable to the current TAI of the UE and was not yet provided to the UE before sending the SERVICE ACCEPT message the AMF shall initiate the generic UE configuration update procedure and include the service area list or LADN information or both in the CONFIGURATION UPDATE COMMAND message; and

- if timer T3540 is not started (see subclause 5.3.1.3 item f) and the UE did not receive a CONFIGURATION UPDATE COMMAND message during the service request procedure the UE may initiate a registration procedure for mobility or periodic registration update if timer T3540 is started and the UE does not receive a CONFIGURATION UPDATE COMMAND message before the established N1 NAS signalling connection is released by the network or timer T3540 expires or is stopped as specified in subclause 5.3.1.3 the UE may initiate the registration procedure for mobility or periodic registration update upon release of the N1 NAS signalling connection

- if the AMF has S-NSSAI locaion validity information that is applicable to the current cell of the UE and was not yet provided to the UE before sending the SERVICE ACCEPT message the AMF shall initiate the generic UE configuration update procedure and include the S-NSSAI location validity information in the CONFIGURATION UPDATE COMMAND message

if the PDU session reactivation result IE is included in the SERVICE ACCEPT message indicating that the user-plane resources cannot be established for a PDU session that was indicated by the UE in the allowed PDU session status IE as allowed to be re-established over 3GPP access the UE considers the corresponding PDU session to be associated with the non-3GPP access

for case d) in subclause 5.6.1.1 the UE shall also treat the indication from the lower layers that the RRC connection has been released as successful completion of the procedure the UE shall reset the service request attempt counter stop the timer T3517 and enter the state 5GMM-REGISTERED

upon receipt of the CONTROL PLANE SERVICE REQUEST message with uplink data

- if the DDX field of the release assistance indication IE or the DDX field of the CIoT small data container IE is set to "No further uplink and no further downlink data transmission subsequent to the uplink data transmission is expected" in the message;

- if the AMF decides to forward the uplink data piggybacked in the CONTROL PLANE SERVICE REQUEST message; and

- if the AMF decides to activate the congestion control for transport of user data via the control plane

then the AMF shall send SERVICE ACCEPT message with the T3448 value IE included

if the AMF decides to deactivate the congestion control for transport of user data via the control plane then the AMF shall delete the stored control plane data back-off time for the UE and the AMF shall not include timer T3448 value IE in the SERVICE ACCEPT message

if the T3448 value IE is present in the received SERVICE ACCEPT message and the value indicates that this timer is neither zero nor deactivated the UE shall

a) stop timer T3448 if it is running;

b) consider the transport of user data via the control plane as successful; and

c) start timer T3448 with the value provided in the T3448 value IE

if the UE is using 5GS services with control plane CIoT 5GS optimization the T3448 value IE is present in the SERVICE ACCEPT message and the value indicates that this timer is either zero or deactivated the UE shall ignore the T3448 value IE and proceed as if the T3448 value IE was not present

if the UE in 5GMM-IDLE mode initiated the service request procedure by sending a CONTROL PLANE SERVICE REQUEST message and the SERVICE ACCEPT message does not include the T3448 value IE and if timer T3448 is running then the UE shall stop timer T3448

for case h) in subclause 5.6.1.1

a) the UE shall treat the indication from the lower layers when the UE has changed to S1 mode as successful completion of the procedure and stop timer T3517;

b) if a UE operating in single-registration mode has changed to S1 mode it shall disable the N1 mode capability for 3GPP access (see subclause 4.9.2); and

c) the AMF shall not check for CAG restrictions

if the CONTROL PLANE SERVICE REQUEST message is for emergency services fallback the AMF triggers the emergency services fallback procedure as specified in subclause 4.13.4.2 of 3GPP TS 23.502 [9]

#### 5.6.1.5 service request procedure not accepted by the network

if the service request cannot be accepted the network shall return a SERVICE REJECT message to the UE including an appropriate 5GMM cause value

if the SERVICE REJECT message with 5GMM cause #76 or #78 was received without integrity protection then the UE shall discard the message

if the AMF needs to initiate PDU session status synchronisation or a PDU session status IE was included in the SERVICE REQUEST message the AMF shall include a PDU session status IE in the SERVICE REJECT message to indicate which PDU sessions associated with the access type the SERVICE REJECT message is sent over are active in the AMF if the PDU session status IE is included in the SERVICE REJECT message and if the message is integrity protected then

a) for single access PDU sessions the UE shall perform a local release of all those PDU sessions which are not in 5GSM state PDU SESSION INACTIVE or PDU SESSION ACTIVE PENDING on the UE side associated with the access type the SERVICE REJECT message is sent over but are indicated by the AMF as being in 5GSM state PDU SESSION INACTIVE if a locally released PDU session is associated with one or more MBS sessions the UE shall locally leave the associated MBS multicast sessions; and

b) for MA PDU sessions for all those PDU sessions which are not in 5GSM state PDU SESSION INACTIVE or PDU SESSION ACTIVE PENDING and have user plane resources established on the UE side associated with the access the SERVICE REJECT message is sent over but are indicated by the AMF as no user plane resources established

1) for MA PDU sessions having user plane resources established only on the access type the SERVICE REJECT message is sent over the UE shall perform a local release of those MA PDU sessions if a locally released PDU session is associated with one or more MBS sessions the UE shall locally leave the associated MBS multicast sessions; and

2) for MA PDU sessions having user plane resources established on both accesses the UE shall perform a local release on the user plane resources on the access type the SERVICE REJECT message is sent over if a locally released PDU session is associated with one or more MBS sessions the UE shall locally leave the associated MBS multicast sessions

if the service request for mobile originated services is rejected due to general NAS level mobility management congestion control the network shall set the 5GMM cause value to #22 "congestion" and assign a value for back-off timer T3346

if the service request for mobile originated services is rejected due to general NAS level mobility management congestion control for the SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) the network may set an appropriate cause value other than 5GMM cause value to #22 "congestion" and does not assign a value for back-off timer T3346

in NB-N1 mode if the service request for mobile originated services is rejected due to operator determined barring (see 3GPP TS 29.503 [20AB]) the network shall set the 5GMM cause value to #22 "congestion" and assign a value for back-off timer T3346

if the service request from a UE supporting CAG is rejected due to CAG restrictions the network shall set the 5GMM cause value to #76 "Not authorized for this CAG or authorized for CAG cells only" and should include the "CAG information list" in the CAG information list IE or the extended CAG information list IE in the SERVICE REJECT message

NOTE 1 the network cannot be certain that "CAG information list" stored in the UE is updated as result of sending of the SERVICE REJECT message with the CAG information list IE or the extended CAG information list IE as the SERVICE REJECT message is not necessarily delivered to the UE (e.g. due to abnormal radio conditions)

NOTE 2 the "CAG information list" can be provided by the AMF and include no entry if no "CAG information list" exists in the subscription

NOTE 2A if the UE supports extended CAG information list the CAG information list can be included either in the CAG information list IE or extended CAG information list IE

NOTE 2B it is unexpected for network to send REGISTRATION REJECT message to the UE with 5GMM cause value #76 in non-CAG cell and not indicate "Indication that the UE is only allowed to access 5GS via CAG cells" for the serving PLMN in the extended CAG information list or the CAG information list

if the UE does not support extended CAG information list the CAG information list shall not be included in the extended CAG information list IE

if the service request from a UE not supporting CAG is rejected due to CAG restrictions the network shall operate as described in bullet h) of subclause 5.6.1.8

upon receipt of the CONTROL PLANE SERVICE REQUEST message with uplink data

- if the AMF decides to not forward the uplink data piggybacked in the CONTROL PLANE SERVICE REQUEST message; and

- if the AMF decides to activate the congestion control for transport of user data via the control plane

then the AMF shall send a SERVICE REJECT message and set the 5GMM cause value to #22 "congestion" and assign a value for control plane data back-off timer T3448

if the AMF determines that the UE is in a non-allowed area or is not in an allowed area as specified in subclause 5.3.5 then

a) if the service type IE in the SERVICE REQUEST message is set to "signalling" or "data" the AMF shall send a SERVICE REJECT message with the 5GMM cause value set to #28 "Restricted service area";

b) otherwise if the service type IE in the SERVICE REQUEST message is set to "mobile terminated services" "emergency services" "emergency services fallback" "high priority access" or "elevated signalling" the AMF shall continue the process as specified in subclause 5.6.1.4 unless for other reasons the service request cannot be accepted

if the service request for mobile originated services is rejected due to service gap control as specified in subclause 5.3.17 i.e the T3447 timer is running in AMF the network shall set the 5GMM cause value to #22 "Congestion" and may include T3346 value IE in the SERVICE REJECT message set to the remaining time of the running T3447 timer

based on operator policy if the service request procedure is rejected due to core network redirection for CIoT optimizations the network shall set the 5GMM cause value to #31 "Redirection to EPC required"

NOTE 3 the network can take into account the UE's S1 mode capability the EPS CIoT network behaviour supported by the UE or the EPS CIoT network behaviour supported by the EPC to determine the rejection with the 5GMM cause value #31 "Redirection to EPC required"

if the service request is via a satellite NG-RAN cell and the network determines that the UE is in a location where the network is not allowed to operate see 3GPP TS 23.502 [9] the network shall set the 5GMM cause value in the SERVICE REJECT message to #78 "PLMN not allowed to operate at the present UE location"

NOTE 3A while location determination is ongoing to ensure that operator and regulatory policies are met the AMF can perform DNN-based or S-NSSAI based congestion control as specified in subclauses 5.3.10 and 5.3.11 to prevent the UE from accessing network

if the service request from a UE supporting MINT is rejected due to a disaster condition no longer being applicable in the current location of the UE the network shall set the 5GMM cause value to #11 "PLMN not allowed" or #13 "Roaming not allowed in this tracking area" and may include a disaster return wait range in the disaster return wait range IE in the SERVICE REJECT message

on receipt of the SERVICE REJECT message if the UE is in state 5GMM-SERVICE-REQUEST-INITIATED the UE shall reset the service request attempt counter and stop timer T3517 if running

if the AMF received multiple TAIs from the satellite NG-RAN as described in 3GPP TS 23.501 [8] and determines that by UE subscription and operator's preferences all of the received TAIs are forbidden for roaming or for regional provision of service the AMF shall include the TAI(s) in

a) the forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" IE; or

b) the forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service" IE; or

c) both;

in the SERVICE REJECT message

regardless of the 5GMM cause value received in the SERVICE REJECT message via satellite NG-RAN

- if the UE receives the forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" IE in the SERVICE REJECT message the UE shall store the TAI(s) belonging to the serving PLMN or equivalent PLMN(s) and ignore the TAI(s) which do not belong to the serving PLMN or equivalent PLMN(s) included in the IE if not already stored into the list of "5GS forbidden tracking areas for roaming"; and

- if the UE receives the forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service" IE in the SERVICE REJECT message the UE shall store the TAI(s) belonging to the serving PLMN or equivalent PLMN(s) and ignore the TAI(s) which do not belong to the serving PLMN or equivalent PLMN(s) included in the IE if not already stored into the list of "5GS forbidden tracking areas for regional provision of service"

furthermore the UE shall take the following actions depending on the 5GMM cause value received in the SERVICE REJECT message

#3 (Illegal UE);

#6 (Illegal ME);

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list and ngKSI

in case of PLMN the UE shall consider the USIM as invalid for 5GS services until switching off the UICC containing the USIM is removed or the timer T3245 expires as described in subclause 5.3.19A.1;

in case of SNPN if the UE is not registered for onboarding services in SNPN and the UE does not support access to an SNPN using credentials from a credentials holder and does not support equivalent SNPNs the UE shall consider the selected entry of the "list of subscriber data" with the SNPN identity of the current SNPN as invalid until the UE is switched off the entry is updated or the timer T3245 expires as described in subclause 5.3.19A.2 in case of SNPN if the UE is not registered for onboarding services in SNPN and the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the UE shall consider the selected entry of the "list of subscriber data" as invalid for 3GPP access until the UE is switched off the entry is updated or the timer T3245 expires as described in subclause 5.3.19A.2 additionally if EAP based primary authentication and key agreement procedure using EAP-AKA' or 5G AKA based primary authentication and key agreement procedure was performed in the current SNPN the UE shall consider the USIM as invalid for the current SNPN until switching off the UICC containing the USIM is removed or the timer T3245 expires as described in subclause 5.3.19A.2

if the UE is not registered for onboarding services in SNPN the UE shall delete the list of equivalent PLMNs (if any) or the list of equivalent SNPNs (if any) and shall enter the state 5GMM-DEREGISTERED.NO-SUPI if the message has been successfully integrity checked by the NAS then the UE shall

1) set the counter for "SIM/USIM considered invalid for GPRS services" events and the counter for "USIM considered invalid for 5GS services over non-3GPP access" events to UE implementation-specific maximum value in case of PLMN if the UE maintains these counters;

2) set the counter for "the entry for the current SNPN considered invalid for 3GPP access" events and the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events to UE implementation-specific maximum value in case of SNPN if the UE maintains these counters; and

if the message was received via 3GPP access and the UE is operating in the single-registration mode the UE shall handle the EMM parameters EMM state EPS update status 4G-GUTI last visited registered TAI TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the service request procedure is rejected with the EMM cause with the same value the USIM shall be considered as invalid also for non-EPS services until switching off the UICC containing the USIM is removed or the timer T3245 expires as described in subclause 5.3.7a in 3GPP TS 24.301 [15] if the message has been successfully integrity checked by the NAS and the UE maintains a counter for "SIM/USIM considered invalid for non-GPRS services" then the UE shall set this counter to UE implementation-specific maximum value

if the UE is registered for onboarding services in SNPN the UE shall store the SNPN identity in the "permanently forbidden SNPNs for onboarding services in SNPN" list enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection or an SNPN selection for onboarding services according to 3GPP TS 23.122 [5] if the message has been successfully integrity checked by the NAS the UE shall set the SNPN-specific attempt counter to the UE implementation-specific maximum value

if the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access the UE shall in addition handle 5GMM parameters and 5GMM state for this access as described for this 5GMM cause value

#7 (5GS services not allowed)

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list and ngKSI

in case of PLMN the UE shall consider the USIM as invalid for 5GS services until switching off the UICC containing the USIM is removed or the timer T3245 expires as described in subclause 5.3.19A.1;

in case of SNPN if the UE is not registered for onboarding services in SNPN and the UE does not support access to an SNPN using credentials from a credentials holder and does not support equivalent SNPNs the UE shall consider the selected entry of the "list of subscriber data" with the SNPN identity of the current SNPN as invalid for 5GS services until the UE is switched off the entry is updated or the timer T3245 expires as described in subclause 5.3.19A.2 in case of SNPN if the UE is not registered for onboarding services in SNPN and the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the UE shall consider the selected entry of the "list of subscriber data" as invalid for 3GPP access until the UE is switched off the entry is updated or the timer T3245 expires as described in subclause 5.3.19A.2 additionally if EAP based primary authentication and key agreement procedure using EAP-AKA' or 5G AKA based primary authentication and key agreement procedure was performed in the current SNPN the UE shall consider the USIM as invalid for the current SNPN until switching off the UICC containing the USIM is removed or the timer T3245 expires as described in subclause 5.3.19A.2

if the UE is not registered for onboarding services in SNPN the UE shall enter the state 5GMM-DEREGISTERED.NO-SUPI if the message has been successfully integrity checked by the NAS then the UE shall

1) set the counter for "SIM/USIM considered invalid for GPRS services" events and the counter for "USIM considered invalid for 5GS services over non-3GPP access" events to UE implementation-specific maximum value in case of PLMN if the UE maintains these counters; or

2) set the counter for "the entry for the current SNPN considered invalid for 3GPP access" events and the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events to UE implementation-specific maximum value in case of SNPN if the UE maintains these counters; and

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall handle the EMM parameters EMM state EPS update status 4G-GUTI last visited registered TAI TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the service request procedure is rejected with the EMM cause with the same value

if the UE is registered for onboarding services in SNPN the UE shall store the SNPN identity in the "permanently forbidden SNPNs for onboarding services in SNPN" list enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection or an SNPN selection for onboarding services according to 3GPP TS 23.122 [5] if the message has been successfully integrity checked by the NAS the UE shall set the SNPN-specific attempt counter to the UE implementation-specific maximum value

if the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access the UE shall in addition handle 5GMM parameters and 5GMM state for this access as described for this 5GMM cause value

NOTE 4 the possibility to configure a UE so that the radio transceiver for a specific radio access technology is not active although it is implemented in the UE is outside the scope of the present document

#9 (UE identity cannot be derived by the network)

the UE shall set the 5GS update status to 5U2 NOT UPDATED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list and ngKSI the UE shall enter the state 5GMM-DEREGISTERED

if the service request was initiated for emergency services fallback the UE shall attempt to select an E-UTRA cell connected to EPC or 5GCN according to the domain priority and selection rules specified in 3GPP TS 23.167 [6] if the UE finds a suitable E-UTRA cell it then proceeds with the appropriate EMM or 5GMM procedures if the UE operating in single-registration mode has changed to S1 mode it shall disable the N1 mode capability for 3GPP access

if the service request was initiated for any reason other than emergency services fallback or initiating an emergency PDU session the UE shall perform a new initial registration procedure

NOTE 5 user interaction is necessary in some cases when the UE cannot re-establish the PDU session(s) automatically

if the message was received via 3GPP access and the UE is operating in the single-registration mode the UE shall handle the EMM parameters EMM state EPS update status 4G-GUTI last visited registered TAI TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the service request procedure is rejected with the EMM cause with the same value

#10 (Implicitly de-registered)

the UE shall enter the state 5GMM-DEREGISTERED.NORMAL-SERVICE the UE shall delete any mapped 5G NAS security context or partial native 5G NAS security context

if the service request was initiated for emergency services fallback the UE shall attempt to select an E-UTRA cell connected to EPC or 5GCN according to the domain priority and selection rules specified in 3GPP TS 23.167 [6] if the UE finds a suitable E-UTRA cell it then proceeds with the appropriate EMM or 5GMM procedures if the UE operating in single-registration mode has changed to S1 mode it shall disable the N1 mode capability for 3GPP access

if the rejected request was neither for initiating an emergency PDU session nor for emergency services fallback the UE shall perform a new initial registration procedure

NOTE 6 user interaction is necessary in some cases when the UE cannot re-establish the PDU session(s) automatically

if the message was received via 3GPP access and the UE is operating in the single-registration mode the UE shall handle the EMM state as specified in 3GPP TS 24.301 [15] for the case when the service request procedure is rejected with the EMM cause with the same value

#11 (PLMN not allowed)

this cause value received from a cell belonging to an SNPN and the UE is operating in SNPN access operation mode is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.6.1.7

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list and ngKSI the UE shall delete the list of equivalent PLMNs and store the PLMN identity in the forbidden PLMN list as specified in subclause 5.3.13A and if the UE is configured to use timer T3245 then the UE shall start timer T3245 and proceed as described in subclause 5.3.19A.1 for 3GPP access the UE shall enter the state 5GMM-DEREGISTERED.PLMN-SEARCH and perform a PLMN selection according to 3GPP TS 23.122 [5] and for non-3GPP access the UE shall enter state 5GMM-DEREGISTERED.LIMITED-SERVICE and perform network selection as defined in 3GPP TS 24.502 [18] if the message has been successfully integrity checked by the NAS and the UE mantains the PLMN-specific attempt counter and the PLMN-specific attempt counter for non-3GPP access for that PLMN the UE shall set the PLMN-specific attempt counter and the PLMN-specific attempt counter for non-3GPP access for that PLMN to the UE implementation-specific maximum value

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall in addition handle the EMM parameters EMM state EPS update status 4G-GUTI last visited registered TAI TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the service request procedure is rejected with the EMM cause with the same value

if the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access to the same PLMN the UE shall in addition handle 5GMM parameters and 5GMM state for this access as described for this 5GMM cause value

if the UE receives the disaster return wait range IE in the SERVICE REJECT message and the UE supports MINT the UE shall delete the disaster return wait range stored in the ME if any and store the disaster return wait range included in the disaster return wait range IE in the ME

#12 (Tracking area not allowed)

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete last visited registered TAI and TAI list if the UE is not registering or has not registered to the same PLMN over both 3GPP access and non-3GPP access the UE shall additionally delete 5G-GUTI and ngKSI

if

1) the UE is not operating in SNPN access operation mode the UE shall store the current TAI in the list of "5GS forbidden tracking areas for regional provision of service" and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE if the SERVICE REJECT message is not integrity protected the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for regional provision of service" for non-integrity protected NAS reject message; or

2) the UE is operating in SNPN access operation mode the UE shall store the current TAI in the list of "5GS forbidden tracking areas for regional provision of service" for the current SNPN and the selected entry of the "list of subscriber data" or the selected PLMN subscription and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE if the SERVICE REJECT message is not integrity protected the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for regional provision of service" for the current SNPN and the selected entry of the "list of subscriber data" or the selected PLMN subscription for non-integrity protected NAS reject message

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall handle the EMM parameters EMM state EPS update status 4G-GUTI last visited registered TAI TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the service request procedure is rejected with the EMM cause with the same value

#13 (Roaming not allowed in this tracking area)

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) for 3GPP access the UE shall enter the state 5GMM-REGISTERED.PLMN-SEARCH and for non-3GPP access the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE

if

1) the UE is not operating in SNPN access operation mode the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" and remove the current TAI from the stored TAI list if present if the SERVICE REJECT message is not integrity protected the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for non-integrity protected NAS reject message; or

2) the UE is operating in SNPN access operation mode the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and the selected entry of the "list of subscriber data" or the selected PLMN subscription and remove the current TAI from the stored TAI list if present if the SERVICE REJECT message is not integrity protected the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and the selected entry of the "list of subscriber data" or the selected PLMN subscription for non-integrity protected NAS reject message

for 3GPP access the UE shall perform a PLMN selection or SNPN selection according to 3GPP TS 23.122 [5] and for non-3GPP access the UE shall perform network selection as defined in 3GPP TS 24.502 [18]

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall handle the EMM parameters EMM state and EPS update status as specified in 3GPP TS 24.301 [15] for the case when the service request procedure is rejected with the EMM cause with the same value

if the UE receives the disaster return wait range IE in the SERVICE REJECT message and the UE supports MINT the UE shall delete the disaster return wait range stored in the ME if any and store the disaster return wait range included in the disaster return wait range IE in the ME

#15 (No suitable cells in tracking area)

the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE

if

1) the UE is not operating in SNPN access operation mode the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" and remove the current TAI from the stored TAI list if present if the SERVICE REJECT message is not integrity protected the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for non-integrity protected NAS reject message; or

2) the UE is operating in SNPN access operation mode the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and the selected entry of the "list of subscriber data" or the selected PLMN subscription and remove the current TAI from the stored TAI list if present if the SERVICE REJECT message is not integrity protected the UE shall memorize the current TAI was stored in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and the selected entry of the "list of subscriber data" or the selected PLMN subscription for non-integrity protected NAS reject message

if the UE initiated service request for emergency services fallback the UE shall attempt to select an E-UTRA cell connected to the EPC or the 5GCN according to the emergency services support indicator (see 3GPP TS 36.331 [25A]) if the UE finds a suitable E-UTRA cell it then proceeds with the appropriate EMM or 5GMM procedures if the UE operating in single-registration mode has changed to S1 mode it shall disable the N1 mode capability for 3GPP access

if the service request was not initiated for emergency services fallback the UE shall search for a suitable cell in another tracking area according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C]

if the message was received via 3GPP access and the UE is operating in the single-registration mode the UE shall handle the EMM parameters EMM state and EPS update status as specified in 3GPP TS 24.301 [15] for the case when the service request procedure is rejected with the EMM cause with the same value

if received over non-3GPP access the cause shall be considered as an abnormal case and the behaviour of the UE for this case is specified in subclause 5.6.1.7

#22 (Congestion)

if the T3346 value IE is present in the SERVICE REJECT message and the value indicates that this timer is neither zero nor deactivated the UE shall proceed as described below otherwise it shall be considered as an abnormal case and the behaviour of the UE for this case is specified in subclause 5.6.1.7

if the rejected request was not for initiating an emergency PDU session the UE shall abort the service request procedure and enter state 5GMM-REGISTERED and stop timer T3517 if still running

the UE shall stop timer T3346 if it is running

if the SERVICE REJECT message is integrity protected the UE shall start timer T3346 with the value provided in the T3346 value IE

if the SERVICE REJECT message is not integrity protected the UE shall start timer T3346 with a random value from the default range specified in 3GPP TS 24.008 [12]

for all other cases the UE stays in the current serving cell and applies normal cell reselection process the service request procedure is started if still necessary when timer T3346 expires or is stopped

if the message was received via 3GPP access and the UE is operating in the single-registration mode the UE shall handle the EMM parameters EMM state and EPS update status as specified in 3GPP TS 24.301 [15] for the case when the service request procedure is rejected with the EMM cause with the same value

if the service request procedure was initiated for an MO MMTEL voice call (i.e access category 4) or for an MO MMTEL video call (i.e access category 5) or for an MO IMS registration related signalling (i.e access category 9) a notification that the service request was not accepted due to congestion shall be provided to the upper layers

if the UE is using 5GS services with control plane CIoT 5GS optimization and if the T3448 value IE is present in the SERVICE REJECT message and the value indicates that this timer is neither zero nor deactivated the UE shall

a) stop timer T3448 if it is running;

b) consider the transport of user data via the control plane as unsuccessful; and

c) start timer T3448

1) with the value provided in the T3448 value IE if the SERVICE REJECT message is integrity protected; or

2) with a random value from the default range specified in 3GPP TS 24.301 [15] table 10.2.1 if the SERVICE REJECT message is not integrity protected

if the UE is using 5GS services with control plane CIoT 5GS optimization the T3448 value IE is present in the SERVICE REJECT message and the value indicates that this timer is either zero or deactivated the UE shall ignore the T3448 value IE and

a) stop timer T3448 if it is running; and

b) consider the transport of user data via the control plane as unsuccessful

if the UE is using 5GS services with control plane CIoT 5GS optimization and if the T3448 value IE is not present in the SERVICE REJECT message it shall be considered as an abnormal case and the behaviour of UE for this case is specified in subclause 5.6.1.7

#27 (N1 mode not allowed)

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE if the message has been successfully integrity checked by the NAS the UE shall set

1) the PLMN-specific N1 mode attempt counter for 3GPP access and the PLMN-specific N1 mode attempt counter for non-3GPP access for that PLMN in case of PLMN; or

2) the SNPN-specific attempt counter for 3GPP access for the current SNPN and the SNPN-specific attempt counter for non-3GPP access for the current SNPN in case of SNPN

to the UE implementation-specific maximum value

the UE shall disable the N1 mode capability for the specific access type for which the message was received (see subclause 4.9)

if the message has been successfully integrity checked by the NAS the UE shall disable the N1 mode capability also for the other access type (see subclause 4.9)

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall in addition set the EPS update status to EU3 ROAMING NOT ALLOWED and enter the state EMM-REGISTERED

#28 (Restricted service area)

this cause value received from non-3GPP access other than wireline access is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.6.1.7

the UE shall enter the state 5GMM-REGISTERED.NON-ALLOWED-SERVICE wait for the release of the N1 NAS signalling connection and perform the registration procedure for mobility and periodic registration update if the service type IE in the SERVICE REQUEST message was not set to "elevated signalling" and the SERVICE REJECT message is received over 3GPP access (see subclause 5.3.5 and 5.5.1.3)

if the service type IE in the SERVICE REQUEST message was set to "elevated signalling" the UE shall not re-initiate service request procedure until the UE enters an allowed area or leaves a non-allowed area except for emergency services high priority access or responding to paging or notification

#31 (Redirection to EPC required)

5GMM cause #31 received by a UE that has not indicated support for CIoT optimizations or received by a UE over non-3GPP access is considered an abnormal case and the behaviour of the UE is specified in subclause 5.6.1.7

this cause value received from a cell belonging to an SNPN and the UE is operating in SNPN access operation mode is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.6.1.7

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) the UE shall reset the service request attempt counter and enter the state 5GMM-REGISTERED.LIMITED-SERVICE

the UE shall enable the E-UTRA capability if it was disabled and disable the N1 mode capability for 3GPP access (see subclause 4.9.2)

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall handle the EMM parameters EMM state and EPS update status as specified in 3GPP TS 24.301 [15] for the case when the service request procedure is rejected with the EMM cause with the same value

#36 (IAB-node operation not authorized)

this cause value is only applicable when received over 3GPP access by a UE operating as an IAB-node this cause value received from a 5G access network other than 3GPP access or received by a UE not operating as an IAB-node is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.6.1.7

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list and ngKSI

if

1) the UE is not operating in SNPN access operation mode

i) the UE shall delete the list of equivalent PLMNs and store the PLMN identity in the forbidden PLMN list as specified in subclause 5.3.13A and if the UE is configured to use timer T3245 then the UE shall start timer T3245 and proceed as described in subclause 5.3.19a.1 the UE shall enter the state 5GMM-DEREGISTERED.PLMN-SEARCH and perform a PLMN selection according to 3GPP TS 23.122 [5] if the message has been successfully integrity checked by the NAS and the UE maintains the PLMN-specific attempt counter for 3GPP access for that PLMN the UE shall set the PLMN-specific attempt counter for 3GPP access for that PLMN to the UE implementation-specific maximum value; and

ii) if the UE is operating in single-registration mode the UE shall in addition handle the EMM parameters EMM state EPS update status 4G-GUTI last visited registered TAI TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the service request procedure is rejected with the EMM cause with the same value; or

2) the UE is operating in SNPN access operation mode

i) the UE shall delete the list of equivalent SNPNs (if available) the UE shall store the SNPN identity in the "temporarily forbidden SNPNs" list for 3GPP access and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the selected entry of the "list of subscriber data" or the selected PLMN subscription or "temporarily forbidden SNPNs for access for localized services in SNPN" list if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) for 3GPP access and the selected entry of the "list of subscriber data" or the selected PLMN subscription or the selected PLMN subscription or in the "temporarily forbidden SNPNs for onboarding services in SNPN" list if the UE is performing initial registration for onboarding services in SNPN for 3GPP access if the UE supports access to an SNPN using credentials from a credentials holder the UE shall store the SNPN identity in the "temporarily forbidden SNPNs" list along with the GIN(s) broadcasted by the SNPN if any for the selected entry of the "list of subscriber data" or the selected PLMN subscription if the UE supports access to an SNPN providing access for localized services in SNPN and the access for localized services in SNPN has been enabled the UE shall store the SNPN identity in the list of "temporarily forbidden SNPNs for access for localized services in SNPN" (if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) along with the GIN(s) broadcasted by the SNPN if any for the selected entry of the "list of subscriber data" or the selected PLMN subscription the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection according to 3GPP TS 23.122 [5] if the message has been successfully integrity checked by the NAS the UE shall set the SNPN-specific attempt counter for 3GPP access for the current SNPN to the UE implementation-specific maximum value

#72 (Non-3GPP access to 5GCN not allowed)

if the UE initiated the service request procedure over non-3GPP access the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete last visited registered TAI and TAI list if the UE is not registering or has not registered to the same PLMN over both 3GPP access and non-3GPP access the UE shall additionally delete 5G-GUTI and ngKSI additionally the UE shall enter the state 5GMM-DEREGISTERED for non-3GPP access if the message has been successfully integrity checked by the NAS the UE shall set

1) the PLMN-specific N1 mode attempt counter for non-3GPP access for that PLMN in case of PLMN; or

2) the SNPN-specific attempt counter for non-3GPP access for that SNPN in case of SNPN;

to the UE implementation-specific maximum value

NOTE 7 the 5GMM sublayer states the 5GMM parameters and the registration status are managed per access type independently i.e 3GPP access or non-3GPP access (see subclauses 4.7.2 and 5.1.3)

the UE shall disable the N1 mode capability for non-3GPP access (see subclause 4.9.3)

as an implementation option if the UE is not currently registered over 3GPP access the UE may enter the state 5GMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection according to 3GPP TS 23.122 [5]

if received over 3GPP access the cause shall be considered as an abnormal case and the behaviour of the UE for this case is specified in subclause 5.6.1.7

#73 (Serving network not authorized)

this cause value received from a cell belonging to an SNPN and the UE is operating in SNPN access operation mode is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.6.1.7

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list and ngKSI the UE shall delete the list of equivalent PLMNs store the PLMN identity in the forbidden PLMN list as specified in subclause 5.3.13A for 3GPP access the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection according to 3GPP TS 23.122 [5] and for non-3GPP access the UE shall enter state 5GMM-DEREGISTERED.LIMITED-SERVICE in order to perform network selection as defined in 3GPP TS 24.502 [18] if the message has been successfully integrity checked by the NAS the UE shall set the PLMN-specific attempt counter and the PLMN-specific attempt counter for non-3GPP access for that PLMN to the UE implementation-specific maximum value

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall in addition set the EPS update status to EU3 ROAMING NOT ALLOWED enter the state EMM-DEREGISTERED and shall delete any 4G-GUTI last visited registered TAI TAI list and eKSI

#74 (Temporarily not authorized for this SNPN)

5GMM cause #74 is only applicable when received from a cell belonging to an SNPN and the UE is operating in SNPN access operation mode 5GMM cause #74 received from a cell not belonging to an SNPN is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.6.1.7

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list ngKSI and the list of equivalent SNPNs (if available) the UE shall store the SNPN identity in the "temporarily forbidden SNPNs" list for the specific access type for which the message was received and the selected entry of the "list of subscriber data" or the selected PLMN subscription or in the "temporarily forbidden SNPNs for onboarding services in SNPN" list if the UE is registered for onboarding services in SNPN for the specific access type for which the message was received if the UE supports access to an SNPN using credentials from a credentials holder the UE shall store the SNPN identity in the "temporarily forbidden SNPNs" list along with the GIN(s) broadcasted by the SNPN if any for the selected entry of the "list of subscriber data" or the selected PLMN subscription if the UE supports access to an SNPN providing access for localized services in SNPN and the access for localized services in SNPN has been enabled the UE shall store the SNPN identity in the list of "temporarily forbidden SNPNs for access for localized services in SNPN" (if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) along with the GIN(s) broadcasted by the SNPN if any for the selected entry of the "list of subscriber data" or the selected PLMN subscription if the UE is not registered for onboarding services in SNPN the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection according to 3GPP TS 23.122 [5] if the UE is registered for onboarding services in SNPN the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection or an SNPN selection for onboarding services according to 3GPP TS 23.122 [5] if the message has been successfully integrity checked by the NAS the UE shall set the SNPN-specific attempt counter for 3GPP access and the SNPN-specific attempt counter for non-3GPP access for the current SNPN to the UE implementation-specific maximum value

if the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access to the same SNPN the UE shall in addition handle 5GMM parameters and 5GMM state for this access as described for this 5GMM cause value

#75 (Permanently not authorized for this SNPN)

5GMM cause #75 is only applicable when received from a cell belonging to an SNPN with a globally-unique SNPN identity and the UE is operating in SNPN access operation mode 5GMM cause #75 received from a cell not belonging to an SNPN or a cell belonging to an SNPN with a non-globally-unique SNPN identity is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.6.1.7

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI last visited registered TAI TAI list ngKSI and the list of equivalent SNPNs (if available) the UE shall store the SNPN identity in the "permanently forbidden SNPNs" list for the specific access type for which the message was received and the selected entry of the "list of subscriber data" or the selected PLMN subscription or in the "permanently forbidden SNPNs for onboarding services in SNPN" list if the UE is registered for onboarding services in SNPN for the specific access type for which the message was received if the UE is not registered for onboarding services in SNPN the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection according to 3GPP TS 23.122 [5] if the UE supports access to an SNPN using credentials from a credentials holder the UE shall store the SNPN identity in the "permanently forbidden SNPNs" list along with the GIN(s) broadcasted by the SNPN if any for the selected entry of the "list of subscriber data" or the selected PLMN subscription if the UE supports access to an SNPN providing access for localized services in SNPN and the access for localized services in SNPN has been enabled the UE shall store the SNPN identity in the list of "permanently forbidden SNPNs for access for localized services in SNPN" (if the SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) along with the GIN(s) broadcasted by the SNPN if any for the selected entry of the "list of subscriber data" or the selected PLMN subscription if the UE is registered for onboarding services in SNPN the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection or an SNPN selection for onboarding services according to 3GPP TS 23.122 [5] if the message has been successfully integrity checked by the NAS the UE shall set the SNPN-specific attempt counter for 3GPP access and the SNPN-specific attempt counter for non-3GPP access for the current SNPN to the UE implementation-specific maximum value

if the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access to the same SNPN the UE shall in addition handle 5GMM parameters and 5GMM state for this access as described for this 5GMM cause value

#76 (Not authorized for this CAG or authorized for CAG cells only)

this cause value received via non-3GPP access or from a cell belonging to an SNPN and the UE is operating in SNPN access operation mode is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.6.1.7

the UE shall set the 5GS update status to 5U3.ROAMING NOT ALLOWED store the 5GS update status according to subclause 5.1.3.2.2

if 5GMM cause #76 is received from

1) a CAG cell and if the UE receives a "CAG information list" in the CAG information list IE or the extended CAG information list IE included in the SERVICE REJECT message the UE shall

i) replace the "CAG information list" stored in the UE with the received "CAG information list" when received in the HPLMN or EHPLMN;

ii) replace the serving VPLMN's entry of the "CAG information list" stored in the UE with the serving VPLMN's entry of the received CAG information list IE or the extended CAG information list IE when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN; or

NOTE 8 when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN entries of a PLMN other than the serving VPLMN if any in the received CAG information list IE or the extended CAG information list IE are ignored

iii) remove the serving VPLMN's entry of the "CAG information list" stored in the UE when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN and the CAG information list IE or the extended CAG information list IE does not contain the serving VPLMN's entry

otherwise the UE shall delete the CAG-ID(s) of the cell from the "allowed CAG list" for the current PLMN if the CAG-ID(s) are authorized based on the "Allowed CAG list" in the case the "allowed CAG list" for the current PLMN only contains a range of CAG-IDs how the UE deletes the CAG-ID(s) of the cell from the "allowed CAG list" for the current PLMN is up to UE implementation in addition

i) if the entry in the "CAG information list" for the current PLMN does not include an "indication that the UE is only allowed to access 5GS via CAG cells" or if the entry in the "CAG information list" for the current PLMN includes an "indication that the UE is only allowed to access 5GS via CAG cells" and one or more CAG-ID(s) are authorized based on the updated "allowed CAG list" for the current PLMN then the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C] with the updated "CAG information list";

ii) if the entry in the "CAG information list" for the current PLMN includes an "indication that the UE is only allowed to access 5GS via CAG cells" and no CAG-ID is authorized based on the updated "allowed CAG list" for the current PLMN then the UE shall enter the state 5GMM-REGISTERED.PLMN-SEARCH and shall apply the PLMN selection process defined in 3GPP TS 23.122 [5] with the updated "CAG information list"; or

iii) if the "CAG information list" does not include an entry for the current PLMN then the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C] with the updated "CAG information list"

2) a non-CAG cell and if the UE receives a "CAG information list" in the CAG information list IE or the extended CAG information list IE included in the SERVICE REJECT message the UE shall

i) replace the "CAG information list" stored in the UE with the received "CAG information list" when received in the HPLMN or EHPLMN;

ii) replace the serving VPLMN's entry of the "CAG information list" stored in the UE with the serving VPLMN's entry of the received CAG information list IE or the extended CAG information list IE when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN; or

NOTE 9 when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN entries of a PLMN other than the serving VPLMN if any in the received CAG information list IE or the extended CAG information list IE are ignored

iii) remove the serving VPLMN's entry of the "CAG information list" stored in the UE when the UE receives the CAG information list IE or the extended CAG information list IE in a serving PLMN other than the HPLMN or EHPLMN and the CAG information list IE or the extended CAG information list IE does not contain the serving VPLMN's entry

otherwise the UE shall store an "indication that the UE is only allowed to access 5GS via CAG cells" in the entry of the "CAG information list" for the current PLMN if any if the "CAG information list" stored in the UE does not include the current PLMN's entry the UE shall add an entry for the current PLMN to the "CAG information list" and store an "indication that the UE is only allowed to access 5GS via CAG cells" in the entry of the "CAG information list" for the current PLMN if the UE does not have a stored "CAG information list" the UE shall create a new "CAG information list" and add an entry with an "indication that the UE is only allowed to access 5GS via CAG cells" for the current PLMN

in addition

i) if one or more CAG-ID(s) are authorized based on the "allowed CAG list" for the current PLMN then the UE shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE and shall search for a suitable cell according to 3GPP TS 38.304 [28] with the updated CAG information; or

ii) if no CAG-ID is authorized based on the "allowed CAG list" for the current PLMN then the UE shall enter the state 5GMM-REGISTERED.PLMN-SEARCH and shall apply the PLMN selection process defined in 3GPP TS 23.122 [5] with the updated "CAG information list"

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall in addition set the EPS update status to EU3 ROAMING NOT ALLOWED reset the service request attempt counter and enter the state EMM-REGISTERED

#77 (Wireline access area not allowed)

5GMM cause #77 is only applicable when received from a wireline access network by the 5G-RG or the W-AGF acting on behalf of the FN-CRG (or on behalf of the N5GC device) 5GMM cause #77 received from a 5G access network other than a wireline access network and 5GMM cause #77 received by the W-AGF acting on behalf of the FN-BRG are considered as abnormal cases and the behaviour of the UE is specified in subclause 5.6.1.7

when received over wireline access network the 5G-RG and the W-AGF acting on behalf of the FN-CRG (or on behalf of the N5GC device) shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) shall delete 5G-GUTI last visited registered TAI TAI list and ngKSI shall enter the state 5GMM-DEREGISTERED and shall act as specified in subclause 5.3.23

NOTE 10 the 5GMM sublayer states the 5GMM parameters and the registration status are managed per access type independently i.e 3GPP access or non-3GPP access (see subclauses 4.7.2 and 5.1.3)

#78 (PLMN not allowed to operate at the present UE location)

this cause value received from a non-satellite NG-RAN cell is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.6.1.7

the UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete last visited registered TAI and TAI list if the UE is not registering or has not registered to the same PLMN over both 3GPP access and non-3GPP access the UE shall additionally delete the list of equivalent PLMNs 5G-GUTI and ngKSI additionally the UE shall reset the service request attempt counter the UE shall store the PLMN identity and if it is known the current geographical location in the list of "PLMNs not allowed to operate at the present UE location" and shall start a corresponding timer instance (see subclause 4.23.2) the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform a PLMN selection according to 3GPP TS 23.122 [5]

if the message was received via 3GPP access and the UE is operating in single-registration mode the UE shall handle the EMM parameters EMM state EPS update status 4G-GUTI last visited registered TAI TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the service request procedure is rejected with the EMM cause with the same value

#### 5.6.1.6 service request procedure for initiating an emergency PDU session not accepted by the network

if the service request for initiating an emergency PDU session cannot be accepted by the network the UE shall perform the procedures as described in subclause 5.6.1.5 if the service request for initiating an emergency PDU session fails due to receiving the AUTHENTICATION REJECT message the UE shall perform the procedures as described in subclauses 5.4.1.2.2.11 5.4.1.2.3.1 5.4.1.2.3A.1 or 5.4.1.3.5 then if the UE is in the same selected PLMN where the last service request was attempted the UE shall

a) inform the upper layers of the failure of the procedure; or

NOTE 1 this can result in the upper layers requesting another emergency call attempt using domain selection as specified in 3GPP TS 23.167 [6]

b) de-register locally if not de-registered already attempt initial registration for emergency services

if the service request for initiating an emergency PDU session fails due to abnormal cases a) f) or l) in subclause .7 the UE shall perform the procedures as described in subclause 5.6.1.7 then if the UE is in the same selected PLMN where the last SERVICE REQUEST message was attempted the UE shall

a) inform the upper layers of the failure of the procedure; or

NOTE 2 this can result in the upper layers requesting another emergency call attempt using domain selection as specified in 3GPP TS 23.167 [6] and 3GPP TS 24.229 [14]

b) de-register locally if not de-registered already attempt initial registration for emergency services

if the service request for initiating a PDU session for emergency services fails due to abnormal case b) in subclause 5.6.1.7 the UE shall perform the actions as described in subclause 5.6.1.7 and inform the upper layers of the failure to access the network

NOTE 3 this can result in the upper layers requesting another emergency call attempt using domain selection as specified in 3GPP TS 23.167 [6]

#### 5.6.1.6A service request procedure for an emergency services fallback not accepted by the network

if the service request for initiating an emergency services fallback cannot be accepted by the network the UE shall perform the procedures as described in subclause 5.6.1.5 if the service request for initiating an emergency services fallback fails due to receiving the AUTHENTICATION REJECT message the UE shall perform the procedures as described in subclauses 5.4.1.2.2.11 5.4.1.2.3.1 5.4.1.2.3A.1 or 5.4.1.3.5 and if the UE does not attempt to select an E-UTRA cell connected to EPC or 5GCN as described in subclause 5.6.1.5 and is camped on NR or E-UTRA cell connected to 5GCN in the same PLMN where the last service request was attempted the UE shall inform the upper layers of the failure of the procedure

NOTE 1 this can result in the upper layers requesting another emergency call attempt using domain selection as specified in 3GPP TS 23.167 [6]

if the service request for initiating an emergency services fallback fails due to abnormal cases a) in subclause 5.6.1.7 the UE shall inform the upper layers of the failure of the emergency services fallback

NOTE 2 this can result in the upper layers requesting another emergency call attempt using domain selection as specified in 3GPP TS 23.167 [6]

if the service request procedure for initiating an emergency services fallback fails due to abnormal cases other than a) in subclause 5.6.1.7 the UE may abort the service request procedure if not aborted already and attempt to select an E-UTRA cell connected to EPC or 5GCN according to the domain priority and selection rules specified in 3GPP TS 23.167 [6] if the UE finds a suitable E-UTRA cell it then proceeds with the appropriate EMM or 5GMM procedures if the UE operating in single-registration mode has changed to S1 mode it shall disable the N1 mode capability for 3GPP access

#### 5.6.1.7 abnormal cases in the UE

the following abnormal cases can be identified

a) T3517 expired

the UE shall enter the state 5GMM-REGISTERED

if the UE triggered the service request procedure in 5GMM-IDLE mode sending a

1) SERVICE REQUEST message and the service type of the SERVICE REQUEST message was not set to "emergency services fallback"; or

2) CONTROL PLANE SERVICE REQUEST message and the control plane service type of the CONTROL PLANE SERVICE REQUEST message was not set to "emergency services fallback";

then the 5GMM sublayer shall increment the service request attempt counter abort the procedure and release locally any resources allocated for the service request procedure the service request attempt counter shall not be incremented if

1) the service request procedure is initiated to establish an emergency PDU session;

2) the UE has an emergency PDU session established;

3) the UE is a UE configured for high priority access in selected PLMN or SNPN;

4) the service request procedure is initiated in response to paging or notification from the network; or

5) the UE in NB-N1 mode is requested by the upper layer to transmit user data related to an exceptional event and the UE is allowed to use exception data reporting (see the ExceptionDataReportingAllowed leaf of the NAS configuration MO in 3GPP TS 24.368 [17] or the USIM file EFNASCONFIG in 3GPP TS 31.102 [22])

if the service request attempt counter is greater than or equal to 5 the UE shall start timer T3525 additionally if the service request procedure was initiated for an MO MMTEL voice call or for an MO MMTEL video call or for an MO IMS registration related signalling a notification that the service request was not initiated due to the UE having started timer T3525 shall be provided to the upper layers

NOTE 1 this can result in the upper layers requesting implementation specific mechanisms e.g the MMTEL voice call being attempted to another IP-CAN or establishment of a CS voice call (if supported and not already attempted in the CS domain)

the UE shall not attempt service request until expiry of timer T3525 unless

1) the service request procedure is initiated in response to paging or notification from the network;

2) the UE is a UE configured for high priority access in selected PLMN or SNPN;

3) the service request procedure is initiated to establish an emergency PDU session;

4) the UE has an emergency PDU session established;

5) the service request procedure is initiated for emergency services fallback;

6) the UE is registered in a new PLMN or SNPN;

NOTE 2 according to table 10.2.1 when "UE camped on a new PLMN other than the PLMN on which timer started" timer T3525 is stopped hence this check may be skipped

7) the UE in NB-N1 mode is requested by the upper layer to transmit user data related to an exceptional event and the UE is allowed to use exception data reporting (see the ExceptionDataReportingAllowed leaf of the NAS configuration MO in 3GPP TS 24.368 [17] or the USIM file EFNASCONFIG in 3GPP TS 31.102 [22]); or

8) the UE supports the reconnection to the network due to RAN timing synchronization status change and receives an indication of a change in the RAN timing synchronization status

NOTE 3 the NAS signalling connection can also be released if the UE deems that the network has failed the authentication check as specified in subclause 5.4.1.3.7

if the UE triggered the service request procedure in 5GMM-CONNECTED mode sending a

1) SERVICE REQUEST message and the service type of the SERVICE REQUEST message was not set to "emergency services fallback"; or

2) CONTROL PLANE SERVICE REQUEST message and the control plane service type of the CONTROL PLANE SERVICE REQUEST message was not set to "emergency services fallback"

the 5GMM sublayer shall abort the procedure and stay in 5GMM-CONNECTED mode

if the service type of the SERVICE REQUEST message was set to "emergency services fallback" or the control plane service type of the CONTROL PLANE SERVICE REQUEST message was set to "emergency services fallback" and

1) the service request procedure was triggered in 5GMM-IDLE mode the 5GMM sublayer shall abort the procedure release locally any resources allocated for the service request procedure; or

2) the service request procedure was triggered in 5GMM-CONNECTED mode the 5GMM sublayer shall abort the procedure stay in 5GMM-CONNECTED mode

b) the lower layers indicate that the access attempt is barred

the UE shall not start the service request procedure the UE stays in the current serving cell and applies the normal cell reselection process receipt of the access barred indication shall not trigger the selection of a different core network type (EPC or 5GCN)

the service request procedure is started if still needed when the lower layers indicate that the barring is alleviated for the access category with which the access attempt was associated

ba) the lower layers indicate that

1) access barring is applicable for all access categories except categories 0 and 2 and the access category with which the access attempt was associated is other than 0 and 2; or

2) access barring is applicable for all access categories except category 0 and the access category with which the access attempt was associated is other than 0

if the SERVICE REQUEST message or CONTROL PLANE SERVICE REQUEST has not been sent the UE shall proceed as specified for case b

if the SERVICE REQUEST message or CONTROL PLANE SERVICE REQUEST has been sent

1) the UE shall abort the service request procedure and stop timer T3517 the UE stays in the current serving cell and applies the normal cell reselection process; and

2) the service request procedure is started if still needed when the lower layers indicate that the barring is alleviated for the access category with which the access attempt was associated

for additional UE requirements for both cases see subclause 4.5.5

c) timer T3346 is running

the UE shall not start the service request procedure unless

1) the UE receives a paging;

2) the UE receives a NOTIFICATION message over non-3GPP access when the UE is in 5GMM-CONNECTED mode over non-3GPP access and in 5GMM-IDLE mode over 3GPP access;

3) the UE receives a NOTIFICATION message over 3GPP access when the UE is in 5GMM-CONNECTED mode over 3GPP access and in 5GMM-IDLE mode over non-3GPP access;

4) the UE is a UE configured for high priority access in selected PLMN or SNPN;

5) the UE has an emergency PDU session established or is establishing an emergency PDU session;

6) the service request procedure is initiated for emergency services fallback;

7) the service request procedure is initiated for elevated signalling;

8) the UE in NB-N1 mode is requested by the upper layer to transmit user data related to an exceptional event and

- the UE is allowed to use exception data reporting (see the ExceptionDataReportingAllowed leaf of the NAS configuration MO in 3GPP TS 24.368 [17] or the USIM file EFNASCONFIG in 3GPP TS 31.102 [22]); and

- timer T3346 was not started when N1 NAS signalling connection was established with RRC establishment cause set to "mo-ExceptionData"; or

9) the MUSIM UE is in 5GMM-CONNECTED mode and requests the network to release the NAS signalling connection (see case o in subclause 5.6.1.1)

if the UE is in 5GMM-IDLE mode the UE stays in the current serving cell and applies normal cell reselection process the service request procedure is started if still necessary when timer T3346 expires or is stopped

if the service request procedure was triggered for an MO MMTEL voice call (i.e access category 4) or for an MO MMTEL video call (i.e access category 5) or for an MO IMS registration related signalling (i.e access category 9) a notification that the service request procedure was not initiated due to congestion shall be provided to the upper layers

if the UE receives a paging with access type set to "Non-3GPP access" and the non-3GPP access is available and UE is in 5GMM-REGISTERED.NORMAL SERVICE over non-3GPP access the UE shall stop timer T3346 and send the SERVICE REQUEST message over non-3GPP access

d) registration procedure for mobility and periodic registration update is triggered

the UE shall abort the service request procedure stop timer T3517 if running and perform the registration procedure for mobility and periodic registration update the Follow-on request indicator in the REGISTRATION REQUEST message shall be handled as specified in subclause 5.5.1.3.2

e) switch off

if the UE is in state 5GMM-SERVICE-REQUEST-INITIATED at switch off the de-registration procedure shall be performed

f) De-registration procedure collision

if the UE receives a DEREGISTRATION REQUEST message from the network in state 5GMM-SERVICE-REQUEST-INITIATED the UE shall progress the DEREGISTRATION REQUEST message and the service request procedure shall be aborted

NOTE 4 the above collision case is valid if the DEREGISTRATION REQUEST message indicates the access type over which the service request procedure is attempted otherwise both the procedures are progressed

g) transmission failure of SERVICE REQUEST or CONTROL PLANE SERVICE REQUEST message indication with change in the current TAI

if the current TAI is not in the TAI list UE shall abort the service request procedure to perform the registration procedure for mobility and periodic registration update as specified in subclause 5.5.1.3.2

if the current TAI is part of the TAI list the UE shall restart the service request procedure unless the service request procedure is initiated for case o) or p) in subclause 5.6.1.1 for case o) and p) in subclause 5.6.1.1 the UE shall abort the service request procedure enters state 5GMM-REGISTERED locally release the N1 NAS signalling connection stop timer T3517 and locally release any resources allocated for the service request procedure

h) transmission failure of SERVICE REQUEST or CONTROL PLANE SERVICE REQUEST message indication without change in the current TAI

the UE shall restart the service request procedure unless the service request procedure is initiated for case o) or p) in subclause 5.6.1.1 for case o) and p) in subclause 5.6.1.1 the UE shall abort the service request procedure enters state 5GMM-REGISTERED locally release the N1 NAS signalling connection stop timer T3517 and locally release any resources allocated for the service request procedure

i) SERVICE REJECT message received with other 5GMM cause values than those treated in subclause 5.6.1.5 and cases of 5GMM cause values #11 #15 #22 #28 #31 #36 #72 #73 #74 #75 #76 #77 and #78 that are considered as abnormal cases according to subclause 5.6.1.5

the UE shall enter state 5GMM-REGISTERED

the UE shall abort the service request procedure stop timer T3517 and locally release any resources allocated for the service request procedure

j) the UE in 5GMM-CONNECTED mode with RRC inactive indication over the 3GPP access and in 5GMM-CONNECTED mode over non-3GPP access receives a NOTIFICATION message over the non-3GPP access with access type indicating 3GPP access

the UE shall transition from 5GMM-CONNECTED mode with RRC inactive indication to 5GMM-IDLE mode over 3GPP access and initiate the service request procedure over the 3GPP access

k) timer T3447 is running

the UE shall not start any service request procedure unless

1) the UE in 5GMM-IDLE receives a paging request;

2) the UE is a UE configured for high priority access;

3) the UE has a PDU session for emergency services established or is establishing a PDU session for emergency services;

4) the service request procedure is initiated for emergency services fallback;

5) the UE in 5GMM-CONNECTED mode receives mobile terminated signalling or downlink data over the user-plane;

6) the service request procedure is initiated for elevated signalling; or

7) the MUSIM UE requests the network to release the NAS signalling connection (see case o in subclause 5.6.1.1)

the UE stays in the current serving cell and applies the normal cell reselection process the service request procedure is started if still necessary when timer T3447 expires or timer T3447 is stopped

l) lower layer failure release of the N1 signalling connection received from lower layers or the lower layers indicate that the RRC connection has been suspended before the service request procedure is completed or SERVICE REJECT message is received

the UE shall abort the service request procedure stop timer T3517 locally release any resources allocated for the service request procedure and enters state 5GMM-REGISTERED for case m) in subclause 5.6.1.1 the UE may retry the service request procedure a certain number of times (maximum re-attempts 5)

m) timer T3448 is running

the UE in 5GMM-IDLE mode shall not initiate the service request procedure for transport of user data via the control plane unless

1) the UE is a UE configured for high priority access in selected PLMN;

2) the UE which is only using 5GS services with control plane CIoT 5GS optimization received a paging request;

3) the UE in NB-N1 mode is requested by the upper layer to transmit user data related to an exceptional event and the UE is allowed to use exception data reporting (see the ExceptionDataReportingAllowed leaf of the NAS configuration MO in 3GPP TS 24.368 [17] or the USIM file EFNASCONFIG in 3GPP TS 31.102 [22]); or

4) the UE is initiating the service request procedure to request emergency services or emergency services fallback

the UE stays in the current serving cell and applies the normal cell reselection process the service request procedure is started if still necessary when timer T3448 expires

n) access for localized services in current SNPN is no longer allowed

if the service request procedure is not to request emergency services and there is no PDU session for emergency services the registered SNPN is an SNPN selected for localized services in SNPN (see 3GPP TS 23.122 [5]) and

- access for localized services in SNPN is disabled; or

- the validity information for the selected SNPN is no longer met;

then the UE shall reset the service request attempt counter stop T3517 abort the service request procedure locally release the NAS signalling connection if any and enter state 5GMM-REGISTERED.LIMITED-SERVICE or 5GMM-REGISTERED.PLMN-SEARCH in order to perform SNPN selection according to 3GPP TS 23.122 [5]

#### 5.6.1.8 abnormal cases on the network side

the following abnormal cases can be identified

a) lower layer failure

if a lower layer failure occurs before a SERVICE REJECT message has been sent to the UE or the service request procedure has been completed by the AMF the AMF enters/stays in 5GMM-IDLE

b) protocol error

if the SERVICE REQUEST message or the CONTROL PLANE SERVICE REQUEST message is received with a protocol error the AMF shall return a SERVICE REJECT message with one of the following 5GMM cause values

#96 invalid mandatory information;

#99 information element non-existent or not implemented;

#100 conditional IE error; or

#111 protocol error unspecified

the AMF stays in the current 5GMM mode

c) more than one SERVICE REQUEST message or CONTROL PLANE SERVICE REQUEST message received before the procedure has been completed (i.e. before SERVICE REJECT message has been sent or service request procedure has been completed)

- if one or more of the information elements in the SERVICE REQUEST message or CONTROL PLANE SERVICE REQUEST message differs from the ones received within the previous SERVICE REQUEST message or CONTROL PLANE SERVICE REQUEST message the previously initiated service request procedure shall be aborted and the new service request procedure shall be progressed;

- if the information elements do not differ then the AMF shall continue with the previous service request procedure and shall not treat any further this SERVICE REQUEST message or this CONTROL PLANE SERVICE REQUEST message

d) REGISTRATION REQUEST message received with "initial registration" or "emergency registration" in the 5GS registration type IE before a SERVICE REJECT message has been sent or the service request procedure has been completed

if a REGISTRATION REQUEST message with "initial registration" or "emergency registration" in the 5GS registration type IE is received and the service request procedure has not been completed or a SERVICE REJECT message has not been sent the AMF may initiate the 5GMM common procedures e.g the primary authentication and key agreement procedure the AMF may e.g after a successful primary authentication and key agreement procedure execution abort the service request procedure delete the 5GMM context indicate towards the SMF that the 5GMM context has been deleted and progress the new REGISTRATION REQUEST message

e) REGISTRATION REQUEST message received with "mobility registration updating" or "periodic registration updating" in the 5GS registration type IE received before the service request procedure has been completed or a SERVICE REJECT message has been sent

if a REGISTRATION REQUEST message with "mobility registration updating" or "periodic registration updating" in the 5GS registration type IE is received and the service request procedure has not been completed or a SERVICE REJECT message has not been sent the AMF may initiate the 5GMM common procedures e.g the primary authentication and key agreement procedure the AMF may e.g after a successful primary authentication and key agreement procedure execution abort the service request procedure and progress the new REGISTRATION REQUEST message

f) if a CONTROL PLANE SERVICE REQUEST message with control plane service type indicating "mobile originating request" is received after the AMF initiated a paging procedure the AMF shall treat this CONTROL PLANE SERVICE REQUEST as a paging response and handle the message according to subclauses 5.6.1.4 and 5.6.1.5

g) CONTROL PLANE SERVICE REQUEST message received with the data type field indicates "control plane user data" in the CIoT small data container IE or received with payload container type IE set to "CIoT user data container" and

1) the AMF does not have a PDU session routing context for the PDU session ID and the UE; or

2) the AMF unsuccessfully attempted to forward the user data container and the PDU session ID

then the AMF may send back to the UE the CIoT user data container or control plane user data which was not forwarded as specified in subclause 5.4.5.3.1 case l1) or case l2)

h) based on operator policy if the service request from a UE not supporting CAG is rejected due to CAG restrictions the network shall reject the service request with a 5GMM cause value other than the 5GMM cause #76 (Not authorized for this CAG or authorized for CAG cells only)

NOTE 5GMM cause #7 (5GS services not allowed) 5GMM cause #11 (PLMN not allowed) 5GMM cause #27 (N1 mode not allowed) 5GMM cause #73 (Serving network not authorized) can be used depending on the subscription of the UE and whether the UE roams or not

i) CIoT user data received for a PDU session ID which is inactive in the network

if a CONTROL PLANE SERVICE REQUEST message is received with CIoT user data for a PDU session that is inactive in the network the AMF shall discard the CIoT user data the AMF shall send the SERVICE ACCEPT message and indicate that this PDU session ID is inactive using the PDU session status IE

### 5.6.2 paging procedure

#### 5.6.2.1 general

the paging procedure is performed only in 3GPP access and used by the network to request the establishment of a NAS signalling connection to the UE the paging procedure is also used by the network to request the UE to re-establish the user-plane resources of PDU sessions for downlink user data transport another purpose of the paging procedure is to request the UE to re-establish the user-plane resources of PDU session(s) associated with non-3GPP access over 3GPP access

additionally the network can use the paging procedure to initiate the mobile terminating SMS

for the UE using eDRX the network initiates the paging procedure when NAS signalling messages or user data is pending to be sent to the UE within the paging time window and requests the lower layers to include the eDRX cycle length and paging time window length in the paging message if NAS signalling messages or user data is pending to be sent to the UE outside the paging time window and the eDRX value that the network provides to the UE in the negotiated extended DRX parameters IE during the last registration procedure indicates

a) the eDRX cycle length duration of the E-UTRA cell connected to 5GCN is higher than 5.12 seconds; or

b) the eDRX cycle length duration of the NR cell connected to 5GCN is higher than 10.24 seconds

the network initiates the paging procedure at t time ahead of the beginning of the next paging time window

NOTE t time is a short time period based on implementation the operator can take possible imperfections in the synchronization between the 5GCN and the UE into account when choosing t time

if the network detects that the pending user data to be sent to the UE is related to the voice service as specified in 3GPP TS 23.502 [9] and the network decides to initiate the paging procedure based on the stored paging restriction information if any the AMF should request the lower layer to include the voice service indication in the paging message when the UE and the network support the paging indication for voice services

#### 5.6.2.2 paging for 5GS services

##### 5.6.2.2.1 general

the network shall initiate the paging procedure for 5GS services when NAS signalling messages or user data is pending to be sent to the UE in 5GMM-IDLE mode over 3GPP access (see example in figure 5.6.2.2.1.1) and there is no paging restriction applied in the network for that paging

figure 5.6.2.2.1.1 paging procedure

to initiate the procedure the 5GMM entity in the AMF requests the lower layer to start paging and shall start timer T3513

if downlink signalling or user data is pending to be sent over non-3GPP access the 5GMM entity in the AMF shall indicate to the lower layer that the paging is associated to non-3GPP access

the network shall not page the UE to re-establish user-plane resources of PDU session(s) associated with non-3GPP access over 3GPP access if all the PDU sessions of the UE that are established over the 3GPP access are associated with control plane only indication or S-NSSAI(s) associated with PDU session(s) are not in the UE’s allowed NSSAI and partially allowed NSSAI for a PLMN on 3GPP access

if the network has downlink user data pending for a UE the AMF has stored paging restriction of the UE and the paging restriction type in the stored paging restriction is set to

a) "All paging is restricted" the network should not page the UE;

b) "All paging is restricted except for voice service" the network should page the UE only when

1) the pending downlink user data for the UE is considered as voice service related by the network;

c) "All paging is restricted except for specified PDU session(s)" the network should page the UE only when

1) for PDU session(s) that paging is not restricted based on the stored paging restriction the network has downlink user data pending; or

d) "All paging is restricted except for voice service and specified PDU session(s)" the network should page the UE only when

1) the pending downlink user data for the UE is considered as voice service related by the network; or

2) for PDU session(s) that paging is not restricted based on the stored paging restriction the network has downlink user data pending

if the network has downlink signalling pending for a UE and the AMF has stored paging restriction of the UE and the paging restriction type in the stored paging restriction is set to

a) "All paging is restricted" the network should not page the UE;

b) "All paging is restricted except for voice service" the network should page the UE only when

1) the pending downlink signalling for the UE is 5GMM signalling or 5GSM signalling of the PDU session of voice service;

c) "All paging is restricted except for specified PDU session(s)" the network should page the UE only when

1) the pending downlink signalling for the UE is 5GMM signalling; or

2) for PDU session(s) that paging is not restricted based on the stored paging restriction the network has downlink 5GSM signalling pending; or

d) "All paging is restricted except for voice service and specified PDU session(s)" the network should page the UE only when

1) the pending downlink signalling for the UE is 5GMM signalling or 5GSM signalling of the PDU session of voice service; or

2) for PDU session(s) that paging is not restricted based on the stored paging restriction the network has downlink 5GSM signalling pending

NOTE 1 if the network pages the UE due to downlink signalling pending the network initiates the release of the N1 NAS signalling connection after network-requested procedure is completed

the 5GMM entity in the AMF may provide the lower layer with the "allowed CAG list" and an "indication that the UE is only allowed to access 5GS via CAG cells" for the current PLMN if available and with the "allowed CAG list" and an "indication that the UE is only allowed to access 5GS via CAG cells" per equivalent PLMN if available if there is an active emergency PDU session the 5GMM entity in the AMF shall not provide the lower layer with the "allowed CAG list" and an "indication that the UE is only allowed to access 5GS via CAG cells" for the current PLMN even if available or with the "allowed CAG list" and an "indication that the UE is only allowed to access 5GS via CAG cells" per equivalent PLMN even if available

upon reception of a paging indication the UE shall stop the timer T3346 if running and

a) if control plane CIoT 5GS optimization is not used by the UE the UE shall

1) initiate a service request procedure over 3GPP access to respond to the paging as specified in subclauses 5.6.1.2.1 if the UE is in 5GMM-REGISTERED.NORMAL-SERVICE or 5GMM-REGISTERED.NON-ALLOWED-SERVICE (as described in subclause 5.3.5.2) state and the UE is in the 5GMM-IDLE mode without suspend indication;

2) initiate a service request procedure over non-3GPP access to respond to the paging as specified in subclauses 5.6.1;

3) initiate a registration procedure for mobility and periodic registration update over 3GPP access to respond to the paging as specified in subclauses 5.5.1.3.2; or

4) proceed as specified in subclause 5.3.1.5 if the UE is in the 5GMM-IDLE mode with suspend indication; or

b) if control plane CIoT 5GS optimization is used by the UE the UE shall

1) initiate a service request procedure as specified in subclause 5.6.1.2.2 if the UE is in the 5GMM-IDLE mode without suspend indication;

2) initiate a registration procedure for mobility and periodic registration update over 3GPP access as specified in subclauses 5.5.1.3.2; or

3) proceed as specified in subclause 5.3.1.5 if the UE is in the 5GMM-IDLE mode with suspend indication

NOTE 2 if the UE is in the 5GMM-IDLE mode without suspend indication and has an uplink user data to be sent to the network using control plane CIoT 5GS optimization when receiving the paging indication the UE can piggyback the uplink user data during the service request procedure initiated to respond to the paging as specified in subclause 5.6.1.2.2

the MUSIM UE based on implementation may use the paging cause indicated by lower layers (see 3GPP TS 38.331 [30]) if any to accept the paging reject the paging or ignore the paging indication

upon reception of a paging indication if the network supports the rejection of paging request and if a MUSIM UE decides not to accept the paging the UE may initiate a service request procedure to reject the paging as specified in subclause 5.6.1.1

NOTE 3 as an implementation option MUSIM UE is allowed to not respond to paging based on the information available in the paging message e.g voice service indication

if TMGI is used as paging identity and the TMGI matches with multicast MBS session which the has UE joined the UE shall respond to the paging otherwise the UE shall not respond to the paging

the network shall stop timer T3513 for the paging procedure when an integrity-protected response is received from the UE and successfully integrity checked by the network or when the 5GMM entity in the AMF receives an indication from the lower layer that it has received the NGAP UE context resume request message as specified in 3GPP TS 38.413 [31] if the response received is not integrity protected or the integrity check is unsuccessful timer T3513 for the paging procedure shall be kept running unless

a) the UE is registered for emergency services;

b) the UE has an emergency PDU session; or

c) the response received is a REGISTRATION REQUEST message for mobility and periodic registration update and the security mode control procedure or authentication procedure performed during mobility and periodic registration update has completed successfully

upon expiry of timer T3513 the network may reinitiate paging

if the network while waiting for a response to the paging sent without paging priority receives downlink signalling or downlink data associated with priority user-plane resources for PDU sessions or receives an MT SMS over NAS with priority for messaging as specified in 3GPP TS 29.503 [20AB] and is allowed by local policy the network shall stop timer T3513 and then initiate the paging procedure with paging priority

##### 5.6.2.2.2 abnormal cases on the network side

the following abnormal case can be identified

a) void

##### 5.6.2.2.3 abnormal cases in the UE

the following abnormal cases can be identified

a) paging message received with access type set to non-3GPP access while the UE is in 5GMM-CONNECTED mode over non-3GPP access

the UE shall not respond to paging message

b) paging message received with access type set to 3GPP access when UE-initiated 5GMM specific procedure or service request procedure is ongoing

the UE shall proceed with 5GMM specific procedure or service request procedure if for registration procedure and service requestprocedure lower layers indicate that the access attempt is barred then the UE shall handle the pending paging message as specified in subclause 5.6.2.2.1 otherwise the UE shall ignore the paging once lower layers confirm the establishment of the signalling connection

### 5.6.3 notification procedure

#### 5.6.3.1 general

the notification procedure is used by the network

a) to request the UE by sending the NOTIFICATION message over 3GPP access to re-establish the user-plane resources of PDU session(s) associated with non-3GPP access over 3GPP access or to deliver 5GSM downlink signalling messages associated with non-3GPP access over 3GPP access when the UE is in 5GMM-IDLE mode over non-3GPP access and in 5GMM-CONNECTED mode over 3GPP access; or

b) to request the UE by sending the NOTIFICATION message over non-3GPP access to re-establish user-plane resources of the PDU session(s) or to deliver downlink signalling associated with 3GPP access over 3GPP access when the UE is in 5GMM-CONNECTED mode over non-3GPP access and

1) in 5GMM-IDLE mode over 3GPP access when the UE is not in MICO mode or when the network determines the unavailability period is not activated for the UE; or

2) in 5GMM-IDLE mode with suspend indication over 3GPP access when the UE is not in MICO mode or when the network determines the unavailability period is not activated for the UE

the network shall not use the NOTIFICATION message to re-establish user-plane resources of PDU session(s) associated with non-3GPP access over 3GPP access if all the PDU sessions of the UE that are established over the 3GPP access are associated with control plane only indication

the network shall not use the NOTIFICATION message over non-3GPP access if

a) the MUSIM UE supports the paging indication for voice services;

b) the network has indicated "paging indication for voice services supported" to the UE; and

c) the AMF detects that the downlink data is related to voice service (see 3GPP TS 23.501 [8])

#### 5.6.3.2 notification procedure initiation

the network shall initiate the notification procedure by sending the NOTIFICATION message to the UE and start timer T3565 (see example in figure 5.6.3.2.1)

for case a) in subclause 5.6.3.1 the NOTIFICATION message is sent from the network to the UE via 3GPP access with access type indicating non-3GPP access

for case b) in subclause 5.6.3.1 the NOTIFICATION message is sent from the network to the UE via non-3GPP access with access type indicating 3GPP access when the UE is not in MICO mode or when the network determines the unavailability period is not activated for the UE

figure 5.6.3.2.1 notification procedure

for case b) in subclause 5.6.3.1 if the network has downlink user data pending for a UE and the AMF has stored paging restriction of the UE and the paging restriction type in the stored paging restriction is set to

a) "All paging is restricted" the network should not send the NOTIFICATION message to the UE;

b) "All paging is restricted except for voice service" the network should send the NOTIFICATION message to the UE only when the pending downlink user data for the UE is considered as voice service related by the network and the MUSIM UE does not support the paging indication for voice services or the network has not indicated "paging indication for voice services supported" to the UE;

c) "All paging is restricted except for specified PDU session(s)" the network should send the NOTIFICATION message to the UE only when

1) for PDU session(s) that paging is not restricted based on the stored paging restriction the network has downlink user data pending;

d) "All paging is restricted except for voice service and specified PDU session(s)" the network should send the NOTIFICATION message to the UE only

1) when the pending downlink user data for the UE is considered as voice service related by the network and the MUSIM UE does not support the paging indication for voice services or the network has not indicated "paging indication for voice services supported" to the UE; or

2) for PDU session(s) that paging is not restricted based on the stored paging restriction the network has downlink user data pending

for case b) in subclause 5.6.3.1 if the network has downlink signalling pending for a UE and the AMF has stored paging restriction of the UE and the paging restriction type in the stored paging restriction is set to

a) "All paging is restricted" the network should not send the NOTIFICATION message to the UE;

b) "All paging is restricted except for voice service" then the network should send the NOTIFICATION message to the UE only when

1) the pending downlink signalling for the UE is 5GMM signalling or 5GSM signalling of the PDU session of voice service;

c) "All paging is restricted except for specified PDU session(s)" the network should send the NOTIFICATION message to the UE only when

1) the pending downlink signalling for the UE is 5GMM signalling; or

2) for PDU session(s) that paging is not restricted based on the stored paging restriction the network has downlink 5GSM signalling pending; or

d) "All paging is restricted except for voice service and specified PDU session(s)" then the network should send the NOTIFICATION message to the UE only when

1) the pending downlink signalling for the UE is 5GMM signalling or 5GSM signalling pending of the PDU session of voice service; or

2) for PDU session(s) that paging is not restricted based on the stored paging restriction the network has downlink 5GSM signalling pending

NOTE 1 if the network sends NOTIFICATION message to the UE due to downlink signalling pending the network initiates the release of the N1 NAS signalling connection over 3GPP access after network-requested procedure is completed

upon reception of a NOTIFICATION message the UE shall stop the timer T3346 if running

for case a) in subclause 5.6.3.1 upon reception of NOTIFICATION message the UE shall initiate a service request procedure over 3GPP access as specified in subclauses 5.6.1

NOTE 2 for a UE in NB-NI mode if there is DL user data pending for a PDU session associated with non-3GPP access then the AMF notifies the SMF that reactivation of user plane resources cannot be performed if the number of PDU sessions that currently has user-plane resources established equals to the UE's maximum number of supported user-plane resources

for case b) in subclause 5.6.3.1 upon reception of NOTIFICATION message

a) if control plane CIoT 5GS optimization is not used by the UE the UE shall

1) initiate a service request procedure over 3GPP access as specified in subclause 5.6.1.2.1 if the UE is in 5GMM-REGISTERED.NORMAL-SERVICE or 5GMM-REGISTERED.NON-ALLOWED-SERVICE (as described in subclause 5.3.5.2) state over 3GPP access or 5GMM-REGISTERED.NON-ALLOWED-SERVICE state (see subclause 5.3.5.2) and the UE is in the 5GMM-IDLE mode without suspend indication;

2) initiate a registration procedure for mobility and periodic registration update over 3GPP access as specified in subclause 5.5.1.3.2 if the UE is in 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE state over 3GPP access; or

3) proceed as specified in subclause 5.3.1.5 if the UE is in the 5GMM-IDLE mode with suspend indication;

b) if control plane CIoT 5GS optimization is used by the UE the UE shall

1) initiate a service request procedure over 3GPP access as specified in subclause 5.6.1.2.2 if the UE is in 5GMM-REGISTERED.NORMAL-SERVICE or 5GMM-REGISTERED.NON-ALLOWED-SERVICE (as described in subclause 5.3.5.2) state and the UE is in the 5GMM-IDLE mode without suspend indication;

2) initiate a registration procedure for mobility and periodic registration update over 3GPP access as specified in subclause 5.5.1.3.2 if the UE is in 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE state; or

3) proceed as specified in subclause 5.3.1.5 if the UE is in the 5GMM-IDLE mode with suspend indication; or

c) if

1) the UE is in 5GMM-REGISTERED.NO-CELL-AVAILABLE state 5GMM-REGISTERED.PLMN-SEARCH state 5GMM-REGISTERED.LIMITED-SERVICE state or 5GMM-REGISTERED.UPDATE-NEEDED state over 3GPP access; or

2) the MUSIM UE is not able to respond the NOTIFICATION message as specified in case a) and b) above e.g. due to UE implementation constraints;

the UE shall respond with NOTIFICATION RESPONSE message over non-3GPP access indicating inability of the UE to initiate a service request procedure or a registration procedure over 3GPP access and may include the PDU session status information element to indicate

1) the single access PDU session(s) not in 5GSM state PDU SESSION INACTIVE in the UE associated with the 3GPP access type; and

2) the MA PDU session(s) not in 5GSM state PDU SESSION INACTIVE in the UE and having user plane resources established associated with the 3GPP access type

upon reception of NOTIFICATION message

for case b) in subclause 5.6.3.1 if the UE is in 5GMM-REGISTERED.NO-CELL-AVAILABLE state or 5GMM-REGISTERED.PLMN-SEARCH state and a local release was performed in the UE for the single access PDU sessions associated with the 3GPP access or for user plane resources on the 3GPP access of MA PDU sessions;

then the UE shall respond with NOTIFICATION RESPONSE message over non-3GPP access indicating with the PDU session status information element that

- the local release of its single access PDU sessions associated with the 3GPP access was performed; and

- the local release of its 3GPP access user plane resources of MA PDU sessions was performed

#### 5.6.3.3 notification procedure completion

upon reception of SERVICE REQUEST message CONTROL PLANE SERVICE REQUEST message or REGISTRATION REQUEST message the AMF shall stop timer T3565 and proceed service request procedure as specified in subclauses 5.6.3.1 or registration procedure for mobility and periodic registration update as specified in subclauses 5.5.1.3 if no user-plane resources of PDU session(s) need to be re-established the AMF should notify the SMF that the UE was reachable but did not accept to re-establish the user-plane resources of PDU session(s)

when the 5GMM entity in the AMF receives an indication from the lower layer that it has received the NGAP UE context resume request message as specified in 3GPP TS 38.413 [31] the AMF shall stop timer T3565

upon reception of NOTIFICATION RESPONSE message over non-3GPP access the AMF shall stop timer T3565 and should notify the SMF that the UE is unreachable

if the NOTIFICATION RESPONSE message includes the PDU session status information element then

a) for single access PDU sessions the AMF shall

1) perform a local release of all those PDU sessions which are not in 5GSM state PDU SESSION INACTIVE on the AMF side associated with 3GPP access but are indicated by the UE in the PDU session status information element in the NOTIFICATION RESPONSE message as being in 5GSM state PDU SESSION INACTIVE; and

2) shall request the SMF to perform a local release of all those PDU sessions associated with 3GPP access if any of those PDU sessions is associated with one or more multicast MBS sessions the SMF shall consider the UE as removed from the associated multicast MBS sessions; and

b) for MA PDU sessions the AMF shall

1) for MA PDU sessions having user plane resources established only on the 3GPP access in the AMF side but are indicated by the UE in the PDU session status information element in the NOTIFICATION RESPONSE message as no user plane resources established on the 3GPP access

i) perform a local release of all those MA PDU sessions; and

ii) request the SMF to perform a local release of all those MA PDU sessions if the MA PDU session is associated with one or more multicast MBS sessions the SMF shall consider the UE as removed from the associated multicast MBS sessions; and

2) for MA PDU sessions having user plane resources established on both accesses in the AMF side but are indicated by the UE in the PDU session status information element in the NOTIFICATION RESPONSE message as no user plane resources established on the 3GPP access

i) perform a local release of 3GPP access user plane resources of all those MA PDU sessions; and

ii) request the SMF to perform a local release of 3GPP access user plane resources of all those MA PDU sessions if the MA PDU session is associated with one or more MBS sessions the SMF shall consider the UE as removed from the associated MBS sessions

#### 5.6.3.4 abnormal cases on the network side

the following abnormal cases can be identified

a) expiry of timer T3565

the network shall on the first expiry of the timer T3565 retransmit the NOTIFICATION message and shall reset and start timer T3565 this retransmission is repeated four times i.e on the fifth expiry of timer T3565 the procedure shall be aborted in addition upon the fifth expiry of timer T3565

for case a) in subclause 5.6.3.1 the AMF should notify the SMF that the UE is unreachable the AMF may enter 5GMM-IDLE mode over 3GPP access

for case b) in subclause 5.6.3.1 the AMF may either

1) perform the paging procedure over the 3GPP access; or

2) notify the SMF that the UE is unreachable

NOTE whether the AMF performs the paging procedure or notifies the SMF is up to operator's policies

b) De-registration procedure collision

if the network receives a DEREGISTRATION REQUEST message before it receives a SERVICE REQUEST message or REGISTRATION REQUEST message the AMF shall stop timer T3565 and proceed de-registration procedure as specified in subclause 5.5.2

#### 5.6.3.5 abnormal cases on the UE side

the following abnormal cases can be identified

a) NOTIFICATION message received via non-3GPP access with access type indicating 3GPP access when UE-initiated 5GMM specific procedure or service request procedure over 3GPP access is ongoing

the UE shall proceed with 5GMM specific procedure or service request procedure if for registration procedure and service requestprocedure lower layers indicate that the access attempt is barred then the UE shall handle the pending NOTIFICATION message as specified in subclause 5.6.3.2 otherwise the UE shall ignore the NOTIFICATION message once lower layers confirms the establishment of the signalling connection

x) NOTIFICATION message received via non-3GPP access with access type indicating 3GPP access when the unavailability period is activated in the UE or the UE is about to activate unavailability period

the UE shall respond with NOTIFICATION RESPONSE message over non-3GPP access indicating inability of the UE to initiate a service request procedure or a registration procedure over 3GPP access

# 6 elementary procedures for 5GS session management

## 6.1 overview

### 6.1.1 general

this clause describes the procedures used for 5GS session management (5GSM) performed over an N1 NAS signalling connection

the main function of the 5GSM sublayer is to support the PDU session handling in the UE and in the SMF (transferred via the AMF)

the 5GSM comprises procedures for

- the authentication and authorization establishment modification and release of PDU sessions; and

- request for performing handover of an existing PDU session between 3GPP access and non-3GPP access or to transfer an existing PDN connection in the EPS to the 5GS

each PDU session represents a PDU session established between the UE and an SMF PDU sessions can remain established even if the radio and network resources constituting the corresponding PDU session between the UE and the SMF are temporarily released

5GSM procedures can be performed only if a 5GMM context has been established between the UE and the AMF and the secure exchange of NAS messages has been initiated by the AMF by use of the 5GMM procedures described in clause 5 once the UE is successfully registered to a PLMN a PDU session can be established if no 5GMM context has been established the 5GMM sublayer has to initiate the establishment of a 5GMM context by use of the 5GMM procedures as described in clause 5

the UE can request the network to modify or release PDU sessions the network can fulfil such a request from the UE by modifying a PDU session or releasing a PDU session using network-requested procedures (see subclause 6.3)

### 6.1.2 types of 5GSM procedures

three types of 5GSM procedures can be distinguished

a) procedures related to PDU sessions

these procedures are initiated by the network and are used for authentication and authorization or manipulation of PDU sessions

1) PDU authentication and authorization;

2) network-requested PDU session modification;

3) network-requested PDU session release; and

4) service-level authentication and authorization

this procedure is initiated by the UE and to request for establishment of PDU sessions or to perform handover of an existing PDU session between 3GPP access and non-3GPP access or to transfer an existing PDN connection in the EPS to the 5GS

UE-requested PDU session establishment

b) transaction related procedures

these procedures are initiated by the UE to request for handling of PDU sessions i.e to modify a PDU session or to release a PDU session

1) UE-requested PDU session modification; and

2) UE-requested PDU session release

this procedure is initiated by the 5G ProSe UE-to-network relay UE and is used for the manipulation of PDU sessions

- remote UE report

a successful transaction related procedure initiated by the UE triggers the network to execute one of the following procedures related to PDU session; network-requested PDU session modification procedure or network-requested PDU session release procedure the UE treats the start of the procedure related to the PDU session as completion of the transaction related procedure

c) common procedure

the following 5GSM procedure can be related to a PDU session or to a procedure transaction

5GSM status procedure

### 6.1.3 5GSM sublayer states

#### 6.1.3.1 general

in the following subclauses the possible states of a PDU session in the UE and the network side are described

#### 6.1.3.2 5GSM sublayer states in the UE

##### 6.1.3.2.1 overview

in the following subclauses the possible 5GSM sublayer states of the UE are described and shown in figure 6.1.3.2.1.1

NOTE 1 not all possible transitions are shown in this figure

NOTE 2 some transitions shown in this figure are not applicable to the MA PDU session

figure 6.1.3.2.1.1 the 5GSM sublayer states for PDU session handling in the UE (overview)

##### 6.1.3.2.2 PDU SESSION INACTIVE

no PDU session exists

##### 6.1.3.2.3 PDU SESSION ACTIVE PENDING

the UE has initiated a PDU session establishment procedure towards the network and is waiting for a response from the network

##### 6.1.3.2.4 PDU SESSION ACTIVE

the PDU session is active in the UE

##### 6.1.3.2.5 PDU SESSION INACTIVE PENDING

the UE has initiated a PDU session release procedure towards the network and is waiting for a response from the network

##### 6.1.3.2.6 PDU SESSION MODIFICATION PENDING

the UE has initiated a PDU session modification procedure towards the network and is waiting for a response from the network

##### 6.1.3.2.7 PROCEDURE TRANSACTION INACTIVE

no procedure transaction exists

##### 6.1.3.2.8 PROCEDURE TRANSACTION PENDING

the UE has initiated a procedure transaction towards the network

figure 6.1.3.2.8.1 the procedure transaction states in the UE (overview)

#### 6.1.3.3 5GSM sublayer states in the network side

##### 6.1.3.3.1 overview

in the following subclauses the possible 5GSM sublayer states of the network are described and shown in figure 6.1.3.3.1.1

NOTE 1 not all possible transitions are shown in this figure

NOTE 2 some transitions shown in this figure are not applicable to the MA PDU session

figure 6.1.3.3.1.1 the 5GSM sublayer states for PDU session handling in the network (overview)

##### 6.1.3.3.2 PDU SESSION INACTIVE

no PDU session exists

##### 6.1.3.3.3 PDU SESSION ACTIVE

the PDU session is active in the network

##### 6.1.3.3.4 PDU SESSION INACTIVE PENDING

the network has initiated a PDU session release procedure towards the UE and is waiting for a response from the UE

##### 6.1.3.3.5 PDU SESSION MODIFICATION PENDING

the network has initiated a PDU session modification procedure towards the UE and is waiting for a response from the UE

##### 6.1.3.3.6 PROCEDURE TRANSACTION INACTIVE

no procedure transaction exists

##### 6.1.3.3.7 PROCEDURE TRANSACTION PENDING

the network has initiated a procedure transaction towards the UE

figure 6.1.3.3.7.1 the procedure transaction states in the network (overview)

### 6.1.4 coordination between 5GSM and ESM

#### 6.1.4.1 coordination between 5GSM and ESM with N26 interface

interworking with EPS is supported for a PDU session if the PDU session includes the mapped EPS bearer context(s) or has association(s) between QoS flow and mapped EPS bearer after inter-system change from S1 mode to N1 mode the SMF shall not include any mapped EPS bearer contexts associated with a PDU session for LADN with a PDU session which is a multi-homed IPv6 PDU session and with a PDU session with the selected SSC mode set to "SSC mode 2" or "SSC mode 3" if the UE receives any mapped EPS bearer context for a PDU session for LADN for a multi-homed IPv6 PDU session or for a PDU session with the selected SSC mode set to "SSC mode 2" or "SSC mode 3" the UE may locally delete the mapped EPS bearer context see coding of the mapped EPS bearer contexts IE in subclause 9.11.4.8 in an MA PDU session the UE shall have one set of the mapped EPS bearer contexts the network can provide the set of the mapped EPS bearer contexts of the MA PDU session via either access of the MA PDU session in an MA PDU session the UE shall support modification or deletion via an access of a mapped EPS bearer context of the MA PDU session created via the same or the other access

upon inter-system change from N1 mode to S1 mode the UE shall create the default EPS bearer context and the dedicated EPS bearer context(s) based on the parameters of the mapped EPS bearer contexts or the associations between QoS flow and mapped EPS bearer in the PDU session if available the EPS bearer identity assigned for the QoS flow of the default QoS rule becomes the EPS bearer identity of the default bearer in the corresponding PDN connection if there is no EPS bearer identity assigned to the QoS flow of the default QoS rule of a PDU session associated with 3GPP access or if there is no corresponding mapped EPS bearer contexts associated with the EPS bearer identity assigned to the QoS flow of the default QoS rule of a PDU session associated with 3GPP access

a) the PDU session is not an MA PDU session established over both 3GPP access and non-3GPP access the UE shall perform a local release of the PDU session; or

b) the PDU session is an MA PDU session established over both 3GPP access and non-3GPP access the UE shall perform a local release of the PDU session over 3GPP access and consider that the MA PDU session is established over non-3GPP access only

if there is no EPS bearer identity assigned to the QoS flow(s) of a PDU session associated with 3GPP access which is not associated with the default QoS rule or if there is no corresponding mapped EPS bearer contexts associated with the EPS bearer identity assigned to the QoS flow of the non-default QoS rule of a PDU session associated with 3GPP access unless the PDU session is an MA PDU session established over 3GPP access and over non-3GPP access the UE shall locally delete the QoS rules and the QoS flow description(s) the UE uses the parameters from each PDU session for which interworking with EPS is supported to create corresponding default EPS bearer context and optionally dedicated EPS bearer context(s) as follows

a) the PDU session type of the PDU session shall be mapped to the PDN type of the default EPS bearer context as follows

1) the PDN type shall be set to "non-IP" if the PDU session type is "Unstructured";

2) the PDN type shall be set to "IPv4" if the PDU session type is "IPv4";

3) the PDN type shall be set to "IPv6" if the PDU session type is "IPv6";

4) the PDN type shall be set to "IPv4v6" if the PDU session type is "IPv4v6";

5) the PDN type shall be set to "non-IP" if the PDU session type is "Ethernet" and the UE the network or both of them do not support ethernet PDN type in S1 mode; and

6) the PDN type shall be set to "Ethernet" if the PDU session type is "Ethernet" and the UE and the network support ethernet PDN type in S1 mode;

b) the PDU address of the PDU session shall be mapped to the PDN address of the default EPS bearer context as follows

1) the PDN address of the default EPS bearer context is set to the PDU address of the PDU session if the PDU session type is "IPv4" "IPv6" or "IPv4v6"; and

2) the PDN address of the default EPS bearer context is set to zero if the PDU session type is "Ethernet" or "Unstructured";

c) the DNN of the PDU session shall be mapped to the APN of the default EPS bearer context unless the PDU session is an emergency PDU session;

d) the APN-AMBR and extended APN-AMBR received in the parameters of the default EPS bearer context of the mapped EPS bearer contexts shall be mapped to the APN-AMBR and extended APN-AMBR of the default EPS bearer context;

e) for each PDU session in state PDU SESSION ACTIVE PDU SESSION MODIFICATION PENDING or PDU SESSION INACTIVE PENDING

1) if the UE is performing an inter-system change from N1 mode to WB-S1 mode the UE shall set the state of the mapped EPS bearer context(s) to BEARER CONTEXT ACTIVE; or

2) if the UE is performing an inter-system change from N1 mode to NB-S1 mode for the mapped EPS bearer context corresponding to the default EPS bearer the UE shall set the state of the mapped EPS bearer context to BEARER CONTEXT ACTIVE additionally if the UE is performing an inter-system change from WB-N1 mode to NB-S1 mode for the mapped EPS bearer context corresponding to a dedicated EPS bearer if any the UE shall set the state of the mapped EPS bearer context to BEARER CONTEXT INACTIVE; and

f) for any other PDU session the UE shall set the state of the mapped EPS bearer context(s) to BEARER CONTEXT INACTIVE

additionally for each mapped EPS bearer context or the association between QoS flow and mapped EPS bearer in the PDU session

a) the EPS bearer identity shall be set to the EPS bearer identity received in the mapped EPS bearer context or the EPS bearer identity associated with the QoS flow;

b) the EPS QoS parameters shall be set to the mapped EPS QoS parameters of the EPS bearer received in the mapped EPS bearer context or the EPS QoS parameters associated with the QoS flow;

c) the extended EPS QoS parameters shall be set to the mapped extended EPS QoS parameters of the EPS bearer received in the mapped EPS bearer context or the extended EPS QoS parameters associated with the QoS flow; and

d) the traffic flow template shall be set to the mapped traffic flow template of the EPS bearer received in the mapped EPS bearer context or the stored traffic flow template associated with the QoS flow if available

after inter-system change from N1 mode to S1 mode the UE shall associate the PDU session identity the S-NSSAI and the session-AMBR with the default EPS bearer context and for each EPS bearer context mapped from one or more QoS flows associate the QoS rule(s) for the QoS flow(s) and the QoS flow description(s) for the QoS flow(s) with the EPS bearer context

if the PDU session is associated with the control plane only indication and supports interworking with EPS after inter-system change from N1 mode to S1 mode the UE shall associate the EPS bearer context(s) of the PDN connection corresponding to the PDU session with the control plane only indication

if the PDU session is associated with a PDU session pair ID after inter-system change from N1 mode to S1 mode the UE shall associate the default EPS bearer context of the PDN connection corresponding to the PDU session with the PDU session pair ID if the PDU session is associated with an RSN after inter-system change from N1 mode to S1 mode the UE shall associate the default EPS bearer context of the PDN connection corresponding to the PDU session with the RSN

after inter-system change from N1 mode to S1 mode if

a) the UE sent the URSP provisioning in EPS support indicator and received the URSP provisioning in EPS support indicator in the PDU session; or

b) the PDU session is associated with the URSP provisioning in EPS support indicators;

the UE shall associate the default EPS bearer context of the PDN connection corresponding to the PDU session with the URSP provisioning in EPS support indicators

after inter-system change from N1 mode to S1 mode the UE and the SMF shall maintain the PDU session type of the PDU session until the PDN connection corresponding to the PDU session is released if the UE supports non-IP PDN type and the PDU session type is "Ethernet" or "Unstructured"

after inter-system change from N1 mode to S1 mode the UE and the SMF shall maintain the following 5GSM attributions and capabilities associated with the PDU session until the PDN connection corresponding to the PDU session is released

a) the always-on PDU session indication;

b) the maximum number of supported packet filters;

c) the support of reflective QoS;

d) the maximum data rate per UE for user-plane integrity protection supported by the UE for uplink and the maximum data rate per UE for user-plane integrity protection supported by the UE for downlink;

e) the support of multi-homed IPv6 PDU session; and

f) if the PDU session is an MA PDU session established over 3GPP access the PDN connection of the default EPS bearer corresponding to the MA PDU session shall be considered as a user-plane resource of the MA PDU session

after inter-system change from N1 mode to S1 mode the UE operating in single-registration mode in a network supporting N26 interface shall deem that the following features are supported by the network on the PDN connection corresponding to the PDU session

a) PS data off; and

b) local address in TFT

if there is a QoS flow used for IMS signalling after inter-system change from N1 mode to S1 mode the EPS bearer associated with the QoS flow for IMS signalling becomes the EPS bearer for IMS signalling

when the UE is provided with a new session-AMBR in the protocol configuration options IE or extended protocol configuration options IE in the MODIFY EPS BEARER CONTEXT REQUEST message the UE shall discard the corresponding association and associate the new valuewith the default EPS bearer context

the network may provide the UE with one or more QoS rules by including either one QoS rules parameter or one QoS rules with the length of two octets parameter but not both in the protocol configuration options IE or extended protocol configuration options IE in the MODIFY EPS BEARER CONTEXT REQUEST message the network may provide the UE with one or more QoS flow descriptions corresponding to the EPS bearer context being modified by including either one QoS flow descriptions parameter or one QoS flow descriptions with the length of two octets parameter but not both in the protocol configuration options IE or extended protocol configuration options IE in the MODIFY EPS BEARER CONTEXT REQUEST message

when the UE is provided with one or more QoS flow descriptions or the EPS bearer identity of an existing QoS flow description is modified in the protocol configuration options IE or extended protocol configuration options IE in the MODIFY EPS BEARER CONTEXT REQUEST message the UE shall check the EPS bearer identity included in the QoS flow description; and

a) if the EPS bearer identity corresponds to the EPS bearer context being modified or the EPS bearer identity is not included the UE shall store the QoS flow description and all the associated QoS rules if any for the EPS bearer context being modified for use during inter-system change from S1 mode to N1 mode; and

b) otherwise the UE shall locally delete the QoS flow description and all the associated QoS rules if any and include a protocol configuration options IE or extended protocol configuration options IE with a 5GSM cause parameter set to 5GSM cause #84 "syntactical error in the QoS operation" in the MODIFY EPS BEARER CONTEXT ACCEPT message

when the UE is provided with one or more QoS rules or one or more QoS flow descriptions in the protocol configuration options IE or extended protocol configuration options IE in the MODIFY EPS BEARER CONTEXT REQUEST message the UE shall process the QoS rules sequentially starting with the first QoS rule and shall process the QoS flow descriptions sequentially starting with the first QoS flow description the UE shall check the QoS rules and QoS flow descriptions for different types of errors as follows

NOTE 1 if an error is detected in a QoS rule or a QoS flow description which requires sending a protocol configuration options IE or extended protocol configuration options IE with a 5GSM cause value then the QoS rules parameter the QoS rules with the length of two octets parameter the QoS flow descriptions parameter and the QoS flow descriptions with the length of two octets parameter included in the protocol configuration options IE or extended protocol configuration options IE in the MODIFY EPS BEARER CONTEXT REQUEST message are discarded if any

NOTE 2 if the EPS bearer context modification procedure is rejected then the QoS rules parameter the QoS rules with the length of two octets parameter the QoS flow descriptions parameter and the QoS flow descriptions with the length of two octets parameter included in the protocol configuration options IE or extended protocol configuration options IE in the MODIFY EPS BEARER CONTEXT REQUEST message are discarded if any

a) semantic errors in QoS operations

1) when the rule operation is "Modify existing QoS rule and add packet filters" "Modify existing QoS rule and replace all packet filters" "Modify existing QoS rule and delete packet filters" or "Modify existing QoS rule without modifying packet filters" on the default QoS rule and the DQR bit is set to "the QoS rule is not the default QoS rule"

2) when the rule operation is "Modify existing QoS rule and add packet filters" "Modify existing QoS rule and replace all packet filters" "Modify existing QoS rule and delete packet filters" or "Modify existing QoS rule without modifying packet filters" on a QoS rule which is not the default QoS rule and the DQR bit is set to "the QoS rule is the default QoS rule"

3) when the rule operation is "Create new QoS rule" and the DQR bit is set to "the QoS rule is the default QoS rule" when there's already a default QoS rule with different QoS rule identifier

4) when the rule operation is "Delete existing QoS rule" on the default QoS rule

5) when the rule operation is "Create new QoS rule" "Modify existing QoS rule and add packet filters" "Modify existing QoS rule and replace all packet filters" "Modify existing QoS rule and delete packet filters" or "Modify existing QoS rule without modifying packet filters" and two or more QoS rules associated with this PDU session would have identical precedence values

6) when the rule operation is "Modify existing QoS rule and delete packet filters" the QoS rule is a QoS rule of a PDU session of IPv4 IPv6 IPv4v6 or ethernet PDU session type and the packet filter list in the resultant QoS rule is empty

7) when the rule operation is "Create new QoS rule" and there is already an existing QoS rule with the same QoS rule identifier and the existing QoS rule is associated with a QoS flow description stored for the EPS bearer context being modified or the existing QoS rule is not associated with any QoS flow description

8) when the rule operation is "Modify existing QoS rule and add packet filters" "Modify existing QoS rule and replace all packet filters" "Modify existing QoS rule and delete packet filters" or "Modify existing QoS rule without modifying packet filters" and there is no existing QoS rule with the same QoS rule identifier associated with a QoS flow description stored for the EPS bearer context being modified

9) when the rule operation is "Delete existing QoS rule" and there is no existing QoS rule with the same QoS rule identifier associated with a QoS flow description stored for the EPS bearer context being modified

10) when the flow description operation is "Create new QoS flow description" and there is already an existing QoS flow description with the same QoS flow identifier stored for the EPS bearer context being modified

11) when the flow description operation is "Modify existing QoS flow description" and there is no existing QoS flow description with the same QoS flow identifier stored for the EPS bearer context being modified

12) when the flow description operation is "Delete existing QoS flow description" and there is no existing QoS flow description with the same QoS flow identifier stored for the EPS bearer context being modified

13) when the UE determines that

i) the default EPS bearer context is associated with one or more QoS flows but the default EPS bearer context is not associated with the default QoS rule

ii) a dedicated EPS bearer context is associated with one or more QoS flows but the dedicated EPS bearer context is associated with the default QoS rule

14) when the rule operation is "Create new QoS rule" and there is already an existing QoS rule with the same QoS rule identifier associated with a QoS flow description stored for an EPS bearer context different from the EPS bearer context being modified and belonging to the same PDN connection as the EPS bearer context being modified

15) when the flow description operation is "Create new QoS flow description" and there is already an existing QoS flow description with the same QoS flow identifier stored for an EPS bearer context different from the EPS bearer context being modified and belonging to the same PDN connection as the EPS bearer context being modified

16) when the rule operation is "Create new QoS rule" "Modify existing QoS rule and add packet filters" "Modify existing QoS rule and replace all packet filters" "Modify existing QoS rule and delete packet filters" or "Modify existing QoS rule without modifying packet filters" and the resultant QoS rule is associated with a QoS flow description stored for an EPS bearer context different from the EPS bearer context being modified

17) when the rule operation is "Create new QoS rule" the DQR bit is set to "the QoS rule is not the default QoS rule" the QoS rule is provided for a PDN connection of PDN type "non-IP" and there is locally available information associated with the PDN connection that is set to "Unstructured"

18) when the flow description operation is "Create new QoS flow description" or "Modify existing QoS flow description" the QFI associated with the QoS flow description is not the same as the QFI of the default QoS rule the QoS flow description is provided for a PDN connection of PDN type "non-IP" and there is locally available information associated with the PDN connection that is set to "Unstructured"

19) when the rule operation is "Modify existing QoS rule and add packet filters" the "packet filter list" field contains a match-all packet filter the resultant QoS rule is the default QoS rule and there is already an existing match-all packet filter associated with the default QoS rule

20) when the rule operation is "Create new QoS rule" and the DQR bit is set to "the QoS rule is not the default QoS rule" or the rule operation is "Modify existing QoS rule and add packet filters" on a QoS rule which is not the default QoS rule or "Modify existing QoS rule and replace all packet filters" on a QoS rule which is not the default QoS rule and one match-all packet filter is to be associated with the resultant QoS rule

in case 5 if the old QoS rule (i.e the QoS rule that existed before the MODIFY EPS BEARER CONTEXT REQUEST message was received) is not the default QoS rule and the old QoS rule is associated with a QoS flow description stored for the EPS bearer context being modified the UE shall not diagnose an error shall further process the new request and if it was processed successfully shall delete the old QoS rule which has identical precedence value otherwise the UE shall include a protocol configuration options IE or extended protocol configuration options IE with a 5GSM cause parameter set to 5GSM cause #83 "semantic error in the QoS operation" in the MODIFY EPS BEARER CONTEXT ACCEPT message

in case 6 if the QoS rule is not the default QoS rule the UE shall delete the QoS rule if the QoS rule is the default QoS rule the UE shall include a protocol configuration options IE or extended protocol configuration options IE with a 5GSM cause parameter set to 5GSM cause #83 "semantic error in the QoS operation" in the MODIFY EPS BEARER CONTEXT ACCEPT message

in case 7 if the existing QoS rule is not the default QoS rule and the DQR bit of the new QoS rule is set to "the QoS rule is not the default QoS rule" the UE shall not diagnose an error further process the create request and if it was processed successfully delete the old QoS rule (i.e the QoS rule that existed when case 7 was detected) if the existing QoS rule is the default QoS rule or the DQR bit of the new QoS rule is set to "the QoS rule is the default QoS rule" the UE shall include a protocol configuration options IE or extended protocol configuration options IE with a 5GSM cause parameter set to 5GSM cause #83 "semantic error in the QoS operation" in the MODIFY EPS BEARER CONTEXT ACCEPT message

in case 9 the UE shall not diagnose an error further process the delete request and if it was processed successfully consider the respective QoS rule as successfully deleted

in case 10 the UE shall not diagnose an error further process the create request and if it was processed successfully delete the old QoS flow description (i.e the QoS flow description that existed when case 10 was detected

in case 12 the UE shall not diagnose an error further process the delete request and if it was processed successfully consider the respective QoS flow description as successfully deleted

otherwise the UE shall include a protocol configuration options IE or extended protocol configuration options IE with a 5GSM cause parameter set to 5GSM cause #83 "semantic error in the QoS operation" in the MODIFY EPS BEARER CONTEXT ACCEPT message

b) syntactical errors in QoS operations

1) when the rule operation is "Create new QoS rule" "Modify existing QoS rule and add packet filters" "Modify existing QoS rule and replace all packet filters" or "Modify existing QoS rule and delete packet filters" the packet filter list in the QoS rule is empty and the QoS rule is provided for a PDN connection of PDN type IPv4 IPv6 IPv4v6 or ethernet or for a PDN connection of PDN type "non-IP" and there is locally available information associated with the PDN connection that is set to "Ethernet"

2) when the rule operation is "Delete existing QoS rule" or "Modify existing QoS rule without modifying packet filters" with a non-empty packet filter list in the QoS rule

3) when the rule operation is "Modify existing QoS rule and delete packet filters" and the packet filter to be deleted does not exist in the original QoS rule

4) void

5) when there are other types of syntactical errors in the coding of the QoS rules parameter the QoS rules with the length of two octets parameter the QoS flow descriptions parameter or the QoS flow descriptions with the length of two octets parameter such as a mismatch between the number of packet filters subfield and the number of packet filters in the packet filter list when the rule operation is "delete existing QoS rule" or "create new QoS rule" or the number of packet filters subfield is larger than the maximum possible number of packet filters in the packet filter list (i.e. there is no QoS rule precedence subfield included in the QoS rule IE) the QoS rule identifier is set to "no QoS rule identifier assigned" when the rule operation is not "delete existing QoS rule" or the QoS flow identifier is set to "no QoS flow identifier assigned" when the flow description operation is not "Delete existing QoS flow description"

6) when the

A) rule operation is "Create new QoS rule" "Modify existing QoS rule and add packet filters" "Modify existing QoS rule and replace all packet filters" "Modify existing QoS rule and delete packet filters" or "Modify existing QoS rule without modifying packet filters" the UE determines by using the QoS rule’s QFI as the 5QI that there is a resulting QoS rule for a GBR QoS flow (as described in 3GPP TS 23.501 [8] table 5.7.4-1) and there is no QoS flow description with a QFI corresponding to the QFI of the resulting QoS rule

B) flow description operation is "Delete existing QoS flow description" and the UE determines by using the QoS rule’s QFI as the 5QI that there is a resulting QoS rule for a GBR QoS flow (as described in 3GPP TS 23.501 [8] table 5.7.4-1) with a QFI corresponding to the QFI of the QoS flow description that is deleted (i.e there is no associated QoS flow description with the same QFI)

7) when the flow description operation is "Create new QoS flow description" or "Modify existing QoS flow description" and the UE determines that there is a QoS flow description of a GBR QoS flow (as described in 3GPP TS 23.501 [8] table 5.7.4-1) which lacks at least one of the mandatory parameters (i.e. GFBR uplink GFBR downlink MFBR uplink and MFBR downlink) if the QoS flow description does not include a 5QI the UE determines this by using the QFI as the 5QI

8) when the rule operation is "Create new QoS rule" "Modify existing QoS rule and add packet filters" or "Modify existing QoS rule and replace all packet filters" with a non-empty packet filter list in the QoS rule and the DQR bit is set to "the QoS rule is the default QoS rule" the QoS rule is provided for a PDN connection of PDN type "non-IP" and there is locally available information associated with the PDN connection that is set to "Unstructured"

in case 3 the UE shall not diagnose an error further process the deletion request and if no error according to items c and d was detected consider the respective packet filter as successfully deleted

otherwise the UE shall include a protocol configuration options IE or extended protocol configuration options IE with a 5GSM cause parameter set to 5GSM cause #84 "syntactical error in the QoS operation" in the MODIFY EPS BEARER CONTEXT ACCEPT message

NOTE 3 it is not considered an error if the UE determines that after processing all QoS operations on QoS rules and QoS flow descriptions there is a QoS flow description that is not associated with any QoS rule and the UE is not in NB-N1 mode

NOTE 3a an implementation that strictly follows QoS rule operation as defined in subclause 9.11.4.13 might not detect case 2)

c) semantic errors in packet filters

1) when a packet filter consists of conflicting packet filter components which would render the packet filter ineffective i.e no IP packet will ever fit this packet filter how the UE determines a semantic error in a packet filter is outside the scope of the present document

the UE shall include a protocol configuration options IE or extended protocol configuration options IE with a 5GSM cause parameter set to 5GSM cause #44 "semantic errors in packet filter(s)" in the MODIFY EPS BEARER CONTEXT ACCEPT message

d) syntactical errors in packet filters

1) when the rule operation is "Modify existing QoS rule and add packet filters" or "Modify existing QoS rule and replace all packet filters" and two or more packet filters in the resultant QoS rule would have identical packet filter identifiers

2) when the rule operation is "Create new QoS rule" and two or more packet filters in the resultant QoS rule would have identical packet filter identifiers

3) when there are other types of syntactical errors in the coding of packet filters such as the use of a reserved value for a packet filter component identifier

4) void

in case 1 if two or more packet filters with identical packet filter identifiers are contained in the MODIFY EPS BEARER CONTEXT REQUEST message the UE shall include a protocol configuration options IE or extended protocol configuration options IE with a 5GSM cause parameter set to 5GSM cause #45 "syntactical error in packet filter(s)" in the MODIFY EPS BEARER CONTEXT ACCEPT message otherwise the UE shall not diagnose an error further process the MODIFY EPS BEARER CONTEXT REQUEST message and if it was processed successfully delete the old packet filters which have the identical packet filter identifiers

otherwise the UE shall include a protocol configuration options IE or extended protocol configuration options IE with a 5GSM cause parameter set to 5GSM cause #45 "syntactical error in packet filter(s)" in the MODIFY EPS BEARER CONTEXT ACCEPT message

if the UE detects different errors in the QoS rules and QoS flow descriptions as described in this subclause which requires sending a 5GSM cause parameter in the MODIFY EPS BEARER CONTEXT ACCEPT message the UE shall include a single 5GSM cause parameter in the MODIFY EPS BEARER CONTEXT ACCEPT message

NOTE 4 the 5GSM cause to use cannot be different from #44 "semantic error in packet filter(s)" #45 "syntactical errors in packet filter(s)" #83 "semantic error in the QoS operation" or #84 "syntactical error in the QoS operation" the selection of a 5GSM cause is up to UE implementation

upon successful completion of an EPS attach procedure or tracking area updating procedure after inter-system change from N1 mode to S1 mode (see 3GPP TS 24.301 [15]) unless the PDU session is an MA PDU session established over 3GPP access and over non-3GPP access both connected to 5GCN

a) the UE shall delete any UE derived QoS rules of each PDU session which has been transferred to EPS;

b) the UE and the SMF shall perform a local release of the PDU session(s) associated with 3GPP access which have not been transferred to EPS; and

c) the UE and the SMF shall perform a local release of QoS flow(s) which have not been transferred to EPS of the PDU session(s) which have been transferred to EPS the UE and the SMF shall also perform a local release of any QoS flow description not associated with any QoS rule and not associated with any mapped EPS bearer context if there is a QoS flow description not associated with any QoS rule but associated with a mapped EPS bearer context and after the inter-system change from N1 mode to S1 mode the respective EPS bearer context is active then the UE shall associate the QoS flow description with the EPS bearer context

for PDU session(s) associated with non-3GPP access in 5GS if present the UE may

a) keep some or all of these PDU sessions still associated with non-3GPP access in 5GS if supported;

b) release some or all of these PDU sessions explicitly by initiating the UE requested PDU session release procedure(s); or

c) attempt to transfer some or all of these PDU sessions from N1 mode to S1 mode by initiating the UE requested PDN connectivity procedure(s) with the PDN CONNECTIVITY REQUEST message created as follows

1) if the PDU session is an emergency PDU session the request type shall be set to "handover of emergency bearer services" otherwise the request type shall be set to "handover";

2) the PDU session type of the PDU session shall be mapped to the PDN type of the default EPS bearer context as follows

i) the PDN type shall be set to "non-IP" if the PDU session type is "Unstructured";

ii) the PDN type shall be set to "IPv4" if the PDU session type is "IPv4";

iii) the PDN type shall be set to "IPv6" if the PDU session type is "IPv6";

iv) the PDN type shall be set to "IPv4v6" if the PDU session type is "IPv4v6";

v) the PDN type shall be set to "non-IP" if the PDU session type is "Ethernet" and the UE the network or both of them do not support ethernet PDN type in S1 mode; and

vi) the PDN type shall be set to "Ethernet" if the PDU session type is "Ethernet" and the UE and the network support ethernet PDN type in S1 mode;

3) the DNN of the PDU session shall be mapped to the APN of the default EPS bearer context unless the PDN connection is an emergency PDN connection; and

4) the PDU session ID parameter in the protocol configuration options IE or the extended protocol configuration options IE shall be set to the PDU session identity of the PDU session

if a PDU session associated with non-3GPP access is transferred to EPS the UE shall associate the PDU session identity with the default EPS bearer context and shall delete any UE derived QoS rules of such PDU session

interworking to 5GS is supported for a PDN connection if the corresponding default EPS bearer context includes a PDU session identity an S-NSSAI if the PDN connection is a non-emergency PDN connection session AMBR and one or more QoS flow descriptions received in the protocol configuration options IE or extended protocol configuration options IE (see 3GPP TS 24.301 [15]) or the default EPS bearer context has association with the PDU session identity the S-NSSAI if the PDU session is a non-emergency PDU session the session-AMBR and one or more QoS flow descriptions after inter-system change from N1 mode to S1 mode

for a PDN connection established in S1 mode to enable the UE to attempt to transfer the PDN connection from S1 mode to N1 mode in case of inter-system change the UE shall allocate a PDU session identity indicate the allocated PDU session identity in the PDU session ID parameter in the protocol configuration options IE of the PDN CONNECTIVITY REQUEST message and associate the allocated PDU session identity with the default EPS bearer context of the PDN connection if an N5CW device supporting 3GPP access establishes a new PDN connection in S1 mode the N5CW device supporting 3GPP access shall refrain from allocating "PDU session identity value 15"

for a PDN connection established in S1 mode the SMF assigning the QoS rules shall consider that the UE supports 16 packet filters for the corresponding PDU session until the UE indicates a higher number (as specified in subclause 6.4.2.2)

the network may provide the UE with one or more QoS rules by including either one QoS rules parameter or one QoS rules with the length of two octets parameter but not both in the protocol configuration options IE or extended protocol configuration options IE in the ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST or ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST message the network may provide the UE with one or more QoS flow descriptions corresponding to the EPS bearer context being activated by including either one QoS flow descriptions parameter or one QoS flow descriptions with the length of two octets parameter but not both in the protocol configuration options IE or extended protocol configuration options IE in the ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST or ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST message

when the UE is provided with one or more QoS flow descriptions in the protocol configuration options IE or extended protocol configuration options IE of the ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST or ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST message the UE shall check the EPS bearer identity included in the QoS flow description; and

a) if the EPS bearer identity corresponds to the EPS bearer context being activated or the EPS bearer identity is not included the UE shall store the QoS flow description and all the associated QoS rules if any for the EPS bearer context being activated for use during inter-system change from S1 mode to N1 mode; and

b) otherwise the UE shall locally delete the QoS flow description and all the associated QoS rules if any and include a protocol configuration options IE or extended protocol configuration options IE with a 5GSM cause parameter set to 5GSM cause #84 "syntactical error in the QoS operation" in the ACTIVATE DEFAULT EPS BEARER CONTEXT ACCEPT or ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT message

when the UE is provided with one or more QoS rules or one or more QoS flow descriptions in the protocol configuration options IE or extended protocol configuration options IE of the ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST or ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST message the UE shall process the QoS rules sequentially starting with the first QoS rule and shall process the QoS flow descriptions sequentially starting with the first QoS flow description the UE shall check QoS rules and QoS flow descriptions for different types of errors as follows

NOTE 5 if an error is detected in a QoS rule or a QoS flow description which requires sending a protocol configuration options IE or extended protocol configuration options IE with a 5GSM cause value then the QoS rules parameter the QoS rules with the length of two octets parameter the QoS flow descriptions parameter and the QoS flow descriptions with the length of two octets parameter included in the protocol configuration options IE or extended protocol configuration options IE in the ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST or ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST message are discarded if any

NOTE 6 if the default EPS bearer context activation procedure or the dedicated EPS bearer context activation procedure is rejected then the QoS rules parameter the QoS rules with the length of two octets parameter the QoS flow descriptions parameter and the QoS flow descriptions with the length of two octets parameter included in the protocol configuration options IE or extended protocol configuration options IE in the ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST or ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST message are discarded if any

a) semantic errors in QoS operations

1) when the rule operation is "Create new QoS rule" and the DQR bit is set to "the QoS rule is the default QoS rule" when there's already a default QoS rule

2) when the rule operation is received in an ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message the rule operation is "Create new QoS rule" and there is no rule with the DQR bit set to "the QoS rule is the default QoS rule"

3) when the rule operation is "Create new QoS rule" and two or more QoS rules associated with this PDU session would have identical precedence values

4) when the rule operation is an operation other than "Create new QoS rule"

5) when the flow description operation is an operation other than "Create new QoS flow description"

6) when the UE determines that

i) the default EPS bearer context is associated with one or more QoS flows but the default EPS bearer context is not associated with the default QoS rules

ii) a dedicated EPS bearer context is associated with one or more QoS flows but the dedicated EPS bearer context is associated with the default QoS rule

7) when the flow description operation is received in an ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST message the flow description operation is "Create new QoS flow description" and there is already an existing QoS flow description with the same QoS flow identifier stored for an EPS bearer context different from the EPS bearer context being activated and belonging to the same PDN connection as the EPS bearer context being activated

8) when the rule operation is received in an ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST message the rule operation is "Create new QoS rule" and there is already an existing QoS rule with the same QoS rule identifier stored for an EPS bearer context different from the EPS bearer context being activated and belonging to the same PDN connection as the EPS bearer context being activated

9) when the rule operation is received in an ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST message the rule operation is "Create new QoS rule" and the resultant QoS rule is associated with a QoS flow description stored for an EPS bearer context different from the EPS bearer context being activated and belonging to the same PDN connection as the EPS bearer context being activated

10) when the rule operation is "Create new QoS rule" and the DQR bit is set to "the QoS rule is not the default QoS rule" and one match-all packet filter is to be associated with the QoS rule

11) when the flow description operation is "Create new QoS flow description" and there is already an existing QoS flow description with the same QoS flow identifier stored for the EPS bearer context being activated

12) when the rule operation is "Create new QoS rule" and there is already an existing QoS rule with the same QoS rule identifier and the existing QoS rule is associated with a QoS flow description stored for the EPS bearer context being activated or the existing QoS rule is not associated with any QoS flow description

in case 4 if the rule operation is for a non-default QoS rule the UE shall delete the QoS rule if the QoS rule is the default QoS rule the UE shall include a protocol configuration options IE or extended protocol configuration options IE with a 5GSM cause parameter set to 5GSM cause #83 "semantic error in the QoS operation" in the ACTIVATE DEFAULT EPS BEARER CONTEXT ACCEPT or ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT message

in case 11 the UE shall not diagnose an error further process the create request and if it was processed successfully delete the old QoS flow description (i.e the QoS flow description that existed when case 11 was detected)

in case 12 if the existing QoS rule is not the default QoS rule and the DQR bit of the new QoS rule is set to "the QoS rule is not the default QoS rule" the UE shall not diagnose an error further process the create request and if it was processed successfully delete the old QoS rule (i.e the QoS rule that existed when case 12 was detected) if the existing QoS rule is the default QoS rule or the DQR bit of the new QoS rule is set to "the QoS rule is the default QoS rule" the UE shall include a protocol configuration options IE or extended protocol configuration options IE with a 5GSM cause parameter set to 5GSM cause #83 "semantic error in the QoS operation" in the ACTIVATE DEFAULT EPS BEARER CONTEXT ACCEPT or ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT message

otherwise for all the cases above the UE shall include a protocol configuration options IE or extended protocol configuration options IE with a 5GSM cause parameter set to 5GSM cause #83 "semantic error in the QoS operation" in the ACTIVATE DEFAULT EPS BEARER CONTEXT ACCEPT or ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT message

b) syntactical errors in QoS operations

1) when the rule operation is "Create new QoS rule" the packet filter list in the QoS rule is empty and the QoS rule is provided for a PDN connection of PDN type IPv4 IPv6 IPv4v6 or ethernet or for a PDN connection of PDN type "non-IP" and there is locally available information associated with the PDN connection that is set to "Ethernet"

2) void

3) when there are other types of syntactical errors in the coding of the QoS rules parameter the QoS rules with the length of two octets parameter the QoS flow descriptions parameter or the QoS flow descriptions with the length of two octets parameter such as a mismatch between the number of packet filters subfield and the number of packet filters in the packet filter list when the rule operation is "delete existing QoS rule" or "create new QoS rule" or the number of packet filters subfield is larger than the maximum possible number of packet filters in the packet filter list (i.e. there is no QoS rule precedence subfield included in the QoS rule IE) the QoS rule identifier is set to "no QoS rule identifier assigned" or the QoS flow identifier is set to "no QoS flow identifier assigned

4) when the

A) rule operation is "Create new QoS rule" the UE determines by using the QoS rule’s QFI as the 5QI that there is a resulting QoS rule for a GBR QoS flow (as described in 3GPP TS 23.501 [8] table 5.7.4-1) and there is no QoS flow description with a QFI corresponding to the QFI of the resulting QoS rule

5) when the flow description operation is "Create new QoS flow description" and the UE determines that there is a QoS flow description of a GBR QoS flow (as described in 3GPP TS 23.501 [8] table 5.7.4-1) which lacks at least one of the mandatory parameters (i.e. GFBR uplink GFBR downlink MFBR uplink and MFBR downlink) if the QoS flow description does not include a 5QI the UE determines this by using the QFI as the 5QI

the UE shall include a protocol configuration options IE or extended protocol configuration options IE with a 5GSM cause parameter set to 5GSM cause #84 "syntactical error in the QoS operation" in the ACTIVATE DEFAULT EPS BEARER CONTEXT ACCEPT or ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT message

NOTE 7 it is not considered an error if the UE determines that after processing all QoS operations on QoS rules and QoS flow descriptions there is a QoS flow description that is not associated with any QoS rule and the UE is not in NB-N1 mode

c) semantic errors in packet filters

1) when a packet filter consists of conflicting packet filter components which would render the packet filter ineffective i.e no IP packet will ever fit this packet filter how the UE determines a semantic error in a packet filter is outside the scope of the present document

the UE shall include a protocol configuration options IE or extended protocol configuration options IE with a 5GSM cause parameter set to 5GSM cause #44 "semantic errors in packet filter(s)" in the ACTIVATE DEFAULT EPS BEARER CONTEXT ACCEPT or ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT message

d) syntactical errors in packet filters

1) when the rule operation is "Create new QoS rule" and two or more packet filters in the resultant QoS rule would have identical packet filter identifiers

2) when there are other types of syntactical errors in the coding of packet filters such as the use of a reserved value for a packet filter component identifier

the UE shall delete the QoS rule and include a protocol configuration options IE or extended protocol configuration options IE with a 5GSM cause parameter set to 5GSM cause #45 "syntactical error in packet filter(s)" in the ACTIVATE DEFAULT EPS BEARER CONTEXT ACCEPT or ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT message

if the UE detects different errors in the QoS rules and QoS flow descriptions as described in this subclause which requires sending a 5GSM cause parameter in the ACTIVATE DEFAULT EPS BEARER CONTEXT ACCEPT or ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT message the UE shall include a single 5GSM cause parameter in the ACTIVATE DEFAULT EPS BEARER CONTEXT ACCEPT or ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT message

NOTE 8 the 5GSM cause to use cannot be different from #44 "semantic error in packet filter(s)" #45 "syntactical errors in packet filter(s)" #83 "semantic error in the QoS operation" or #84 "syntactical error in the QoS operation" the selection of a 5GSM cause is up to UE implementation

upon inter-system change from S1 mode to N1 mode the UE uses the parameters from the default EPS bearer context of each PDN connection for which interworking to 5GS is supported to create a corresponding PDU session associated with 3GPP access as follows unless the PDN connection is a user-plane resource of an MA PDU session

a) the PDN type of the default EPS bearer context shall be mapped to the PDU session type of the PDU session as follows

1) if the PDN type is "non-IP"

- the PDU session type is set to the locally available information associated with the PDN connection (either "Ethernet" or "Unstructured") if available; or

- otherwise the PDU session type is set to "Unstructured";

2) if the PDN type is "IPv4" the PDU session type is set to "IPv4";

3) if the PDN type is "IPv6" the PDU session type is set to "IPv6";

4) if the PDN type is "IPv4v6" the PDU session type is set to "IPv4v6"; and

5) if the PDN type is "Ethernet" the PDU session type is "Ethernet";

b) the PDN address of the default EPS bearer context shall be mapped to PDU address of the PDU session if the PDN type is "IPv4" "IPv6" or "IPv4v6";

c) the APN of the default EPS bearer context shall be mapped to the DNN of the PDU session unless the PDN connection is an emergency PDN connection;

d) for each default EPS bearer context in state BEARER CONTEXT ACTIVE the UE shall set the state of the mapped PDU session to PDU SESSION ACTIVE; and

e) for any other default EPS bearer context the UE shall set the state of the mapped PDU session to PDU SESSION INACTIVE

additionally the UE shall set

a) the PDU session identity of the PDU session to the PDU session identity included by the UE in the protocol configuration options IE or extended protocol configuration options IE in the PDN CONNECTIVITY REQUEST message or the PDU session identity associated with the default EPS bearer context;

b) the S-NSSAI of the PDU session to the S-NSSAI included by the network in the protocol configuration options IE or extended protocol configuration options IE in the ACTIVATE DEFAULT EPS BEARER REQUEST message or the S-NSSAI associated with the default EPS bearer context if the PDN connection is a non-emergency PDN connection;

c) the session-AMBR of the PDU session to the session-AMBR included by the network in the protocol configuration options IE or extended protocol configuration options IE in the ACTIVATE DEFAULT EPS BEARER REQUEST message or the MODIFY EPS BEARER CONTEXT REQUEST message or the session-AMBR associated with the default EPS bearer context;

d) the SSC mode of the PDU session to "SSC mode 1"; and

e) the always-on PDU session indication to the always-on PDU session indication maintained in the UE if any

upon inter-system change from S1 mode to N1 mode the UE shall locally release the PDN connection(s) for which interworking to 5GS is not supported

upon inter-system change from S1 mode to N1 mode for each PDN connection which is a user-plane resource of MA PDU session and for which interworking to 5GS is supported the UE shall consider that the MA PDU session is established over 3GPP access and unless the MA PDU session is established over non-3GPP access too the UE shall set the session-AMBR of the PDU session to the session-AMBR included by the network in the protocol configuration options IE or extended protocol configuration options IE in the ACTIVATE DEFAULT EPS BEARER REQUEST message or the MODIFY EPS BEARER CONTEXT REQUEST message or the session-AMBR associated with the default EPS bearer context of the PDN connection

upon inter-system change from S1 mode to N1 mode if

a) the UE sent the URSP provisioning in EPS support indicator and received the URSP provisioning in EPS support indicator in the PDN connection corresponding to the PDU session; or

b) the default EPS bearer context of the PDN connection corresponding to the PDU session is associated with the URSP provisioning in EPS support indicators;

then the UE shall associate the PDU session with the URSP provisioning in EPS support indicators

additionally for each EPS bearer context of the PDN connection the UE shall create QoS flow(s) each of which is associated with the QoS flow description received in the protocol configuration options IE or extended protocol configuration options IE in the ACTIVATE DEFAULT EPS BEARER REQUEST message ACTIVATE DEDICATED EPS BEARER REQUEST message or MODIFY EPS BEARER REQUEST message (see 3GPP TS 24.301 [15]) or the QoS flow description associated with EPS bearer context unless

a) the PDU session is an MA PDU session which

1) is established over non-3GPP access; and

2) has a PDN connection as a user-plane resource; and

b) the QoS flow already exists over the non-3GPP access

additionally for each EPS bearer context of the PDN connection the UE shall create QoS rules(s) if any each of which is associated with the QoS rule received in the protocol configuration options IE or extended protocol configuration options IE in the ACTIVATE DEFAULT EPS BEARER REQUEST message ACTIVATE DEDICATED EPS BEARER REQUEST message or MODIFY EPS BEARER CONTEXT REQUEST message (see 3GPP TS 24.301 [15]) or the QoS rules associated with EPS bearer context unless

a) the PDU session is an MA PDU session which

1) is established over non-3GPP access; and

2) has a PDN connection as a user-plane resource; and

b) the QoS rule already exists over the non-3GPP access

NOTE 9 for a QoS rule which does not exist over non-3GPP access the UE does not create the QoS rule if the QoS rule is the default QoS rule or the precedence value of the QoS rule equals to the precedence value of a QoS rule exists over the non-3GPP access

additionally for each PDU session which was created at inter-system change from S1 mode to N1 mode from a corresponding PDN connection of the "Ethernet" PDN type the UE shall consider that ethernet PDN type in S1 mode is supported by the network and the SMF shall consider that ethernet PDN type in S1 mode is supported by the UE

the UE and the network shall locally release the PDN connection(s) and EPS bearer context(s) associated with the 3GPP access which have not been transferred to 5GS

after inter-system change from S1 mode to N1 mode for each QoS flow mapped from an EPS bearer context the UE shall associate the EPS bearer identity the EPS QoS parameters the extended EPS QoS parameters and the traffic flow template if available of the EPS bearer context with the QoS flow

after inter-system change from S1 mode to N1 mode for each QoS flow of an MA PDU session which

a) is established over non-3GPP access; and

b) has a PDN connection as a user-plane resource;

such that the QoS flow was received in the protocol configuration options IE or extended protocol configuration options IE in the ACTIVATE DEFAULT EPS BEARER REQUEST message ACTIVATE DEDICATED EPS BEARER REQUEST message MODIFY EPS BEARER CONTEXT REQUEST message (see 3GPP TS 24.301 [15]) or associated with EPS bearer context the UE shall associate the EPS bearer identity the EPS QoS parameters the extended EPS QoS parameters and the traffic flow template if available of the EPS bearer context with the QoS flow

if the EPS bearer context(s) of the PDN connection are associated with the control plane only indication and the PDN connection supports interworking to 5GS after inter-system change from S1 mode to N1 mode the UE shall associate the PDU session corresponding to the PDN connection with the control plane only indication

if the default EPS bearer context of the PDN connection is associated with the PDU session pair ID and the PDN connection supports interworking to 5GS after inter-system change from S1 mode to N1 mode the UE shall associate the PDU session corresponding to the PDN connection with the PDU session pair ID if the default EPS bearer context of the PDN connection is associated with the RSN and the PDN connection supports interworking to 5GS after inter-system change from S1 mode to N1 mode the UE shall associate the PDU session corresponding to the PDN connection with the RSN

if there is an EPS bearer used for IMS signalling after inter-system change from S1 mode to N1 mode the QoS flow of the default QoS rule in the corresponding PDU session is used for IMS signalling

for a PDN connection established when in S1 mode upon an inter-system change from S1 mode to N1 mode if a UE-requested PDU session modification procedure has not been successfully performed yet,the SMF shall determine the always-on PDU session indication as specified in subclause 6.3.2.2

when the UE is provided with one or more mapped EPS bearer contexts in the mapped EPS bearer contexts IE of the PDU SESSION MODIFICATION COMMAND message the UE shall process the mapped EPS bearer contexts sequentially starting with the first mapped EPS bearer context

when the UE is provided with a new EPS bearer identity a new EPS QoS parameters a new extended EPS QoS parameters a new APN-AMBR or a new extended APN-AMBR in the mapped EPS bearer context IE of the PDU SESSION MODIFICATION COMMAND message for a QoS flow the UE shall discard the corresponding association(s) and associate the new value(s) with the QoS flow

when the UE is provided with a new traffic flow template in the mapped EPS bearer contexts IE of the PDU SESSION MODIFICATION COMMAND message for a QoS flow the UE shall check the traffic flow template for different types of TFT IE errors as specified in subclause 6.3.2.3

when a QoS flow is deleted the associated EPS bearer context information that are mapped from the deleted QoS flow shall be deleted from the UE and the network if there is no other existing QoS flow associated with this EPS bearer context when the EPS bearer identity of a QoS flow is deleted the associated EPS bearer context information that are mapped from the deleted EPS bearer identity shall be deleted from the UE and the network if there is no other existing QoS flow associated with this EPS bearer context when an EPS bearer is released all the associated QoS flow descriptions and QoS rules that are mapped from the released EPS bearer shall be deleted from the UE and the network

NOTE 10 if T3584 is running or deactivated for the S-NSSAI and optionally the DNN combination the UE is allowed to initate ESM procedures in EPS with or without APN corresponding to that DNN and if the APN is congested in EPS the MME can send a back-off timer for the APN to the UE as specified in 3GPP TS 24.301 [15]

upon inter-system change from N1 mode to S1 mode if the UE has any PDU sessions associated with one or more multicast MBS sessions the UE shall locally leave the associated multicast MBS sessions and the network shall consider the UE as removed from the associated MBS sessions

for the case of handover of an existing PDU session from 3GPP access to non-3GPP access

- upon receipt of the PDU SESSION ESTABLISHMENT ACCEPT message the UE locally deletes the EPS bearer identities for the PDU session if any (see subclause 6.4.1.3); and

- after successful handover the network shall locally delete the EPS bearer identities for the PDU session if any

#### 6.1.4.2 coordination between 5GSM and ESM without N26 interface

when the network does not support N26 interface the SMF does not provide the UE with the mapped EPS bearer context for a PDU session

NOTE 1 since the SMF does not provide the UE with the mapped EPS bearer context for a PDU session the UE does not know whether interworking with EPS is supported for a PDU session before attempting to transfer the PDU session from N1 mode to S1 mode

NOTE 2 it is up to UE implementation to decide which PDU session(s) to be attempted to transfer from N1 mode to S1 mode e.g based on UE policy or UE local configuration

upon inter-system change from N1 mode to S1 mode in EMM-IDLE mode the UE shall not transfer a PDU session for LADN to EPS

upon inter-system change from N1 mode to S1 mode in EMM-IDLE mode the UE shall not transfer a multi-homed IPv6 PDU session to EPS

upon inter-system change from N1 mode to S1 mode in EMM-IDLE mode the UE shall not transfer a PDU session with the selected SSC mode set to "SSC mode 2" or "SSC mode 3" to EPS

upon inter-system change from N1 mode to S1 mode in EMM-IDLE mode the UE shall use the parameters from each PDU session which the UE intends to transfer to EPS to create the contents of a PDN CONNECTIVITY REQUEST message as follows

a) if the PDU session is an emergency PDU session the request type shall be set to "handover of emergency bearer services" otherwise the request type shall be set to "handover";

b) the PDU session type of the PDU session shall be mapped to the PDN type of the default EPS bearer context as follows

1) the PDN type shall be set to "non-IP" if the PDU session type is "Unstructured";

2) the PDN type shall be set to "IPv4" if the PDU session type is "IPv4";

3) the PDN type shall be set to "IPv6" if the PDU session type is "IPv6";

4) the PDN type shall be set to "IPv4v6" if the PDU session type is "IPv4v6";

5) the PDN type shall be set to "non-IP" if the PDU session type is "Ethernet" and the UE the network or both of them do not support ethernet PDN type in S1 mode; and

6) the PDN type shall be set to "Ethernet" if the PDU session type is "Ethernet" and the UE and the network support ethernet PDN type in S1 mode;

c) the DNN of the PDU session shall be mapped to the APN of the default EPS bearer context unless the PDU session is an emergency PDU session;

d) the PDU session ID parameter in the protocol configuration options IE or extended protocol configuration options IE shall be set to the PDU session identity of the PDU session; and

e) if the PDU session is an MA PDU session established over 3GPP access the ATSSS request parameter shall be included in the protocol configuration options IE or extended protocol configuration options IE

after inter-system change from N1 mode to S1 mode the UE shall associate the PDU session identity with the default EPS bearer context if the PDU session being transferred is a non-emergency PDU session the UE shall in addition associate the S-NSSAI and the PLMN ID of the current PLMN with the default EPS bearer context

upon successful completion of an EPS attach procedure after inter-system change from N1 mode to S1 mode (see 3GPP TS 24.301 [15]) the UE shall delete any UE derived QoS rules except when the PDU session is an MA PDU session established over 3GPP access and non-3GPP access both connected to the 5GCN

the UE shall perform a local release of the PDU session(s) and QoS flow(s) associated with the 3GPP access which have not been transferred to EPS the UE shall also perform a local release of any QoS flow description not associated with any QoS rule

for PDU session(s) associated with non-3GPP access in 5GS if present the UE may

a) keep some or all of these PDU sessions still associated with non-3GPP access in 5GS if supported;

b) release some or all of these PDU sessions explicitly by initiating the UE requested PDU session release procedure(s); or

c) attempt to transfer some or all of these PDU sessions from N1 mode to S1 mode by initiating the UE requested PDN connectivity procedure(s) with the PDN CONNECTIVITY REQUEST message created as above

when the network does not support N26 interface the MME does not provide the UE with the mapped PDU session for a PDN connection but provides the UE with an S-NSSAI if the PDN connection is not for emergency bearer services when establishing a new PDN connection in S1 mode to enable the UE to attempt to transfer the PDN connection from S1 mode to N1 mode in case of inter-system change the UE shall allocate a PDU session identity indicate the allocated PDU session identity in the PDU session ID parameter in the protocol configuration options IE of the PDN CONNECTIVITY REQUEST message and associate the allocated PDU session identity with the default EPS bearer context of the PDN connection if an N5CW device supporting 3GPP access establishes a new PDN connection in S1 mode the N5CW device supporting 3GPP access shall refrain from allocating "PDU session identity value 15" the network provides the UE with an S-NSSAI and the related PLMN ID in the protocol configuration options IE or extended protocol configuration options IE of the ACTIVATE DEFAULT EPS BEARER REQUEST message the UE shall delete the stored S-NSSAI and the related PLMN ID if any and shall store the S-NSSAI and the related PLMN ID provided in the ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message

NOTE 3 since the MME does not provide the UE with the mapped PDU session for a PDN connection the UE does not know whether interworking to 5GS is supported for a PDN connection for which the UE assigned a PDU session identity before attempting to transfer the PDN connection from S1 mode to N1 mode

NOTE 4 it is up to UE implementation to decide which PDN connection(s) to be attempted to transfer from S1 mode to N1 mode e.g based on UE policy or UE local configuration

NOTE 5 if the PDN connection has been transferred from a PDN connection established via non-3GPP access to EPC it is possible that the network provided the S-NSSAI already during the establishment via non-3GPP access (see 3GPP TS 24.302 [16])

upon inter-system change from S1 mode to N1 mode in 5GMM-IDLE mode the UE uses the parameters from the default EPS bearer context of each PDN connection which the UE intends to transfer to 5GS and for which the UE has allocated a PDU session identity to create a PDU SESSION ESTABLISHMENT REQUEST message as follows

a) if the PDN connection is for emergency bearer services the request type shall be set to "existing emergency PDU session" otherwise the request type shall be set to

1) "MA PDU request" if the PDN connection to be transferred is a user-plane resource of an MA PDU session; or

2) "existing PDU session";

b) the PDN type of the default EPS bearer context shall be mapped to the PDU session type of the PDU session as follows

1) if the PDN type is "non-IP"

- the PDU session type is set to the locally available information associated with the PDN connection (either "Ethernet" or "Unstructured") if available; or

- otherwise the PDU session type is set to "Unstructured";

2) if the PDN type is "IPv4" the PDU session type is set to "IPv4";

3) if the PDN type is "IPv6" the PDU session type is set to "IPv6";

4) if the PDN type is "IPv4v6" the PDU session type is set to "IPv4v6"; and

5) if the PDN type is "Ethernet" the PDU session type is set to "Ethernet"; and

c) the APN of the default EPS bearer context shall be mapped to the DNN of the PDU session unless the PDN connection is an emergency PDN connection;

d) the PDU session ID shall be set to the PDU session identity included by the UE in the protocol configuration options IE or extended protocol configuration options IE in the PDN CONNECTIVITY REQUEST message or to the PDU session ID associated with the default EPS bearer context;

e) if the PDU session is not an emergency PDU session the S-NSSAI of the PDU session shall be set to the S-NSSAI included by the network in the protocol configuration options IE or extended protocol configuration options IE in the ACTIVATE DEFAULT EPS BEARER REQUEST message if provided by the network or the S-NSSAI associated with the default EPS bearer context if available; and

f) the SSC mode IE shall be set to "SSC mode 1"

NOTE 6 if T3584 is running or deactivated for the S-NSSAI and optionally the DNN combination the UE is allowed to initiate ESM procedures in EPS with or without APN corresponding to that DNN and if the APN is congested in EPS the MME can send a back-off timer for the APN to the UE as specified in 3GPP TS 24.301 [15]

the UE shall locally release the PDN connection(s) and EPS bearer(s) associated with the 3GPP access which have not been transferred to 5GS

upon inter-system change from N1 mode to S1 mode if the UE has any PDU sessions associated with one or more MBS multicast sessions the UE shall locally leave the associated multicast MBS sessions and the network shall consider the UE as removed from the associated multicast MBS sessions

upon inter-system change from S1 mode to N1 mode for the PDN connection(s) in the EPS transferred to the 5GS if the UE supports reporting of URSP rule enforcement and is indicated to send URSP rule enforcement report to the network based on the matching URSP rule newly enforced while the UE was in S1 mode which contains the URSP rule enforcement report indication set to "URSP rule enforcement report is required" the UE shall include the URSP rule enforcement reports IE in the PDU SESSION ESTABLISHMENT REQUEST message

### 6.1.4A coordination between 5GSM and SM

coordination between 5GSM and SM states is not required

after the 5G-SRVCC handover from NG-RAN to UTRAN (see 3GPP TS 23.216 [6A]) all the PDU sessions of the UE are locally released at the UE and the network if the UE has any PDU sessions associated with one or more MBS multicast sessions the UE shall locally leave the associated MBS multicast sessions and the network shall consider the UE as removed from the associated MBS sessions

### 6.1.5 coordination for interworking with ePDG connected to EPC

when the UE establishes a new PDN connection via an ePDG connected to EPC to enable the transfer of the PDN connection to N1 mode in case of inter-system change the UE allocates a PDU session identity and indicates its value in the PDU session ID field in the N1\_MODE\_CAPABILITY notify payload of the IKE\_AUTH request message (see 3GPP TS 24.302 [16]) the network provides the UE with an S-NSSAI in the N1\_MODE\_INFORMATION notify payload of the IKE\_AUTH response message (see 3GPP TS 24.302 [16])

upon inter-system change to N1 mode for PDN connection(s) established via an ePDG connected to EPC if present the UE may

a) keep some or all of these PDN connections still via ePDG connected to EPC if supported;

b) release some or all of these PDN connections explicitly by initiating the UE initiated tunnel disconnection procedure(s) as specified in 3GPP TS 24.302 [16]; or

c) attempt to transfer some or all of these PDN connections to N1 mode using the parameters of the PDN connection for which the UE has allocated a PDU session identity by initiating the PDU session establishment procedure(s) with the PDU SESSION ESTABLISHMENT REQUEST message created in that case for each and every PDN connection to be transferred

1) if the PDN connection is for emergency bearer services the request type shall be set to "existing emergency PDU session" otherwise the request type shall be set to "existing PDU session";

2) if the previously allocated home address information for a PDN connection consists of an IPv4 address only for an ePDG connected to EPC according to 3GPP TS 24.302 [16] the PDU session type shall be set to "IPv4";

3) if the previously allocated home address information for a PDN connection consists of an IPv6 prefix only for an ePDG connected to EPC according to 3GPP TS 24.302 [16] the PDU session type shall be set to "IPv6";

4) if the previously allocated home address information for a PDN connection consists of both an IPv4 address and an IPv6 prefix for an ePDG connected to EPC according to 3GPP TS 24.302 [16] the PDU session type shall be set to "IPv4v6";

5) the APN of the PDN connection shall be mapped to the DNN of the PDU session;

6) the PDU session ID shall be set to the PDU session identity in the N1\_MODE\_CAPABILITY notify payload of the IKE\_AUTH request message establishing IPsec tunnel of the PDN connection;

7) if the PDN connection is not for emergency bearer services the S-NSSAI of the PDU session shall be set to the S-NSSAI associated with the PDN connection as specified in 3GPP TS 24.302 [16] the UE shall not request to perform handover of an existing PDN connection to N1 mode if the associated S-NSSAI is not included in the allowed NSSAI for 3GPP access; and

8) the SSC mode IE shall be set to "SSC mode 1"

if an existing PDU session is transferred from 3GPP access to an ePDG connected to EPC connection and that existing PDU session is associated with one or more MBS sessions the UE shall locally leave the associated multicast MBS sessions and the SMF shall consider the UE as removed from the associated multicast MBS sessions

upon inter-system change to N1 mode for the PDN connection(s) via an ePDG connected to EPC transferred to the 5GS if the UE supports reporting of URSP rule enforcement and is indicated to send URSP rule enforcement report to the network based on the matching URSP rule newly enforced while the PDN connection is via an ePDG connected to EPC which contains the URSP rule enforcement report indication set to "URSP rule enforcement report is required" the UE shall include the URSP rule enforcement reports IE in the PDU SESSION ESTABLISHMENT REQUEST message

## 6.2 general on elementary 5GSM procedures

### 6.2.1 principles of PTI handling for 5GSM procedures

when the UE or the network initiates a transaction related procedure (i.e a procedure consisting of more than one message and the messages are related) it shall include a valid PTI value in the message header of the request message or of the command message

if a response message is sent as result of a received request message or a received command message the sending entity shall include in the response message the PTI value received within the request message or within the command message (see examples in figure 6.2.1.1 figure 6.2.1.2 and figure 6.2.1.3)

if a command message is sent as result of a received request message the sending entity shall include in the command message the PTI value received with the request message (see examples in figure 6.2.1.3)

if a command message is not sent as result of a received request message the sending entity shall include in the command message the PTI value set to "no procedure transaction identity assigned" (see examples in figure 6.2.1.4)

figure 6.2.1.1 UE-requested transaction related procedure accepted by the network

figure 6.2.1.2 UE-requested transaction related procedure rejected by the network

figure 6.2.1.3 UE-requested transaction related procedure triggering a network-requested transaction related procedure

figure 6.2.1.4 network-requested transaction related procedure not triggered by a UE-requested transaction related procedure

### 6.2.2 PDU session types

the following PDU session types are supported

a) IPv4;

b) IPv6;

c) IPv4v6;

d) ethernet (EtherType as defined in IEEE std 802.3 [31A]); and

e) unstructured

IP address allocation for IPv4 IPv6 and IPv4v6 PDU session types is described in subclause 6.2.4

neither a MAC nor an IP address is allocated by the 5GCN to the UE for ethernet PDU session type

### 6.2.3 PDU session management

the SMF is responsible for the session management functions to provide the PDU connectivity service to the UE via the 5GSM signalling between UE and SMF the session management procedures includes

a) the UE-requested PDU session establishment procedure;

b) the PDU session authentication and authorization procedure;

c) the UE-requested PDU session modification procedure;

d) the network-requested PDU session modification procedure;

e) the UE-requested PDU session release procedure; and

f) the network-requested PDU session release procedure

a UE may establish multiple PDU sessions to the same data network or to different data networks via 3GPP access and via non-3GPP access at the same time it is not required for a UE to initiate the PDU session release procedure to release a PDU session associated with another access if any due to the reason that the UE initiates the registration procedure or PDU session establishment procedure over the current access

NOTE PDU session is managed independently between 3GPP access and non-3GPP access

the session management messages between UE and SMF are transferred via AMF as specified in subclause 8.3

### 6.2.4 IP address allocation

#### 6.2.4.1 general

this clause specifies IP address allocation for the PDU session

in this release of specification PDU session can be initiated with one IP version i.e IPv4 PDU session type or IPv6 PDU session type or with both IP versions i.e IPv4v6 PDU session type

IP address allocation to the UE shall be performed by SMF based on one or both the selected IP versions and operator policies if IPv4 PDU session type is selected an IPv4 address is allocated to the UE if IPv6 PDU session type is selected an IPv6 prefix except when the SMF acts according to subclause 6.2.4.3 and an interface identifier for the IPv6 link local address are allocated to the UE if IPv4v6 PDU session type is selected an IPv4 address an IPv6 prefix except when the SMF acts according to subclause 6.2.4.3 or 6.2.4.4 and an interface identifier for the IPv6 link local address are allocated to the UE if IPv6 or IPv4v6 PDU session type is selected in a PDU session established by the W-AGF acting on behalf of the FN-RG and the PDU SESSION ESTABLISHMENT REQUEST message contains the suggested interface identifier IE the SMF shall allocate to the UE the interface identifier for the IPv6 link local address indicated in the suggested interface identifier IE

for IPv4 PDU session type and for IPv4v6 PDU session type the UE

a) shall obtain an IPv4 address via

1) NAS signalling as specified in subclause 6.2.4.2; or

2) DHCPv4 as specified in IETF RFC 2131 [33E]; and

b) may obtain IPv4 configuration parameters (e.g DNS server address) via DHCPv4 as specified in IETF RFC 2132 [33F] or may receive IPv4 configuration parameters (e.g DNS server address) as specified in subclause 6.4.1 and subclause 6.3.2

for IPv6 PDU session type and for IPv4v6 PDU session type the UE

a) shall build an IPv6 link local address based on the allocated interface identifier for the IPv6 link local address;

b) shall obtain /64 IPv6 prefix via IPv6 stateless address autoconfiguration as specified in 3GPP TS 23.501 [8] and IETF RFC 4862 [39] except when the 5G-RG or the W-AGF act according to subclause 6.2.4.3;

c) may obtain IPv6 configuration parameters via stateless DHCPv6 as specified in IETF RFC 8415 [33D] except when the 5G-RG or the W-AGF act according to subclause 6.2.4.3 may receive IPv6 configuration parameters (e.g DNS server address) as specified in subclause 6.4.1 and subclause 6.3.2 or may receive DNS server IPv6 addresses in a router advertisement message as specified in IETF RFC 4861 [38B] with recursive DNS server option as specified in IETF RFC 8106 [52];and

d) may obtain an additional IPv6 prefix for a PDU session by IPv6 prefix delegation via DHCPv6 as specified in subclause 6.2.4.2a

#### 6.2.4.2 IP address allocation via NAS signalling

the UE shall set the PDU session type IE in the PDU SESSION ESTABLISHMENT REQUEST message based on its IP stack capabilities if the UE requests IP connectivity as follows

a) a UE

1) which is IPv6 and IPv4 capable shall set the PDU session type IE to IPv4 IPv6 or IPv4v6 according to UE configuration or received policy

2) which is only IPv6 capable shall set the PDU session type IE to IPv6

3) which is only IPv4 capable shall set the PDU session type IE to IPv4

b) when the IP version capability of the UE is unknown in the UE (as in the case when the MT and TE are separated and the capability of the TE is not known in the MT) the UE shall set the PDU session type IE to IPv4v6

if the UE wants to use DHCPv4 for IPv4 address assignment it shall indicate that to the network within the extended protocol configuration options IE in the PDU SESSION ESTABLISHMENT REQUEST

on receipt of the PDU SESSION ESTABLISHMENT REQUEST message sent by the UE the network when allocating an IP address shall take into account the PDU session type IE the operator's policies of the network and the user's subscription data and

a) if the network sets the selected PDU session type IE to IPv4 the network shall include an IPv4 address in the PDU address IE;

b) if the network sets the selected PDU session type IE to IPv6 the network shall include an interface identifier for the IPv6 link local address in the PDU address IE; and

c) if the network sets the selected PDU session type IE to IPv4v6 the network shall include an IPv4 address and an interface identifier for the IPv6 link local address in the PDU address IE

#### 6.2.4.2a IPv6 prefix delegation via DHCPv6

in order to perform the IPv6 prefix delegation via DHCPv6 the UE shall use DHCPv6 to request additional IPv6 prefixes (i.e prefixes shorter than the default /64 prefix) from the SMF the UE shall act as a "Requesting Router" as described in IETF RFC 8415 [33D] and shall insert one or more identity association for prefix delegation options into a DHCPv6 solicit message

if the IPv6 address allocation using IPv6 stateless address autoconfiguration is used the UE sends the DHCPv6 message to request additional IPv6 prefixes to the SMF after the PDU session establishment and IPv6 prefix allocation

when the UE requests additional prefixes using DHCPv6 the UE may include DHCPv6 rapid commit option as specified in IETF RFC 8415 [33D] in a DHCPv6 solicit message and the UE other than the ones specified in subclause 6.2.4.3 shall include DHCPv6 OPTION\_ORO option with the OPTION\_PD\_EXCLUDE option code as specified in IETF RFC 6603 [40A] in the DHCPv6 message

upon receiving one or more identity association for prefix delegation prefixes in a DHCPv6 reply message the UE is allowed to use the allocated additional prefixes after inter-system change from N1 mode to S1 mode or from S1 mode to N1 mode

#### 6.2.4.3 additional RG related requirements for IP address allocation

if IPv6 PDU session type or IPv4v6 PDU session type is selected an IPv6 address one or more IPv6 prefixes or both are allocated to the 5G-RG or the W-AGF acting on behalf of the FN-RG (or on behalf of the N5GC device)

if the 5G-RG or the W-AGF acting on behalf of the FN-RG (or on behalf of the N5GC device) receives a router advertisement message as specified in IETF RFC 4861 [38B] with the "Managed address configuration" flag set to zero the 5G-RG and the W-AGF acting on behalf of the FN-RG (or on behalf of the N5GC device)

a) shall obtain /64 IPv6 prefix via IPv6 stateless address autoconfiguration as specified in 3GPP TS 23.501 [8] and IETF RFC 4862 [39];

b) may obtain IPv6 configuration parameters via stateless DHCPv6 as specified in IETF RFC 8415 [33D]; and

c) may request additional IPv6 prefixes using DHCPv6 if the 5G-RG and the W-AGF acting on behalf of the FN-RG (or on behalf of the N5GC device) request IPv6 prefixes using DHCPv6 the 5G-RG and the W-AGF acting on behalf of the FN-RG (or on behalf of the N5GC device) shall act as a "Requesting Router" as described in IETF RFC 8415 [33D] shall perform procedures described in subclause 6.2.4.2a additionally the 5G-RG or the W-AGF acting on behalf of the FN-RG (or on behalf of the N5GC device) may include DHCPv6 OPTION\_ORO option with the OPTION\_PD\_EXCLUDE option code as specified in IETF RFC 6603 [40A] in the DHCP

if the 5G-RG or the W-AGF acting on behalf of the FN-RG (or on behalf of the N5GC device) receives a router advertisement message as specified in IETF RFC 4861 [38B] with the "Managed address configuration" flag set to one the 5G-RG and the W-AGF acting on behalf of the FN-RG (or on behalf of the N5GC device)

a) shall obtain an IPv6 address via DHCPv6 and the DHCPv6 identity association for non-temporary addresses option as specified in IETF RFC 8415 [33D];

b) may obtain IPv6 configuration parameters via DHCPv6 as specified in IETF RFC 8415 [33D]; and

c) may request IPv6 prefixes using DHCPv6 if the 5G-RG and the W-AGF acting on behalf of the FN-RG (or on behalf of the N5GC device) requests IPv6 prefixes using DHCPv6 the 5G-RG and the W-AGF acting on behalf of the FN-RG (or on behalf of the N5GC device) shall act as a "Requesting Router" as described in IETF RFC 8415 [33D] shall perform procedures described in subclause 6.2.4.2a additionally the 5G-RG or the W-AGF acting on behalf of the FN-RG (or on behalf of the N5GC device) may include DHCPv6 OPTION\_ORO option with the OPTION\_PD\_EXCLUDE option code as specified in IETF RFC 6603 [40A] in the DHCP message the 5G-RG or the W-AGF acting on behalf of the FN-RG (or on behalf of the N5GC device) may include both IA\_PD option and IA\_NA option to request the delegated prefix together with the IPv6 address in the same DHCPv6 message

NOTE the 5G-RG and the W-AGF acting on behalf of the FN-RG (or on behalf of the N5GC device) can send multiple DHCPv6 requests with different DHCPv6 identity association for non-temporary addresses options when the 5G-RG or the FN-RG acts as a DHCP relay for devices behind the 5G-RG or the FN-RG

the 5G-RG may obtain ACS information via DHCP as specified in subclause 3.1 of BBF TR-069 [49] or in BBF TR-369 [50] R-DIS.1 and R-DIS.2

#### 6.2.4.4 additional requirements of the UE acting as 5G ProSe layer-3 UE-to-network relay UE for IP address allocation

if a UE acting as 5G ProSe layer-3 UE-to-network relay needs to indicate "IPv6 Router" or "DHCPv4 server & IPv6 Router" in the IP address configuration IE as specified in 3GPP 24.554 [19E] the UE shall support acting as a "Requesting Router" as described in IETF RFC 8415 [33D] to request additional IPv6 prefixes (i.e prefixes in addition to the /64 default prefix which was allocated via stateless IPv6 address autoconfiguration as specified in subclause 6.2.4.1) from the SMF as specified in subclause 5.5.2 of 3GPP TS 23.304 [6E]

when the UE acting as 5G ProSe layer-3 UE-to-network relay UE requests additional prefixes using DHCPv6 the UE shall perform procedures described in subclause 6.2.4.2a

### 6.2.5 quality of service

#### 6.2.5.1 general

##### 6.2.5.1.1 QoS rules

###### 6.2.5.1.1.1 general

in a PDU session of IPv4 IPv6 IPv4v6 and ethernet PDU session type the NAS protocol enables different forwarding treatments of UL user data packets in one or more QoS flows based on signalled QoS rules derived QoS rules or any combination of them

in a PDU session of unstructured PDU session type all UL user data packets are associated with the same QoS flow

###### 6.2.5.1.1.2 signalled QoS rules

the NAS protocol enables the network to provide the UE with signalled QoS rules associated with a PDU session

the network can provide the UE with one or more signalled QoS rules associated with a PDU session at the PDU session establishment or at the PDU session modification

each signalled QoS rule contains

a) an indication of whether the QoS rule is the default QoS rule;

b) a QoS rule identifier (QRI);

c) a QoS flow identifier (QFI);

d) optionally a set of packet filters; and

e) a precedence value

NOTE 1 the default QoS rule indication (DQR) of a signalled QoS rule cannot be changed

for case d) above

1) if the QoS rule is the default QoS rule of a PDU session of IPv4 IPv6 IPv4v6 or ethernet PDU session type the set of packet filters contains zero or more packet filters for DL direction and may additionaly contain one of the following

A) a match-all packet filter for UL direction;

B) a match-all packet filter for UL and DL directions;

C) zero or more packet filters for UL direction (other than the match-all packet filter for UL direction);

D) zero or more packet filters for UL and DL directions (other than the match-all packet filter for UL and DL directions); or

E) one or more packet filters for UL direction (other than the match-all packet filter for UL direction) and one or more packet filters for UL and DL directions (other than the match-all packet filter for UL and DL directions)

the set of packet filters for the default QoS rule shall not be empty if the default QoS rule contains a match-all packet filter then the highest precedence value shall be used for the default QoS rule

NOTE 1a set of packet filters for the default QoS rule can contain only packet filters for DL direction e.g for determination that local preconditions are met in an IMS session (see 3GPP TS 24.229 [14]) with a receive only media

2) if the QoS rule is a QoS rule of a PDU session of IPv4 IPv6 IPv4v6 or ethernet PDU session type and is not the default QoS rule the set of packet filters contains zero or more packet filters for the DL direction and may additionally contain one of the following

A) zero or more packet filters for UL direction (other than the match-all packet filter for UL direction); and

B) zero or more packet filters for both UL and DL directions (other than the match-all packet filter for UL and DL directions)

the set of packet filters for a QoS rule which is not the default QoS rule shall not be empty

NOTE 1b set of packet filters for a QoS rule which is not the default QoS rule can contain only packet filters for DL direction e.g for determination that local preconditions are met in an IMS session (see 3GPP TS 24.229 [14]) with a receive only media

3) for PDU session of unstructured PDU session type there is only one QoS rule associated with it and the set of packet filters of that QoS rule is empty

if the UE requests a new QoS rule it shall assign a precedence value for the signalled QoS rule which is not in the range from 70 to 99 (decimal)

NOTE 2 in this release of the specification there is no support for a match-all packet filter for DL direction

NOTE 3 in order to support QoS differentiation in case of access to PLMN services via an SNPN the UE within the SNPN can construct packet filters based on the destination IP address to reach the N3IWF in the PLMN and the security parameters index (SPI) for the IPsec SA

NOTE 4 in order to support QoS differentiation in case of access to SNPN services via a PLMN the UE within the PLMN can construct packet filters based on the destination IP address to reach the N3IWF in the SNPN and the security parameters index (SPI) for the IPsec SA

NOTE 5 the above described condition of assigning a precedence value for the signalled QoS rule is applied to the UE when the UE requests a QoS rule for network to bind service data flows described by the QoS rule to a dedicated QoS flow by setting the segregation bit to 1

in NB-N1 mode there is only one QoS rule associated with a PDU session and that is the default QoS rule as described in 3GPP TS 23.501 [8] when the SMF determines that the UE has

a) moved from a tracking area in WB-N1 mode into a tracking area in NB-N1 mode;

b) moved from a tracking area in WB-S1 mode into a tracking area in NB-N1 mode; or

c) moved from a tracking area in NR connected to 5GCN into a tracking area in NB-N1 mode;

the SMF shall for each PDU session that is kept active initiate the PDU session modification procedure (see subclause 6.3.3.2) to delete every QoS rule that is not the default QoS rule if any

within a PDU session

a) each signalled QoS rule has a unique QRI;

b) there is at least one signalled QoS rule;

c) one signalled QoS rule is the default QoS rule; and

d) there can be zero one or more signalled QoS rules associated with a given QFI

###### 6.2.5.1.1.3 derived QoS rules

derived QoS rules are applicable only for PDU session of IPv4 IPv6 IPv4v6 or ethernet PDU session type

the reflective QoS in the UE creates derived QoS rules associated with a PDU session based on DL user data packets received via the PDU session

each derived QoS rule contains

a) a QoS flow identifier (QFI);

b) a packet filter for UL direction; and

c) a precedence value of 80 (decimal)

NOTE on the network side the corresponding QoS rule can be associated with a different precedence value in the range from 70 to 99 (decimal)

within a PDU session

a) there can be zero one or more derived QoS rules associated with a given QFI; and

b) there can be up to one derived QoS rule associated with a given packet filter for UL direction

in the UE a timer T3583 runs for each derived QoS rule

reflective QoS is not supported in NB-N1 mode reflective QoS is not applicable for a PDU session with control plane only indication

###### 6.2.5.1.1.4 QoS flow descriptions

the network can also provide the UE with one or more QoS flow descriptions associated with a PDU session at the PDU session establishment or at the PDU session modification

each QoS flow description contains

a) a QoS flow identifier (QFI);

b) if the flow is a GBR QoS flow

1) guaranteed flow bit rate (GFBR) for UL;

2) guaranteed flow bit rate (GFBR) for DL;

3) maximum flow bit rate (MFBR) for UL;

4) maximum flow bit rate (MFBR) for DL; and

5) optionally averaging window applicable for both UL and DL;

c) 5QI if the QFI is not the same as the 5QI of the QoS flow identified by the QFI; and

d) optionally an EPS bearer identity (EBI) if the QoS flow can be mapped to an EPS bearer as specified in subclause 4.11.1 of 3GPP TS 23.502 [9]

if the averaging window is not included in a QoS flow description for a GBR QoS flow with a 5QI indicated in 3GPP TS 23.501 [8] table 5.7.4-1 the averaging window associated with the 5QI in 3GPP TS 23.501 [8] table 5.7.4-1 applies for the averaging window

if the averaging window is not included in a QoS flow description for a GBR QoS flow with a 5QI not indicated in 3GPP TS 23.501 [8] table 5.7.4-1 the standardized value of two seconds is used as the averaging window

##### 6.2.5.1.2 Session-AMBR

the NAS protocol enables the network to provide the UE with the session-AMBR associated with a PDU session

the standardized value of two seconds is used as the averaging window for the UE's enforcement of the UL rate limitation indicated by the session-AMBR

##### 6.2.5.1.2A void

##### 6.2.5.1.3 UL user data packet matching

for PDU session of IPv4 IPv6 IPv4v6 or ethernet PDU session type upon receiving an UL user data packet from the upper layers for transmission via a PDU session the UE shall attempt to associate the UL user data packet with

a) the QFI of a signalled QoS rule associated with the PDU session which has a set of packet filters containing a packet filter for UL direction matching the UL user data packet or containing a packet filter for both UL and DL directions matching the UL user data packet; or

b) the QFI of a derived QoS rule associated with the PDU session which has the packet filter for UL direction matching the UL user data packet;

by evaluating the QoS rules in increasing order of their precedence values until the UL user data packet is associated with a QFI or all QoS rules are evaluated

for PDU session of unstructured PDU session type upon receiving an UL user data packet from the upper layers for transmission via a PDU session the UE shall associate the UL user data packet with the QFI of the default QoS rule associated with the PDU session

if the UL user data packet is associated with a QFI the UE shall pass the QFI along the UL user data packet to the lower layers for transmission

NOTE marking of the UL user data packet with the QFI is performed by the lower layers

if all QoS rules are evaluated and the UL user data packet is not associated with a QFI the UE shall discard the UL user data packet

##### 6.2.5.1.4 reflective QoS

###### 6.2.5.1.4.1 general

the UE may support reflective QoS

if the UE supports the reflective QoS the UE shall support the procedures in the following subclauses

the reflective QoS is applicable in a PDU session of IPv4 IPv6 IPv4v6 and ethernet PDU session type the reflective QoS is not applicable in a PDU session of unstructured PDU session type reflective QoS is not applicable for a PDU session with control plane only indication

the UE may request to revoke the usage of reflective QoS for an existing PDU session for which the UE had previously indicated support for reflective QoS

###### 6.2.5.1.4.2 derivation of packet filter for UL direction from DL user data packet

if the UE needs to derive a packet filter for UL direction from the DL user data packet (see subclause 6.2.5.1.4.3 and 6.2.5.1.4.4) the UE shall proceed as follows

a) if the received DL user data packet belongs to a PDU session of IPv4 or IPv4v6 PDU session type and is an IPv4 packet and

1) the protocol field of the received DL user data packet indicates TCP as specified in IETF RFC 793 [33];

2) the protocol field of the received DL user data packet indicates UDP as specified in IETF RFC 768 [32]; or

3) the protocol field of the received DL user data packet indicates ESP as specified in IETF RFC 4303 [38] and an uplink IPSec SA corresponding to a downlink IPSec SA indicated in the security parameters index field of the received DL user data packet exists;

then the packet filter for UL direction contains the following packet filter components

1) an IPv4 remote address component set to the value of the source address field of the received DL user data packet;

2) an IPv4 local address component set to the value of the destination address field of the received DL user data packet;

3) a protocol identifier/next header type component set to the value of the protocol field of the received DL user data packet;

4) if the protocol field of the received DL user data packet indicates TCP as specified in IETF RFC 793 [33] or UDP as specified in IETF RFC 768 [32]

i) a single local port type component set to the value of the destination port field of the received DL user data packet; and

ii) a single remote port type component set to the value of the source port field of the received DL user data packet;

5) if the protocol field of the received DL user data packet indicates ESP as specified in IETF RFC 4303 [38] an uplink IPSec SA corresponding to a downlink IPSec SA of the SPI in the DL user data packet exists and the SPI of the uplink IPSec SA is known to the NAS layer

i) a security parameter index type component set to the security parameters index of the uplink IPSec SA corresponding to the downlink IPSec SA indicated in the security parameters index field of the received DL user data packet; and

6) if the protocol field of the received DL user data packet indicates UDP and the received DL user data packet contains a UDP-encapsulated ESP header as specified in IETF RFC 3948 [55] an uplink IPSec SA corresponding to a downlink IPSec SA of the SPI in the DL user data packet exists and the SPI of the uplink IPSec SA is known to the NAS layer

i) a security parameter index type component set to the security parameters index of the uplink IPSec SA corresponding to the downlink IPSec SA indicated in the security parameters index field of the ESP header field of the UDP-encapsulated ESP header as specified in IETF RFC 3948 [55] of the received DL user data packet;

otherwise it is not possible to derive a packet filter for UL direction from the DL user data packet;

b) if the received DL user data packet belongs to a PDU session of IPv6 or IPv4v6 PDU session type and is an IPv6 packet and

1) the last next header field of the received DL user data packet indicates TCP as specified in IETF RFC 793 [33];

2) the last next header field of the received DL user data packet indicates UDP as specified in IETF RFC 768 [32]; or

3) the last next header field of the received DL user data packet indicates ESP as specified in IETF RFC 4303 [38] and an uplink IPSec SA corresponding to a downlink IPSec SA indicated in the security parameters index field of the received DL user data packet exists;

then the packet filter for UL direction contains the following packet filter components

1) an IPv6 remote address/prefix length component set to the value of the source address field of the received DL user data packet;

2) an IPv6 local address/prefix length component set to the value of the destination address field of the received DL user data packet;

3) a protocol identifier/next header type component set to the value of the last next header field of the received DL user data packet;

4) if the last next header field of the received DL user data packet indicates TCP as specified in IETF RFC 793 [33] or UDP as specified in IETF RFC 768 [32]

i) a single local port type component set to the value of the destination port field of the received DL user data packet; and

ii) a single remote port type component set to the value of the source port field of the received DL user data packet;

5) if the last next header field of the received DL user data packet indicates ESP as specified in IETF RFC 4303 [38] an uplink IPSec SA corresponding to a downlink IPSec SA of the SPI in the DL user data packet exists and the SPI of the uplink IPSec SA is known to the NAS layer

i) a security parameter index type component set to the security parameters index of the uplink IPSec SA corresponding to the downlink IPSec SA indicated in the security parameters index field of the received DL user data packet; and

6) if the last next header field of the received DL user data packet indicates UDP and the received DL user data packet contains a UDP-encapsulated ESP header as specified in IETF RFC 3948 [55] an uplink IPSec SA corresponding to a downlink IPSec SA of the SPI in the DL user data packet exists and the SPI of the uplink IPSec SA is known to the NAS layer

i) a security parameter index type component set to the security parameters index of the uplink IPSec SA corresponding to the downlink IPSec SA indicated in the security parameters index field of the ESP header field of the UDP-encapsulated ESP header as specified in IETF RFC 3948 [55] of the received DL user data packet;

otherwise it is not possible to derive a packet filter for UL direction from the DL user data packet;

c) if the received DL user data packet belongs to a PDU session of ethernet PDU session type the packet filter for UL direction contains the following packet filter components

1) a destination MAC address component set to the source MAC address of the received DL user data packet;

2) a source MAC address component set to the destination MAC address of the received DL user data packet;

3) if one or more 802.1Q C-TAG is included in the received DL user data packet an 802.1Q C-TAG VID component set to the outermost 802.1Q C-TAG VID of the received DL user data packet and an 802.1Q C-TAG PCP/DEI component set to the outermost 802.1Q C-TAG PCP/DEI of the received DL user data packet;

4) if one or more 802.1Q S-TAG is included in the received DL user data packet an 802.1Q S-TAG VID component set to the outermost 802.1Q S-TAG VID of the received DL user data packet and an 802.1Q S-TAG PCP/DEI component set to the outermost 802.1Q S-TAG PCP/DEI of the received DL user data packet;

5) if the ethertype field of the received DL user data packet is set to a value of 1536 or above an ethertype component set to the ethertype of the received DL user data packet;

6) if the ethertype field of the ethernet frame header indicates that the data carried in the ethernet frame is IPv4 data the UE shall also add to the packet filter for UL direction the IP-specific components based on the contents of the IP header of the received DL user data packet as described in bullet a) above; and

7) if the ethertype field of the ethernet frame header indicates that the data carried in the ethernet frame is IPv6 data the UE shall also add to the packet filter for UL direction the IP-specific components based on the contents of the IP header of the received DL user data packet as described in bullet b) above; and

d) if the received DL user data packet belongs to a PDU session of PDU session type other than ethernet IPv4 IPv6 and IPv4v6 it is not possible to derive a packet filter for UL direction from the DL user data packet

###### 6.2.5.1.4.3 creating a derived QoS rule by reflective QoS in the UE

if the UE receives a DL user data packet marked with a QFI and an RQI the DL user data packet belongs to a PDU session of IPv4 IPv6 IPv4v6 or ethernet PDU session type and the UE does not have a derived QoS rule with the same packet filter for UL direction as the packet filter for UL direction derived from the DL user data packet as specified in subclause 6.2.5.1.4.2 then the UE shall create a new derived QoS rule as follows

a) the QFI of the derived QoS rule is set to the received QFI;

b) the precedence value of the derived QoS rule is set to 80 (decimal); and

c) the packet filter for UL direction of the derived QoS rule is set to the derived packet filter for UL direction;

and the UE shall start the timer T3583 associated with the derived QoS rule with the RQ timer value last received during the UE-requested PDU session establishment procedure of the PDU session (see subclause 6.4.1) or the network-requested PDU session modification procedure of the PDU session (see subclause 6.4.2) if the RQ timer value was received neither in the UE-requested PDU session establishment procedure of the PDU session nor in any network-requested PDU session modification procedure of the PDU session the default standardized RQ timer value is used

###### 6.2.5.1.4.4 updating a derived QoS rule by reflective QoS in the UE

if the UE receives a DL user data packet associated with a QFI and an RQI the DL user data packet belongs to a PDU session of IPv4 IPv6 IPv4v6 or ethernet PDU session type and the UE has a derived QoS rule with the same packet filter for UL direction as the packet filter for UL direction derived from the DL user data packet as specified in subclause 6.2.5.1.4.2

a) the UE shall re-start the timer T3583 associated with the derived QoS rule with the RQ timer value last received during the UE-requested PDU session establishment procedure of the PDU session (see subclause 6.4.1) or the network-requested PDU session modification procedure of the PDU session (see subclause 6.4.2) if the RQ timer value was received neither in the UE-requested PDU session establishment procedure of the PDU session nor in any network-requested PDU session modification procedure of the PDU session the default standardized RQ timer value is used; and

b) if the QFI value associated with the DL user data packet is different from the QFI value stored for the derived QoS rule the UE shall replace the QFI value stored for the derived QoS rule with the new QFI value for the derived QoS rule

###### 6.2.5.1.4.5 deleting a derived QoS rule in the UE

upon expiry of timer T3583 associated with a derived QoS rule the UE shall remove the derived QoS rule

upon release of the PDU session the UE shall remove the derived QoS rule(s) associated with the PDU session

if the network accepts the request from the UE to revoke the usage of reflective QoS and sets the value of the RQ timer to "deactivated" or zero the UE shall remove the derived QoS rule(s) associated with the PDU session

upon inter-system mobility from WB-N1 mode to NB-N1 mode or from NR connected to 5GCN to NB-N1 mode the UE shall remove the derived QoS rule(s) associated with the PDU session that is kept active

when a derived QoS rule is deleted the timer T3583 associated with the derived QoS rule shall be stopped

###### 6.2.5.1.4.6 ignoring RQI in the UE

if the UE receives a DL user data packet marked with a QFI and an RQI and it is not possible to derive a packet filter for UL direction from the DL user data packet as specified in subclause 6.2.5.1.4.2 the UE shall ignore the RQI and shall handle the received DL user data packet

#### 6.2.5.2 QoS in MA PDU session

in an MA PDU session unless it

a) is established over non-3GPP access; and

b) has a PDN connection as a user-plane resource;

the UE shall have one set of QoS rules one set of QoS flow descriptions and one session-AMBR the network can provide the set of QoS rules the set of QoS flow descriptions and the session-AMBR of the MA PDU session via either access of the MA PDU session in an MA PDU session the UE shall support:-

- modification or deletion via an access of a QoS rule or a QoS flow description; and

- modification via an access of the session-AMBR;

of the MA PDU session created via the same or the other access

in an MA PDU session

a) established over non-3GPP access; and

b) with a PDN connection as a user-plane resource;

the UE shall have two sets of QoS rules two sets of QoS flow descriptions and two session-AMBR values - one is maintained via non-3GPP access and the other is associated with EPS bearer contexts of the PDN connection and maintained via extended protocol configuration options IE parameters received via the PDN connection

### 6.2.6 local area data network (LADN)

the UE can receive the local area data network (LADN) information consisting of LADN DNNs and LADN service area information (a set of tracking areas that belong to the current registration area) during the registration procedure or the generic UE configuration update procedure (see subclause 5.5.1 and subclause 5.4.4)

if the UE supports LADN per DNN and S-NSSAI the UE can additionally receive the extended local area data network (LADN) information consisting of LADN DNNs S-NSSAIs and LADN service area information (a set of tracking areas configured per DNN and S-NSSAI that belong to the current registration area) during the registration procedure or the generic UE configuration update procedure (see subclause 5.5.1 and subclause 5.4.4)

if the UE is not operating in SNPN access operation mode the UE considers the received LADN information or the extended LADN information to be valid only in the TAIs of the registered PLMN that are in the LADN service area information and in the TAIs of the equivalent PLMNs if the LADN service area information includes TAIs for the equivalent PLMNs when the AMF provides the UE with LADN service area information containing TAIs for the equivalent PLMNs the AMF shall include these TAIs of the equivalent PLMNs in the UE's registration area

if the UE is operating in SNPN access operation mode the UE considers the received LADN information or the extended LADN information to be valid only in the TAIs of the registered SNPN that are in the LADN service area information

the LADN DNN(s) received by the UE is also considered as LADN DNN(s) in the equivalent PLMNs

the UE shall consider itself to be located inside the LADN service area based on the LADN service area information if the UE does not have an LADN service area information for the LADN DNN the UE shall consider itself to be located outside the LADN service area

when the UE is located in the LADN service area and the UE is in substate 5GMM-REGISTERED.NORMAL-SERVICE the UE may initiate

- the UE-requested PDU session establishment procedure with an LADN DNN to establish a PDU session for LADN;

- the UE-requested PDU session establishment procedure with an LADN DNN and an S-NSSAI associated with the LADN to establish a PDU session for LADN if the extended LADN information is available at the UE;

- the UE-requested PDU session modification procedure to modify the PDU session for LADN;

- the service request procedure to re-establish the user-plane resources for the PDU session for LADN; or

- the service request procedure or the UE-initiated NAS transport procedure to send CIoT user data via the control plane for a PDU session for LADN

NOTE 1 if the service area list for the service area restrictions is available in the UE and at least one of the LADN information or the extended LADN information are available in the UE the service area list is evaluated before the LADN information and extended LADN information

NOTE 1A if the partially allowed NSSAI the partially rejected NSSAI or both are available in the UE and at least one of the LADN information or the extended LADN information are available in the UE the UE evaluates the partially allowed NSSAI and the partially rejected NSSAI before the LADN information and extended LADN information

when the UE is located outside the LADN service area the UE is allowed

- to initiate the UE-requested PDU session release procedure to release a PDU session for LADN; or

- to initiate the UE-requested PDU session modification procedure to indicate a change of 3GPP PS data off UE status

the AMF shall determine the UE presence in LADN service area as out of the LADN service area in the following cases

- if the DNN used for the LADN is included in the LADN information and the UE is located outside the LADN service area indicated in the LADN information;

- if the DNN and the S-NSSAI used for the LADN are included in the extended LADN information and the UE is located outside the LADN service area indicated in the extended LADN information;

- if the DNN used for the LADN is included in the extended LADN information and there is no S-NSSAI provided by the UE to establish a PDU session for LADN; or

- if the DNN used for the LADN is included in the extended LADN information and the S-NSSAI provided by the UE to establish a PDU session for LADN is not associated with that LADN

if the UE has moved out of the LADN service area

a) the SMF shall

1) release the PDU session for LADN; or

2) release the user-plane resources for the PDU session for LADN and maintain the PDU session for LADN;

according to operator's policy; and

b) the SMF shall not initiate the transfer of CIoT user data via the control plane to the UE for the PDU session for LADN

in case a2) and b)

- if the UE has returned to the LADN service area within a specific period of time according to operator's policy and the network has downlink user data pending the network re-establishes the user-plane resources for the PDU session for LADN;

- if the UE has returned to the LADN service area within a specific period of time according to operator's policy and the network has downlink CIoT user data pending the SMF shall initiate the CIoT user data via the control plane transfer to the UE; and

- if the UE has not returned to the LADN service area after a specific period of time according to operator's policy the SMF may release the PDU session for LADN

when the UE moves to 5GMM-DEREGISTERED state the UE shall delete the stored LADN information if any and the stored extended LADN information if any

NOTE 2 in this release LADNs apply only to 3GPP access

upon inter-system change from N1 mode to S1 mode in EMM-IDLE mode the UE shall not transfer a PDU session for LADN to EPS

if

a) the UE supports LADN per DNN and S-NSSAI;

b) the UE has a PDU session established using the DNN and S-NSSAI which are not associated with any LADN service area indicated in the extended LADN information;

c) an LADN service area is configured in the extended LADN information which is associated with the DNN and S-NSSAI of the PDU session; and

d) the AMF determines the UE presence in LADN service area as out of the LADN service area configured in the extended LADN information;

the AMF requests the SMF to release this PDU session as specified in 3GPP TS 23.502 [9]

if

a) the UE supports LADN per DNN and S-NSSAI;

b) the UE has a PDU session for LADN established; and

c) the AMF determines that the LADN service area associated with the DNN and S-NSSAI of the PDU session for LADN is removed from the extended LADN information;

the AMF requests the SMF to release this PDU session as specified in 3GPP TS 23.502 [9]

### 6.2.7 handling of DNN based congestion control

the network may detect and start performing DNN based congestion control when one or more DNN congestion criteria as specified in 3GPP TS 23.501 [8] are met if the UE does not provide a DNN for a non-emergency PDU session then the network uses the selected DNN

in the UE 5GS session management timers T3396 for DNN based congestion control are started and stopped on a per DNN basis except for an LADN DNN in case of PLMN for an LADN DNN 5GS session management timers T3396 for DNN based congestion control is applied to the registered PLMN and its equivalent PLMNs in case of SNPN if the UE does not support access to an SNPN using credentials from a credentials holder and equivalent SNPNs in the UE 5GS session management timers T3396 for DNN based congestion control are started and stopped on a per DNN and SNPN basis if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both in the UE 5GS session management timers T3396 for DNN based congestion control are started and stopped on a per DNN SNPN and selected entry of the "list of subscriber data" or selected PLMN subscription basis upon receipt of a 5GMM message or 5GSM message from the network for which the UE needs to stop the running timers T3396 associated with an LADN DNN as specified in subclause 6.3.2.3 6.3.3.3 6.4.1.4.2 and 6.4.2.4.2 only the running timer T3396 which is associated with the PLMN and equivalent PLMNs where the timer was started is stopped

in an SNPN if the UE supports equivalent SNPNs the UE applies the timer T3396 for all the equivalent SNPNs otherwise the UE applies the timer T3396 for the registered SNPN

the DNN associated with T3396 is the DNN provided by the UE during the PDU session establishment if no DNN is provided by the UE along the PDU SESSION ESTABLISHMENT REQUEST then T3396 is associated with no DNN for this purpose the UE shall memorize the DNN provided to the network during the PDU session establishment the timer T3396 associated with no DNN will never be started due to any 5GSM procedure related to an emergency PDU session if the timer T3396 associated with no DNN is running it does not affect the ability of the UE to request an emergency PDU session

in a PLMN if T3396 is running or is deactivated then the UE is not allowed to initiate the

a) PDU session establishment procedure;

b) PDU session modification procedure; or

c) NAS transport procedure for sending CIoT user data;

for the respective DNN or without a DNN unless the UE is a UE configured for high priority access in selected PLMN or to report a change of 3GPP PS data off UE status

in an SNPN if T3396 is running or is deactivated for the registered SNPN is associated with a DNN or with no DNN with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder with the selected entry of the "list of subscriber data" or the selected PLMN subscription then the UE is not allowed to initiate the

a) PDU session establishment procedure; or

b) PDU session modification procedure;

for the respective DNN or without a DNN unless the UE is a UE configured for high priority access in the RSNPN or to report a change of 3GPP PS data off UE status

in an SNPN if the UE supports equivalent SNPNs the timer T3396 is running or is deactivated for all the equivalent SNPNs is associated with a DNN or no DNN with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription then the UE is not allowed to initiate the

a) PDU session establishment procedure; or

b) PDU session modification procedure;

for the respective DNN or without a DNN unless the UE is a UE configured for high priority access in selected SNPN or to report a change of 3GPP PS data off UE status

if the network does not include timer T3396 with 5GSM cause #26 "insufficient resources" the UE may use a local back-off timer that has exponential value or a default value which is provisioned using implementation specific means to:a) prevent sending any 5GSM procedure for the respective DNN till its expiry; and

b) allow sending any 5GSM procedure for the respective DNN after its expiry

### 6.2.8 handling of S-NSSAI based congestion control

the network may detect and start performing S-NSSAI based congestion control when one or more S-NSSAI congestion criteria as specified in 3GPP TS 23.501 [8] are met if the UE does not provide a DNN for a non-emergency PDU session then the network uses the selected DNN if the UE does not provide an S-NSSAI for a non-emergency PDU session then the network uses the selected S-NSSAI

in case of PLMN or SNPN in the UE 5GS session management timers T3584 for the S-NSSAI based congestion control are started and stopped on a per S-NSSAI DNN and PLMN or SNPN basis if the 5GSM congestion re-attempt indicator IE with the ABO bit set to "The back-off timer is applied in all PLMNs or equivalent SNPNs " is included in the 5GSM message with the 5GSM cause value #67 "insufficient resources for specific slice and DNN" then the UE applies the timer T3584 for all the PLMNs or all the equivalent SNPNs otherwise the UE applies the timer T3584 for the registered PLMN or the registered SNPN if the timer T3584 applies for all the PLMNs or all the equivalent SNPNs the timer T3584 starts when the UE is registered in a VPLMN or an unsubscribed SNPN and the S-NSSAI is provided by the UE during the PDU session establishment the timer T3584 is associated with the [mapped S-NSSAI DNN] combination of the PDU session

in case of PLMN or SNPN in the UE 5GS session management timers T3585 for the S-NSSAI based congestion control are started and stopped on a per S-NSSAI and PLMN or SNPN basis if the 5GSM congestion re-attempt indicator IE with the ABO bit set to "The back-off timer is applied in all PLMNs or all equivalent SNPNs " is included in the 5GSM message with the 5GSM cause value #69 "insufficient resources for specific slice" then the UE applies the timer T3585 for all the PLMNs or all the equivalent SNPNs otherwise the UE applies the timer T3585 for the registered PLMN or registered SNPN if the timer T3585 applies for all the PLMNs or all the equivalent SNPNs the timer T3585 starts when the UE is registered in a VPLMN or an unsubscribed SNPN and the S-NSSAI is provided by the UE during the PDU session establishment the timer T3585 is associated with the mapped S-NSSAI of the PDU session additionally if the 5GSM congestion re-attempt indicator IE with the CATBO bit set to "The back-off timer is applied in the current access type" is included in the 5GSM message with the 5GSM cause value #69 "insufficient resources for specific slice" then the UE applies the timer T3585 for the current access type otherwise the UE applies the timer T3585 for both 3GPP access type and non-3GPP access type and the UE shall stop any running timer T3585 for the applied PLMN or SNPN and for the access different from the access from which the message is received

in case of SNPN if the UE does not support access to an SNPN using credentials from a credentials holder and equivalent SNPNs in the UE 5GS session management timers T3584 for the S-NSSAI based congestion control are started and stopped on a per S-NSSAI DNN and SNPN basis if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both in the UE 5GS session management timers T3584 for the S-NSSAI based congestion control are started and stopped on a per S-NSSAI DNN SNPN and selected entry of the "list of subscriber data" or selected PLMN subscription basis

in case of SNPN if the UE does not support access to an SNPN using credentials from a credentials holder and equivalent SNPNs in the UE 5GS session management timers T3585 for the S-NSSAI based congestion control are started and stopped on a per S-NSSAI and SNPN basis if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both in the UE 5GS session management timers T3585 for the S-NSSAI based congestion control are started and stopped on a per S-NSSAI SNPN and selected entry of the "list of subscriber data" or selected PLMN subscription basis

if the timer T3584 or timer T3585 was provided during the PDU session establishment procedure the S-NSSAI associated with T3584 or T3585 respectively is the S-NSSAI including no S-NSSAI provided by the UE during the PDU session establishment

if the timer T3584 is provided during the PDU session modification or PDU session release procedure the UE behaves as follows the DNN associated with T3584 is the DNN provided by the UE during the PDU session establishment if no S-NSSAI but DNN is provided by the UE along the PDU SESSION ESTABLISHMENT REQUEST message then T3584 is associated with no S-NSSAI and the DNN provided to the network during the PDU session establishment if the PDN connection was established when in the S1 mode then T3584 is associated with no S-NSSAI if no DNN but S-NSSAI is provided by the UE along the PDU SESSION ESTABLISHMENT REQUEST message then T3584 is associated with no DNN and the S-NSSAI of the PDU session if no DNN and no S-NSSAI is provided by the UE along the PDU SESSION ESTABLISHMENT REQUEST message then T3584 is associated with no DNN and no S-NSSAI for this purpose the UE shall memorize the DNN and the S-NSSAI provided to the network during the PDU session establishment the timer T3584 associated with no DNN and an S-NSSAI will never be started due to any 5GSM procedure related to an emergency PDU session if the timer T3584 associated with no DNN and an S-NSSAI is running it does not affect the ability of the UE to request an emergency PDU session

if the timer T3585 was provided during the PDU session modification or PDU session release procedure the UE behaves as follows if an S-NSSAI was provided by the UE during the PDU session establishment then T3585 is associated with the S-NSSAI of the PDU session if no S-NSSAI is provided by the UE along the PDU SESSION ESTABLISHMENT REQUEST message then T3585 is associated with no S-NSSAI if the PDN connection was established when in the S1 mode then T3585 is associated with no S-NSSAI

if T3584 is running or is deactivated then the UE is not allowed to initiate the

a) PDU session establishment procedure;

b) PDU session modification procedure; or

c) NAS transport procedure for sending CIoT user data;

for the respective [S-NSSAI no DNN] or [S-NSSAI DNN] combination unless the UE is a UE configured for high priority access in selected PLMN or SNPN or to report a change of 3GPP PS data off UE status

in a PLMN if the timer T3584 is running or is deactivated for all the PLMNs and is associated with an S-NSSAI other than no S-NSSAI then

a) the UE registered in the HPLMN is not allowed to initiate the

1) PDU session establishment procedure;

2) PDU session modification procedure; or

3) NAS transport procedure for sending CIoT user data;

when the [S-NSSAI no DNN] or [S-NSSAI DNN] combination provided by the UE during the PDU session establishment is the same as the [S-NSSAI no DNN] or [S-NSSAI DNN] combination associated with the timer T3584 unless the UE is a UE configured for high priority access in selected PLMN or to report a change of 3GPP PS data off UE status; and

b) the UE registered in a VPLMN is not allowed to initiate the

1) PDU session establishment procedure;

2) PDU session modification procedure; or

3) NAS transport procedure for sending CIoT user data;

when the [mapped S-NSSAI no DNN] or [mapped S-NSSAI DNN] combination provided by the UE during the PDU session establishment is the same as the [S-NSSAI no DNN] or [S-NSSAI DNN] combination associated with the timer T3584 unless the UE is a UE configured for high priority access in selected PLMN or to report a change of 3GPP PS data off UE status

in a PLMN if the timer T3584 is running or is deactivated for all the PLMNs and is associated with [no S-NSSAI no DNN] or [no S-NSSAI DNN] combination then the UE is not allowed to initiate the

a) PDU session establishment procedure;

b) PDU session modification procedure; or

c) NAS transport procedure for sending CIoT user data;

for [no S-NSSAI no DNN] or [no S-NSSAI DNN] combination in any PLMN unless the UE is a UE configured for high priority access in selected PLMN or to report a change of 3GPP PS data off UE status

in an SNPN if the UE supports equivalent SNPNs the timer T3584 is running or is deactivated for all the equivalent SNPNs is associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription with an S-NSSAI other than no S-NSSAI and with the RSNPN or an equivalent SNPN

a) the UE registered in the subscribed SNPN is not allowed to initiate the

1) PDU session establishment procedure; or

2) PDU session modification procedure;

when the [S-NSSAI no DNN] or [S-NSSAI DNN] combination provided by the UE during the PDU session establishment is the same as the [S-NSSAI no DNN] or [S-NSSAI DNN] combination associated with the timer T3584 unless the UE is a UE configured for high priority access in the RSNPN or to report a change of 3GPP PS data off UE status; and

b) the UE registered in a non-subscribed is not allowed to initiate the

1) PDU session establishment procedure; or

2) PDU session modification procedure;

when the [mapped S-NSSAI no DNN] or [mapped S-NSSAI DNN] combination provided by the UE during the PDU session establishment is the same as the [S-NSSAI no DNN] or [S-NSSAI DNN] combination associated with the timer T3584 unless the UE is a UE configured for high priority access in RSNPN or to report a change of 3GPP PS data off UE status

in an SNPN if the UE supports equivalent SNPNs the timer T3584 is running or is deactivated for all the equivalent SNPNs is associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription with [no S-NSSAI no DNN] or [no S-NSSAI DNN] combination and with the RSNPN or an equivalent SNPN then the UE is not allowed to initiate the

a) PDU session establishment procedure; or

b) PDU session modification procedure;

for [no S-NSSAI no DNN] or [no S-NSSAI DNN] combination unless the UE is a UE configured for high priority access in the RSPN or to report a change of 3GPP PS data off UE status

if T3585 is running or is deactivated then the UE is neither allowed to initiate the PDU session establishment procedure nor the PDU session modification procedure for the respective S-NSSAI unless the UE is a UE configured for high priority access in selected PLMN or SNPN or to report a change of 3GPP PS data off UE status

in a PLMN if the timer T3585 is running or is deactivated for all the PLMNs and is associated with an S-NSSAI other than no S-NSSAI then

a) the UE registered in the HPLMN is not allowed to initiate the

1) PDU session establishment procedure;

2) PDU session modification procedure; or

3) NAS transport procedure for sending CIoT user data;

when the S-NSSAI provided by the UE during the PDU session establishment is the same as the S-NSSAI associated with timer T3585 unless the UE is a UE configured for high priority access in selected PLMNs or to report a change of 3GPP PS data off UE status; and

b) the UE registered in a VPLMN is not allowed to initiate the

1) PDU session establishment procedure;

2) PDU session modification procedure; or

3) NAS transport procedure for sending CIoT user data;

when the mapped S-NSSAI provided by the UE during the PDU session establishment is the same as the S-NSSAI associated the timer T3585 unless the UE is a UE configured for high priority access in selected PLMN or to report a change of 3GPP PS data off UE status

in a PLMN if the timer T3585 is running or is deactivated for all the PLMNs and is associated with no S-NSSAI then the UE is not allowed to initiate the

a) PDU session establishment procedure;

b) PDU session modification procedure;

c) NAS transport procedure for sending CIoT user data;

for no S-NSSAI in any PLMN unless the UE is a UE configured for high priority access in selected PLMN or to report a change of 3GPP PS data off UE status.In an SNPN if the UE supports equivalent SNPNs the timer T3585 is running or is deactivated for all the equivalent SNPNs is associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription with an S-NSSAI other than no S-NSSAI and with the RSNPN or an equivalent SNPN

a) the UE registered in the subscribed SNPN is not allowed to initiate the

1) PDU session establishment procedure; or

2) PDU session modification procedure;

when the S-NSSAI provided by the UE during the PDU session establishment is the same as the S-NSSAI associated with timer T3585 unless the UE is a UE configured for high priority access in the RSNPN or to report a change of 3GPP PS data off UE status; and

b) the UE registered in a non-subscribed SNPN is not allowed to initiate the

1) PDU session establishment procedure; or

2) PDU session modification procedure;

when the mapped S-NSSAI provided by the UE during the PDU session establishment is the same as the S-NSSAI associated the timer T3585 unless the UE is a UE configured for high priority access in the RSNPN or to report a change of 3GPP PS data off UE status

in an SNPN if the UE supports equivalent SNPNs the timer T3585 is running or is deactivated for all the equivalent SNPNs is associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription with no S-NSSAI and with the RSNPN or an equivalent SNPN then the UE is not allowed to initiate the

a) PDU session establishment procedure; or

b) PDU session modification procedure;

for no S-NSSAI unless the UE is a UE configured for high priority access in RSNPN or to report a change of 3GPP PS data off UE status

if the network does not include timer T3584 with 5GSM cause #67 "insufficient resources for specific slice and DNN" the UE may use a local back-off timer that has exponential value or a default value which is provisioned using implementation specific means to:a) prevent sending any 5GSM procedure for the respective DNN and S-NSSAI till its expiry; andb) allow sending any 5GSM procedure for the respective DNN and S-NSSAI after its expiry

if the network does not include timer T3585 with 5GSM cause #69 "insufficient resources for specific slice" the UE may use a local back-off timer that has exponential value or a default value which is provisioned using implementation specific means to:a) prevent sending any 5GSM procedure for the respective S-NSSAI till its expiry; and

b) allow sending any 5GSM procedure for the respective S-NSSAI after its expiry

### 6.2.9 interaction with upper layers

#### 6.2.9.1 general

a 5GSM entity interacts with upper layers subclause 6.2.9.2 describes how the 5GSM entity interacts with upper layers with respect to the URSP subclause 6.2.9.3 describes how the 5GSM entity interacts with upper layers with respect to the ProSeP

#### 6.2.9.2 URSP

the URSP requires interaction between upper layers and the 5GSM entities in the UE (see 3GPP TS 24.526 [19] for further details) each of the 5GSM entities in the UE shall indicate attributes (e.g PDU session identity SSC mode S-NSSAI DNN PDU session type access type PDU address) of a newly established PDU session to the upper layers if a PDU session is released the 5GSM entity handling the PDU session shall inform the PDU session identity of the released PDU session to the upper layers the upper layers may request a 5GSM entity

a) to establish a PDU session indicating one or more PDU session attributes;

b) to release an existing PDU session; or

c) to establish a PDU session indicating one or more PDU session attributes and to release an existing PDU session

#### 6.2.9.3 ProSeP

the ProSeP requires interaction between upper layers and the 5GSM entities in the UE acting as a 5G ProSe layer-3 UE-to-network relay UE (see 3GPP TS 24.554 [19E] for further details) the upper layers may request the 5GSM entity

a) to establish a PDU session indicating one or more PDU session attributes; or

b) to release the existing PDU session; or

c) to establish a PDU session indicating one or more PDU session attributes and to release the existing PDU session

each of the 5GSM entities in the UE acting as a 5G ProSe layer-3 UE-to-network relay UE shall indicate attributes (e.g PDU session identity SSC mode S-NSSAI DNN PDU session type access type PDU address) of the newly established PDU session to the upper layers if the PDU session is released the 5GSM entity handling the PDU session shall inform the PDU session identity of the released PDU session to the upper layers

### 6.2.10 handling of 3GPP PS data off

in case of PLMN a UE which supports 3GPP PS data off (see 3GPP TS 23.501 [8]) can be configured with up to two lists of 3GPP PS data off exempt services as specified in 3GPP TS 24.368 [17] or in the EF3GPPPSDATAOFF USIM file as specified in 3GPP TS 31.102 [22]

a) a list of 3GPP PS data off exempt services to be used in the HPLMN or EHPLMN; and

b) a list of 3GPP PS data off exempt services to be used in the VPLMN

if only the list of 3GPP PS data off exempt services to be used in the HPLMN or EHPLMN is configured at the UE this list shall be also used in the VPLMN

in case of SNPN a UE which supports 3GPP PS data off (see 3GPP TS 23.501 [8]) can be configured with

a) up to two lists of 3GPP PS data off exempt services as specified in 3GPP TS 24.368 [17] for each subscribed SNPN whose entry exists in the "list of subscriber data"

1) a list of 3GPP PS data off exempt services to be used in the subscribed SNPN; and

2) a list of 3GPP PS data off exempt services to be used in the non-subscribed SNPN; and

b) one list of 3GPP PS data off exempt services as specified in 3GPP TS 24.368 [17] for PLMN subscription

1) a list of 3GPP PS data off exempt services to be used in the non-subscribed SNPN

if only the list of 3GPP PS data off exempt services to be used in the subscribed SNPN is configured for the selected entry of "list of subscriber data" this list shall be also used in the non-subscribed SNPN

if the UE supports 3GPP PS data off the UE shall provide the 3GPP PS data off UE status in the extended protocol configuration options IE during UE-requested PDU session establishment procedure except for the transfer of a PDU session from non-3GPP access to 3GPP access and except for the establishment of user plane resources on the other access for the MA PDU session(see subclause 6.4.1) and during UE-requested PDU session modification procedure (see subclause 6.4.2) regardless of associated access type of the PDU session if the UE requests a PDU session establishment procedure in order to transfer a PDU session from non-3GPP access to 3GPP access or in order to establish user plane resources on the other access for the MA PDU session over 3GPP access or non-3GPP access and

a) if the 3GPP PS data off UE status has changed since the last providing to the network the UE shall provide the 3GPP PS data off UE status in the extended protocol configuration options IE; or

b) if the 3GPP PS data off UE status has not changed since the last providing to the network the UE need not provide the 3GPP PS data off UE status

the network shall support of 3GPP PS data off

the UE shall indicate change of the 3GPP PS data off UE status for the PDU session by using the UE-requested PDU session modification procedure as specified in subclause 6.4.2

when the 3GPP PS data off UE status is "activated"

a) the UE does not send uplink IP packets via 3GPP access except

1) for those services indicated in the list of 3GPP PS data off exempt services to be used in the HPLMN or EHPLMN as specified in 3GPP TS 24.368 [17] when the UE is in its HPLMN or EHPLMN;

2) for those services indicated in the list of 3GPP PS data off exempt services to be used in the subscribed SNPN configured for the selected entry of "list of subscriber data" as specified in 3GPP TS 24.368 [17] when the UE is in the subscribed SNPN;

3) for those services indicated in the list of 3GPP PS data off exempt services to be used in the HPLMN or EHPLMN when the UE is in the VPLMN if only the list of 3GPP PS data off exempt services to be used in the HPLMN or EHPLMN is configured to the UE as specified in 3GPP TS 24.368 [17];

4) for those services indicated in the list of 3GPP PS data off exempt services to be used in the subscribed SNPN configured for the selected entry of "list of subscriber data" when the UE is in a non-subscribed SNPN and only the list of 3GPP PS data off exempt services to be used in the subscribed SNPN is configured for the selected entry of "list of subscriber data" as specified in 3GPP TS 24.368 [17];

5) for those services indicated in the list of 3GPP PS data off exempt services to be used in the VPLMN when the UE is in the VPLMN if the list of 3GPP PS data off exempt services to be used in the VPLMN is configured to the UE as specified in 3GPP TS 24.368 [17];

6) for those services indicated in the list of 3GPP PS data off exempt services to be used in the non-subscribed SNPN configured for the selected entry of "list of subscriber data" when the UE is in a non-subscribed SNPN and the list of 3GPP PS data off exempt services to be used in the non-subscribed SNPN is configured for the selected entry of "list of subscriber data" as specified in 3GPP TS 24.368 [17];

7) for those services indicated in the list of 3GPP PS data off exempt services to be used in the non-subscribed SNPN configured for the selected PLMN subscription when the UE is in the non-subscribed SNPN and the list of 3GPP PS data off exempt services to be used in the non-subscribed SNPN is configured for the selected PLMN subscription as specified in 3GPP TS 24.368 [17];

8) for those services indicated in the EF3GPPPSDATAOFF USIM file as specified in 3GPP TS 31.102 [22];

9) any uplink traffic due to procedures specified in 3GPP TS 24.229 [14]; and

10) any uplink traffic due to procedures specified in 3GPP TS 24.623 [20];

b) the UE does not send uplink ethernet user data packets via 3GPP access; and

c) the UE does not send uplink unstructured user data packets via 3GPP access

otherwise the UE sends uplink user data packets without restriction

NOTE if the UE supports 3GPP PS data off uplink IP packets are filtered as specified in 3GPP TS 24.229 [14] in U.3.1.5

3GPP PS data off does not restrict sending of uplink user data packets via non-3GPP access of a single access PDU session or an MA PDU session

### 6.2.11 Multi-homed IPv6 PDU session

the UE supporting IPv6 may support multi-homed IPv6 PDU session

if the UE supports the multi-homed IPv6 PDU session

a) the UE shall support acting as a type c host as specified in IETF RFC 4191 [36]; and

b) the UE indicates support of the multi-homed IPv6 PDU session

1) during the UE-requested PDU session establishment of a PDU session of "IPv6" or "IPv4v6" PDU session type; and

2) during the UE-requested PDU session modification performed after an inter-system change from S1 mode to N1 mode for a PDU session associated with a PDN connection established when in S1 mode if the UE is a UE operating in single-registration mode in a network supporting N26 interface the PDU session is of "IPv6" or "IPv4v6" PDU session type and the UE has not previously successfully performed the UE-requested PDU session modification to provide this indication

### 6.2.12 handling of network rejection not due to congestion control

the network may include a back-off timer value in a 5GS session management reject message to regulate the time interval at which the UE may retry the same procedure for 5GSM cause values other than #26 "insufficient resources" #28 "unknown PDU session type" #39 "reactivation requested" #46 "out of LADN service area" #50 "PDU session type IPv4 only allowed" #51 "PDU session type IPv6 only allowed" #54 "PDU session does not exist" #57 "PDU session type IPv4v6 only allowed" #58 "PDU session type unstructured only allowed" #61 "PDU session type ethernet only allowed" #67 "insufficient resources for specific slice and DNN" #68 "not supported SSC mode" and #69 "insufficient resources for specific slice" for 5GSM cause values other than #26 "insufficient resources" #28 "unknown PDU session type" #39 "reactivation requested" #46 "out of LADN service area" #54 "PDU session does not exist" #67 "insufficient resources for specific slice and DNN" #68 "not supported SSC mode" and #69 "insufficient resources for specific slice" and #86 "UAS services not allowed" the network may also include the re-attempt indicator to indicate whether the UE is allowed to re-attempt the corresponding session management procedure for the same DNN in S1 mode after inter-system change

NOTE 1 in a PLMN if the network includes this back-off timer value for 5GSM cause values other than #27 "missing or unknown DNN" then the UE is blocked from sending another 5GSM request for the same procedure for the same [PLMN DNN S-NSSAI] [PLMN DNN no S-NSSAI] [PLMN no DNN S-NSSAI] or [PLMN no DNN no S-NSSAI] combination for the specified duration if the network includes this back-off timer value for 5GSM cause value #27 "missing or unknown DNN" then the UE is blocked from sending another 5GSM request for the same procedure for the same [PLMN DNN] or [PLMN no DNN] combination for the specified duration in an SNPN if the network includes this back-off timer value for 5GSM cause values other than #27 "missing or unknown DNN" then the UE is blocked from sending another 5GSM request for the same procedure for the same [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription DNN S-NSSAI] [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription DNN no S-NSSAI] [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription no DNN S-NSSAI] or [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription no DNN no S-NSSAI] combination for the specified duration if the network includes this back-off timer value for 5GSM cause value #27 "missing or unknown DNN" then the UE is blocked from sending another 5GSM request for the same procedure for the same [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription DNN] or [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription no DNN] combination for the specified duration therefore the operator needs to exercise caution in determining the use of this timer value

NOTE 2 if the re-attempt indicator is not provided by the network a UE registered in its HPLMN or in an EHPLMN can use the configured SM\_RetryAtRATChange value specified in the NAS configuration MO or in the USIM NASCONFIG file to derive the re-attempt indicator as specified in subclauses 6.4.1.4.3 and 6.4.2.4.3

if re-attempt in S1 mode is allowed for 5GSM cause values other than #27 "missing or unknown DNN" the UE shall consider the back-off timer to be applicable only to the 5GS session management in N1 mode for the rejected 5GS session management procedure and the given [PLMN DNN S-NSSAI] [PLMN DNN no S-NSSAI] [PLMN no DNN S-NSSAI] or [PLMN no DNN no S-NSSAI] combination if re-attempt in S1 mode is allowed for 5GSM cause value #27 "missing or unknown DNN" the UE shall consider the back-off timer to be applicable only to the 5GS session management in N1 mode for the rejected 5GS session management procedure and the given [PLMN DNN] or [PLMN no DNN] combination.If re-attempt in S1 mode is not allowed the UE shall consider the back-off timer to be applicable to both NAS protocols i.e applicable to the 5GS session management in N1 mode for the rejected 5GS session management procedure and to the EPS session management in S1 mode for the corresponding session management procedure and the given [PLMN DNN] or [PLMN no DNN] combination

NOTE 3 in the present subclause the terms DNN and APN are referring to the same parameter

in a PLMN if the back-off timer was provided during the PDU session establishment procedure the UE behaves as follows for 5GSM cause values other than #27 "missing or unknown DNN" when the UE is registered in a HPLMN the DNN and the S-NSSAI of the [PLMN DNN S-NSSAI] combination associated with the back-off timer is the DNN and the S-NSSAI provided by the UE when the PDU session is established when the UE is registered in a VPLMN the DNN and the S-NSSAI of the [PLMN DNN S-NSSAI] combination associated with the back-off timer is the DNN and the mapped S-NSSAI provided by the UE when the PDU session is established for 5GSM cause value #27 "missing or unknown DNN" the DNN of the [PLMN DNN] combination associated with the back-off timer is the DNN provided by the UE when the PDU session is established if no DNN or no S-NSSAI was provided to the network during the PDU session establishment then the back-off timer is associated with the [PLMN DNN no S-NSSAI] [PLMN no DNN S-NSSAI] or [PLMN no DNN no S-NSSAI] combination dependent on which parameters were provided for 5GSM cause values other than #27 "missing or unknown DNN" if no DNN was provided to the network during the PDU session establishment then the back-off timer is associated with the [PLMN no DNN] combination for 5GSM cause value #27 "missing or unknown DNN" for this purpose the UE shall memorize the DNN and the S-NSSAI provided to the network during the PDU session establishment

in a PLMN if the back-off timer was provided during the PDU session modification procedure the UE behaves as follows the DNN associated with the back-off timer is the DNN including no DNN provided by the UE when the PDU session is established if an S-NSSAI was provided by the UE during the PDU session establishment when the UE is registered in a HPLMN then the S-NSSAI associated with the back-off timer is the S-NSSAI of the PDU session if an S-NSSAI was provided by the UE during the PDU session establishment when the UE is registered in a VPLMN then the S-NSSAI associated with the back-off timer is the mapped S-NSSAI of the PDU session if no S-NSSAI was provided by the UE during the PDU session establishment then the back-off timer is associated with no S-NSSAI for this purpose the UE shall memorize the DNN and the S-NSSAI provided to the network during the PDU session establishment

in a PLMN the back-off timer associated with the [PLMN no DNN no S-NSSAI] or [PLMN no DNN] combination will never be started due to any 5GSM procedure related to an emergency PDU session if the back-off timer associated with the [PLMN no DNN no S-NSSAI] or [PLMN no DNN] combination is running it does not affect the ability of the UE to request an emergency PDU session

in an SNPN the back-off timer associated with the [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription no DNN no S-NSSAI] or [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription no DNN] combination will never be started due to any 5GSM procedure related to an emergency PDU session if the back-off timer associated with the back-off timer associated with the [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription no DNN no S-NSSAI] or [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription no DNN] combination it does not affect the ability of the UE to request an emergency PDU session

in a PLMN the network may additionally indicate in the re-attempt indicator that a command to back-off is applicable not only for the PLMN in which the UE received the 5GS session management reject message but for each PLMN included in the equivalent PLMN list at the time when the 5GS session management reject message was received

in an SNPN the network may additionally indicate in the re-attempt indicator that a command to back-off is applicable not only for the SNPN in which the UE received the 5GS session management reject message but for each SNPN included in the equivalent SNPN list at the time when the 5GS session management reject message was received

in a PLMN if the back-off timer is running or is deactivated for a given [PLMN DNN S-NSSAI] [PLMN DNN no S-NSSAI] [PLMN no DNN S-NSSAI] [PLMN no DNN no S-NSSAI] [PLMN DNN] or [PLMN no DNN] combination and the UE is a UE configured for high priority access in selected PLMN then the UE is allowed to initiate 5GSM procedures for the [PLMN DNN S-NSSAI] [PLMN DNN no S-NSSAI] [PLMN no DNN S-NSSAI] [PLMN no DNN no S-NSSAI] [PLMN DNN] or [PLMN no DNN] combination

in an SNPN if the back-off timer is running or is deactivated for a given [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription DNN S-NSSAI] [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription DNN no S-NSSAI] [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription no DNN S-NSSAI] [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription no DNN no S-NSSAI] [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription DNN] or [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription no DNN] combination if the UE is a UE configured for high priority access in selected SNPN then the UE is allowed to initiate 5GSM procedures for the [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription DNN S-NSSAI] [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription DNN no S-NSSAI] [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription no DNN S-NSSAI] [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription no DNN no S-NSSAI] [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription DNN] or [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription no DNN] combination

the RATC bit in the re-attempt indicator IE and its derivation shall not be applicable in an SNPN

if the network does not include a back-off timer with 5GSM cause #29 "user authentication or authorization failed" #31 "request rejected unspecified" and #38 "network failure" the UE may use a local back-off timer that has exponential value or a default value which is provisioned using implementation specific means to

a) prevent sending the rejected 5GSM procedure for the respective DNN till its expiry; and

b) allow sending the rejected 5GSM procedure for the respective DNN after its expiry

### 6.2.13 handling of small data rate control

small data rate control is applicable only to NB-N1 mode and WB-N1 mode

small data rate control controls the maximum number of uplink user data messages including uplink exception data reporting sent by the UE in a time interval for the PDU session in accordance with 3GPP TS 23.501 [8] the UE shall limit the rate at which it generates uplink user data messages to comply with the small data rate control policy the NAS shall provide the indicated rates to upper layers for enforcement the indicated rates in a NAS procedure applies to the PDU session the NAS procedure corresponds to and the indicated rates are valid until a new value is indicated or the PDU session is released

if the UE indicates support for CIoT 5GS optimizations the network may provide the small data rate control parameters to the UE and may provide the small data rate control parameters for exception data to the UE if and only if the small data rate control parameters is provided to the UE small data rate control parameters and small data rate control parameters for exception data can also be provided to the UE in S1 mode as specified in 3GPP TS 24.301 [15]

if an allowed indication of additional exception reports is provided with the small data rate control parameters and

- the additional small data rate control parameters for exception data is provided and the limit for additional rate for exception data reporting is not reached; or

- the additional small data rate control parameters for exception data is not provided

the UE is allowed to send uplink exception reports even if the limit for the small data rate control has been reached

during a PDU session release procedure if the small data rate control was applied to the PDU session that is being released the network may store the small data rate control status for the released PDU session as specified in 3GPP TS 23.501 [8]

if

a) the UE indicates support for CIoT 5GS optimizations; and

b) the small data rate control status was stored for the PDU session and is still valid

the network may provide the remaining small data rate control status as initial small data rate control parameters to the UE and initial small data rate control parameters for exception data to the UE during a subsequent PDU session establishment procedure

if received during the establishment of a PDU session the UE shall apply the initial small data rate control parameters and the initial small data rate control parameters for exception data for the duration of the validity period when the validity period expires the small data rate control parameters and the small data rate control parameters for exception data shall be applied (see 3GPP TS 23.501 [8])

NOTE 1 the HPLMN can discard or delay user data that exceeds the limit provided for small data rate control

upon inter-system change from N1 mode to S1 mode the UE shall store the current small data rate control status for PDU sessions to be transferred from N1 mode to S1 mode as specified in 3GPP TS 23.501 [8]

NOTE 2 how long the UE stores the current small data rate control status is implementation specific

upon inter-system change from S1 mode to N1 mode the UE shall use the stored small data rate control status if any to comply with the small data rate control policy for PDU sessions transferred from S1 mode to N1 mode as specified in 3GPP TS 23.501 [8] if the validity period of the stored small data rate control status has not expired

### 6.2.14 handling of serving PLMN rate control

serving PLMN rate control is applicable only for PDU sessions established for control plane CIoT 5GS optimization

serving PLMN rate control protect its AMF from the load generated by user data over control plane

the SMF can inform the UE of any local serving PLMN rate control during the PDU session establishment procedure (see subclause 6.4.1) or the PDU session modification procedure (see subclause 6.4.2) if serving PLMN rate control is enabled the SMF shall start the serving PLMN rate control for the PDU session when the first control plane user data is received over the PDU session.The UE shall limit the rate at which it generates uplink control plane user data to comply with the serving PLMN policy provided by the network the indicated rate in a NAS procedure applies to the PDU session the NAS procedure corresponds to and the indicated rate is valid until the PDU session is released

any serving PLMN rate control information provided by the network to the UE is only applicable for the PLMN which provided this information this serving PLMN rate control information shall be discarded when the UE successfully registers to another PLMN

NOTE the serving PLMN can discard or delay control plane user data that exceed the limit provided for serving PLMN rate control

### 6.2.15 handling of reliable data service

if the UE supports reliable data service (see 3GPP TS 23.501 [8] and 3GPP TS 24.250 [14A]) the UE may request data transfer using reliable data service for a PDU session in the extended protocol configuration options IE during UE-requested PDU session establishment procedure (see subclause 6.4.1)

the reliable data service may only be used with PDU sessions for which the "Control plane CIoT 5GS Optimisation" indicator is set or with PDU sessions using the control plane CIoT 5GS optimization when the AMF does not move such PDU sessions to the user plane

the network shall inform the UE about the acceptance of UE's request for reliable data service usage during the PDU session establishment procedure (see subclause 6.4.1) in the extended protocol configuration options IE

if the network accepts the use of reliable data service to transfer data for the specified PDU session the UE shall use this PDU session exclusively for data transfer using reliable data Service; otherwise the UE shall not use this PDU session for data transfer using reliable data service

### 6.2.16 handling of header compression for control plane CIoT optimizations

the UE and the SMF may use

- IP header compression for PDU sessions of "IPv4" "IPv6" or "IPv4v6" PDU session type; and

- ethernet header compression for PDU sessions of "Ethernet" PDU session type

both the UE and the AMF indicate whether header compression for control plane CIoT 5GS optimization is supported during registration procedures (see subclause 5.5.1) if both the UE and the network support header compression the header compression configuration for each PDU session is negotiated during the PDU session establishment procedure and PDU session modification procedure as specified in subclauses 6.3.2 6.4.1 and 6.4.2

for IP header compression ROHC protocol specified in IETF RFC 5795 [39B] is used the IP header compression configuration used for IP header compression is (re-)negotiated between the UE and the SMF using the IP header compression configuration IE as specified in subclauses 6.3.2.2 6.4.1.2 6.4.1.3 and 6.4.2.2 respectively

for ethernet header compression ethernet header compression (EHC) protocol specified in 3GPP TS 38.323 [29] is used the ethernet header compression configuration used for ethernet header compression is (re-)negotiated between the UE and the SMF using the ethernet header compression configuration IE as specified in subclauses 6.3.2.2 6.4.1.2 6.4.1.3 and 6.4.2.2 respectively

### 6.2.17 handling of edge computing enhancements

EAS discovery EAS rediscovery and ECS address provisioning provide enhanced edge computing support in 5GS (see 3GPP TS 23.548 [10A])

if the network supports the session breakout connectivity model or distributed anchor connectivity model to enable edge computing enhancements and the UE generated DNS message is to be handled by an edge application server discovery function (EASDF) for EAS discovery as specified in 3GPP TS 23.548 [10A] the SMF selects the EASDF and it provides its IP address to the UE as the DNS server to be used for the PDU session in the extended protocol configuration options IE during the UE-requested PDU session establishment procedure as described in subclause 6.4.1.3

NOTE 1 EASDF selection is outside the scope of the present document

if the network supports the session breakout connectivity model to enable edge computing enhancements and the UE generated DNS message is to be handled by a local DNS server for EAS discovery as specified in 3GPP TS 23.548 [10A] the SMF selects the local DNS server obtains its IP address and can provide the IP address of the local DNS server to the UE as the DNS server to be used for the PDU session in the extended protocol configuration options IE during the UE-requested PDU session establishment procedure or the network-requested PDU session modification procedure as described in subclauses 6.4.1.3 and 6.3.2.2 respectively

NOTE 2 local DNS server selection and the acquisition of its IP address is outside the scope of the present document

if the UE supports EAS rediscovery and the SMF decides to trigger the EAS rediscovery as specified in 3GPP TS 23.548 [10A] the SMF initiates a network-requested PDU session modification procedure to provide the EAS rediscovery information to the UE as described in subclauses 6.3.2.2 upon receipt of the EAS rediscovery information the UE provides the received information to the upper layers

NOTE 3 the upper layers of the UE uses the EAS rediscovery information to trigger the EAS discovery procedure to get the new EAS information as specified in 3GPP TS 23.548 [10A]

if the UE supports ECS address provisioning over NAS as specified in 3GPP TS 23.548 [10A] the UE indicates its support of ECS configuration information provisioning over NAS in the extended protocol configuration options IE either during the UE-requested PDU session establishment procedure as described in subclause 6.4.1.2 or while in S1 mode as described in 3GPP TS 24.301 [15] respectively

if the UE indicated support of ECS configuration information address provisioning over NAS the SMF can provide the ECS configuration information in the extended protocol configuration options IE during the network-requested PDU session modification procedure UE-requested PDU session establishment procedure or the UE-requested PDU session modification procedure as described in subclauses 6.3.2.2 6.4.1.3 and 6.4.2.3 respectively

NOTE 4 the SMF can obtain the ECS configuration information based on the local configuration the UE's location the UE's subscription information or any combination of them

if the UE supports the edge DNS client (EDC) as specified in 3GPP TS 23.548 [10A] the UE indicates its support of EDC in the extended protocol configuration options IE during the UE-requested PDU session establishment procedure as described in subclause 6.4.1.2 or the UE-requested PDU session modification procedure as described in subclause 6.4.2.2

if the UE indicates support of EDC the SMF can indicate in the extended protocol configuration options IE during the UE-requested PDU session establishment procedure as described in subclause 6.4.1.3 or the network-requested PDU session modification procedure as described in subclause 6.3.2.2 that the network allows the use of EDC for the applications which are mapped onto the PDU session and explicitly requested the use of EDC or that the network requires the use of EDC for all applications mapped onto the PDU session

### 6.2.18 support of redundant PDU sessions

the 5GSM sublayer may support establishment of redundant PDU sessions (see subclause 5.33.2 of 3GPP TS 23.501 [8])

in order to establish a set of two redundant PDU sessions a UE can include a PDU session pair ID an RSN or both in a PDU SESSION ESTABLISHMENT REQUEST message for each of the two redundant PDU sessions (see subclause 6.4.1.2) the UE can set the PDU session pair ID the RSN or both according to URSP or UE local configuration (see 3GPP TS 24.526 [19])

an SMF receiving a PDU session pair ID an RSN or both via a PDU SESSION ESTABLISHMENT REQUEST message operates as specified in subclause 5.33.2 of 3GPP TS 23.501 [8] in addition an SMF can handle two PDU sessions as redundant even if the UE provides neither a PDU session pair ID nor an RSN in a PDU SESSION ESTABLISHMENT REQUEST message for each of the PDU sessions (see subclause 5.33.2 of 3GPP TS 23.501 [8])

### 6.2.19 handling of maximum group data rate limitation control

the network can perform maximum group data rate limitation control to 5G VN groups as specified in 3GPP TS 23.503 [10] if the maximum data rate of PDU sessions associated within a 5G VN group has been exceeded the maximum group data rate of the 5G VN group the SMF may reject the PDU SESSION ESTABLISHMENT REQUEST message against the 5G VN group using S-NSSAI based congestion control as specified in subclause 6.2.8 and 6.4.1.4.2

NOTE 1 the maximum group data rate limitation control does not apply for emergency services or for a UE configured for high priority access in selected PLMN or SNPN

NOTE 2 the maximum group data rate limitation control is performed by the PCF

### 6.2.20 support of UL PDU set handling

if the network supports PDU set handling (see subclause 5.37.5 of 3GPP TS 23.501 [8]) based on operator policy the SMF may provide the protocol description for UL PDU set handling in the PDU SESSION ESTABLISHMENT ACCEPT message or the PDU SESSION MODIFICATION COMMAND message to the UE the UE can store the protocol description and may use it to identify PDUs belong to PDU sets for the uplink direction

NOTE 1 whether and how to use the protocol description to identify PDUs belonging to a PDU set in the uplink direction is up to UE implementation the use of protocol description does not impact UL user data packet matching in the UE

NOTE 2 whether and how to process PDUs belonging to a PDU set in the uplink direction is up to UE implementation

NOTE 3 in this release of the specification UL PDU set handling is supported for non-3GPP access

## 6.3 Network-requested 5GSM procedures

### 6.3.1 PDU session authentication and authorization procedure

#### 6.3.1.1 general

the purpose of the PDU session authentication and authorization procedure is to enable the DN

a) to authenticate the upper layers of the UE when establishing the PDU session;

b) to authorize the upper layers of the UE when establishing the PDU session;

c) both of the above; or

d) to re-authenticate the upper layers of the UE after establishment of the PDU session

the PDU session authentication and authorization procedure can be performed only during or after the UE-requested PDU session procedure establishing a non-emergency PDU session the PDU session authentication and authorization procedure shall not be performed during or after the UE-requested PDU session establishment procedure establishing an emergency PDU session

the upper layers store the association between a DNN and corresponding credentials if any for the PDU session authentication and authorization

if the UE is registered for onboarding services in SNPN the SMF may initiate the PDU session authentication and authorization procedure based on local policy with a DCS as specified in 3GPP TS 33.501 [24] subclause I.9.2.4.1 or a DN-AAA server as specified in 3GPP TS 33.501 [24] subclause I.9.2.4.2

if the UE is registered for onboarding services in SNPN and the network initiates the PDU session authentication and authorization procedure the UE shall use the default UE credentials for secondary authentication for the PDU session authentication and authorization procedure

the network authenticates the UE using the extensible authentication protocol (EAP) as specified in IETF RFC 3748 [34]

EAP has defined four types of EAP messages

a) an EAP-request message;

b) an EAP-response message;

c) an EAP-success message; and

d) an EAP-failure message

the EAP-request message is transported from the network to the UE using the PDU SESSION AUTHENTICATION COMMAND message of the PDU EAP message reliable transport procedure

the EAP-response message to the EAP-request message is transported from the UE to the network using the PDU SESSION AUTHENTICATION COMPLETE message of the PDU EAP message reliable transport procedure

if the PDU session authentication and authorization procedure is performed during the UE-requested PDU session establishment procedure

a) and the DN authentication of the UE completes successfully the EAP-success message is transported from the network to the UE as part of the UE-requested PDU session establishment procedure in the PDU SESSION ESTABLISHMENT ACCEPT message

b) and the DN authentication of the UE completes unsuccessfully the EAP-failure message is transported from the network to the UE as part of the UE-requested PDU session establishment procedure in the PDU SESSION ESTABLISHMENT REJECT message

if the PDU session authentication and authorization procedure is performed after the UE-requested PDU session establishment procedure

a) and the DN authentication of the UE completes successfully the EAP-success message is transported from the network to the UE using the PDU SESSION AUTHENTICATION RESULT message of the PDU EAP result message transport procedure

b) and the DN authentication of the UE completes unsuccessfully the EAP-failure message is transported from the network to the UE using the PDU SESSION RELEASE COMMAND message of the network-requested PDU session release procedure

there can be several rounds of exchange of an EAP-request message and a related EAP-response message for the DN to complete the authentication and authorization of the request for a PDU session (see example in figure 6.3.1.1)

the SMF shall set the authenticator retransmission timer specified in IETF RFC 3748 [34] subclause 4.3 to infinite value

NOTE the PDU session authentication and authorization procedure provides a reliable transport of EAP messages and therefore retransmissions at the EAP layer of the SMF do not occur

figure 6.3.1.1 PDU session authentication and authorization procedure

#### 6.3.1.2 PDU EAP message reliable transport procedure

##### 6.3.1.2.1 PDU EAP message reliable transport procedure initiation

in order to initiate the PDU EAP message reliable transport procedure the SMF shall create a PDU SESSION AUTHENTICATION COMMAND message

the SMF shall set the PTI IE of the PDU SESSION AUTHENTICATION COMMAND message to "No procedure transaction identity assigned"

the SMF shall set the EAP message IE of the PDU SESSION AUTHENTICATION COMMAND message to the EAP-request message provided by the DN or generated locally

the SMF shall send the PDU SESSION AUTHENTICATION COMMAND message and the SMF shall start timer T3590 (see example in figure 6.3.1.1)

upon receipt of the PDU SESSION AUTHENTICATION COMMAND message if the UE provided a DNN during the PDU session establishment the UE shall stop timer T3396 if it is running for the DNN provided by the UE if the UE did not provide a DNN during the PDU session establishment the UE shall stop the timer T3396 associated with no DNN if it is running in an SNPN the timer T3396 to be stopped includes

a) the timer T3396 applied for all the equivalent SNPNs associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

b) the timer T3396 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

upon receipt of the PDU SESSION AUTHENTICATION COMMAND message if the UE provided an S-NSSAI and a DNN during the PDU session establishment the UE shall stop timer T3584 if it is running for the [S-NSSAI of the PDU session DNN] combination if the UE provided a DNN but did not provide an S-NSSAI during the PDU session establishment the UE shall stop timer T3584 if it is running for the same [no S-NSSAI DNN] combination provided by the UE if the UE provided an S-NSSAI but did not provide a DNN during the PDU session establishment the UE shall stop timer T3584 if it is running for the same [S-NSSAI no DNN] combination provided by the UE if the UE provided neither a DNN nor an S-NSSAI during the PDU session establishment the UE shall stop timer T3584 if it is running for the same [no S-NSSAI no DNN] combination provided by the UE the timer T3584 to be stopped includes

a) in a PLMN

1) the timer T3584 applied for all the PLMNs if running; and

2) the timer T3584 applied for the registered PLMN if running; or

b) in an SNPN

1) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

2) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

upon receipt of the PDU SESSION AUTHENTICATION COMMAND message if the UE provided an S-NSSAI during the PDU session establishment the UE shall stop timer T3585 if it is running for the S-NSSAI of the PDU session if the UE did not provide an S-NSSAI during the PDU session establishment the UE shall stop the timer T3585 associated with no S-NSSAI if it is running the timer T3585 to be stopped includes

a) in a PLMN

1) the timer T3585 applied for all the PLMNs and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received if running;

2) the timer T3585 applied for all the PLMNs and for both 3GPP access type and non-3GPP access type if running;

3) the timer T3585 applied for the registered PLMN and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received if running; and

4) the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type if running; or

b) in an SNPN

1) the timer T3585 applied for all the equivalent SNPNs and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

2) the timer T3585 applied for all the equivalent SNPNs and for both 3GPP access type and non-3GPP access type associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

3) the timer T3585 applied for the registered SNPN and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

4) the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

NOTE 1 upon receipt of the PDU SESSION AUTHENTICATION COMMAND message for a PDU session if the UE provided a DNN (or no DNN) and an S-NSSAI (or no S-NSSAI) when the PDU session is established timer T3396 associated with the DNN (or no DNN if no DNN was provided by the UE) is running and timer T3584 associated with the DNN (or no DNN if no DNN was provided by the UE) and the S-NSSAI (or no S-NSSAI if no S-NSSAI was provided by the UE) is running then the UE stops both the timer T3396 and the timer T3584

NOTE 2 upon receipt of the PDU SESSION AUTHENTICATION COMMAND message for a PDU session if the UE provided a DNN (or no DNN) and an S-NSSAI (or no S-NSSAI) when the PDU session is established timer T3585 associated with the S-NSSAI (or no S-NSSAI if no S-NSSAI was provided by the UE) is running and timer T3584 associated with the DNN (or no DNN if no DNN was provided by the UE) and the S-NSSAI (or no S-NSSAI if no S-NSSAI was provided by the UE) is running then the UE stops both the timer T3585 and the timer T3584

upon receipt of a PDU SESSION AUTHENTICATION COMMAND message and a PDU session ID using the NAS transport procedure as specified in subclause 5.4.5 the UE passes to the upper layers the EAP message received in the EAP message IE of the PDU SESSION AUTHENTICATION COMMAND message apart from this action and the stopping of timers T3396 T3584 and T3585 (if running) the authentication and authorization procedure initiated by the DN is transparent to the 5GSM layer of the UE

##### 6.3.1.2.2 PDU EAP message reliable transport procedure accepted by the UE

the UE shall create a PDU SESSION AUTHENTICATION COMPLETE message when the upper layers provide an EAP-response message responding to the received EAP-request message

the UE shall set the EAP message IE of the PDU SESSION AUTHENTICATION COMPLETE message to the EAP-response message

the UE shall transport the PDU SESSION AUTHENTICATION COMPLETE message and the PDU session ID using the NAS transport procedure as specified in subclause 5.4.5 apart from this action the authentication and authorization procedure initiated by the DN is transparent to the 5GSM layer of the UE

upon receipt of a PDU SESSION AUTHENTICATION COMPLETE message the SMF shall stop timer T3590 and provides the EAP message received in the EAP message IE of the PDU SESSION AUTHENTICATION COMPLETE message to the DN or handles it locally

##### 6.3.1.2.3 abnormal cases on the network side

the following abnormal cases can be identified

a) T3590 expired

the SMF shall on the first expiry of the timer T3590 retransmit the PDU SESSION AUTHENTICATION COMMAND message and shall reset and start timer T3590 this retransmission is repeated four times i.e on the fifth expiry of timer T3590 the SMF shall abort the procedure

b) collision of UE-requested PDU session release procedure and a PDU session authentication and authorization procedure

when the SMF receives a PDU SESSION RELEASE REQUEST message during the PDU session authentication and authorization procedure and the PDU session indicated in the PDU SESSION RELEASE REQUEST message is the PDU session that the SMF had requested to authenticate the SMF shall abort the PDU session authentication and authorization procedure and proceed with the UE-requested PDU session release procedure

##### 6.3.1.2.4 abnormal cases in the UE

the following abnormal cases can be identified

a) PDU session inactive for the received PDU session ID

if the PDU session ID in the PDU SESSION AUTHENTICATION COMMAND message belongs to any PDU session in state PDU SESSION INACTIVE in the UE the UE shall send a 5GSM STATUS message with the 5GSM cause IE set to #43 "Invalid PDU session identity"

b) collision of UE-requested PDU session release procedure and a PDU session authentication and authorization procedure

when the UE receives a PDU SESSION AUTHENTICATION COMMAND message during the UE-requested PDU session release procedure and the PDU session indicated in PDU SESSION AUTHENTICATION COMMAND message is the PDU session that the UE had requested to release the UE shall ignore the PDU SESSION AUTHENTICATION COMMAND message and proceed with the UE-requested PDU session release procedure

#### 6.3.1.3 PDU EAP result message transport procedure

##### 6.3.1.3.1 PDU EAP result message transport procedure initiation

PDU EAP result message transport procedure is initiated by the SMF if the PDU session authentication and authorization procedure is performed after the PDU session is established and the DN authentication of the UE completes successfully

in order to initiate the PDU EAP result message transport procedure the SMF shall create a PDU SESSION AUTHENTICATION RESULT message

the SMF shall set the PTI IE of the PDU SESSION AUTHENTICATION RESULT message to "No procedure transaction identity assigned"

the SMF shall set the EAP message IE of the PDU SESSION AUTHENTICATION RESULT message to the EAP-success message provided by the DN

the SMF shall send the PDU SESSION AUTHENTICATION RESULT message

upon receipt of a PDU SESSION AUTHENTICATION RESULT message and a PDU session ID using the NAS transport procedure as specified in subclause 5.4.5 the UE passes to the upper layers the EAP message received in the EAP message IE of the PDU SESSION AUTHENTICATION RESULT message apart from this action the authentication and authorization procedure initiated by the DN is transparent to the 5GSM layer of the UE

##### 6.3.1.3.2 abnormal cases in the UE

the following abnormal cases can be identified

a) PDU session inactive for the received PDU session ID

if the PDU session ID in the PDU SESSION AUTHENTICATION RESULT message belongs to any PDU session in state PDU SESSION INACTIVE in the UE the UE shall send a 5GSM STATUS message with the 5GSM cause IE set to #43 "Invalid PDU session identity"

b) collision of UE-requested PDU session release procedure and a PDU EAP result message transport procedure

when the UE receives a PDU SESSION AUTHENTICATION RESULT message during the UE-requested PDU session release procedure and the PDU session indicated in PDU SESSION AUTHENTICATION RESULT message is the PDU session that the UE had requested to release the UE shall ignore the PDU SESSION AUTHENTICATION RESULT message and proceed with the UE-requested PDU session release procedure

### 6.3.1A Service-level authentication and authorization procedure

#### 6.3.1A.1 general

the purpose of the service-level authentication and authorization (service-level-AA) procedure is to enable the DN using NEF services for authentication

a) to authenticate the upper layers of the UE when establishing the PDU session;

b) to authorize the upper layers of the UE when establishing the PDU session;

c) both of the above; or

d) to re-authenticate the upper layers of the UE after establishment of the PDU session

the service-level authentication and authorization procedure is used for UUAA as specified in 3GPP TS 23.256 [6AB]

NOTE 1 the authentication protocol for UUAA is out of scope of 3GPP in this release of specification

the service-level authentication and authorization procedure can be performed only during or after the UE-requested PDU session procedure establishing a non-emergency PDU session the service-level authentication and authorization procedure shall not be performed during or after the UE-requested PDU session establishment procedure establishing an emergency PDU session

if the service-level authentication and authorization procedure is performed during the UE-requested PDU session establishment procedure

a) and the service-level-AA procedure of the UE completes successfully the service-level-AA response is transported from the network to the UE as a part of the UE-requested PDU session establishment procedure in the PDU SESSION ESTABLISHMENT ACCEPT message; or

b) and the service-level-AA procedure of the UE completes unsuccessfully the service-level-AA response is transported from the network to the UE as a part of the UE-requested PDU session establishment procedure in the PDU SESSION ESTABLISHMENT REJECT message

NOTE 2 if the SMF receives the HTTP code set to "4xx" or "5xx" as specified in 3GPP TS 29.500 [20AA] or the SMF detects a UUAA-SM failure as specified in 3GPP TS 29.256 [21B] then the SMF considers that the UUAA-SM procedure has completed unsuccessfully

if the service-level authentication and authorization procedure is performed for the established PDU session with re-authentication purpose

a) and the service-level-AA procedure of the UE completes successfully the service-level-AA response is transported from the network to the UE as a part of the network-requested PDU session modification procedure in the PDU SESSION MODIFICATION COMMAND message; or

b) and the service-level-AA procedure of the UE completes unsuccessfully the service-level-AA response is transported from the network to the UE as a part of the network-requested PDU session release procedure in the PDU SESSION RELEASE COMMAND message

there can be several rounds of exchange of a service-level-AA payload for the service to complete the service-level authentication and authorization of the request for a PDU session (see example in figure 6.3.1A.1-1)

if the UE receives the service-level-AA response in the PDU SESSION ESTABLISHMENT ACCEPT message or the PDU SESSION ESTABLISHMENT REJECT message the UE passes it to the upper layer

figure 6.3.1A.1-1 Service-level authentication and authorization procedure

#### 6.3.1A.2 Service-level authentication and authorization procedure initiation

in order to initiate the service-level authentication and authorization procedure the SMF shall create a SERVICE-LEVEL AUTHENTICATION COMMAND message

the SMF shall set the PTI IE of the SERVICE-LEVEL AUTHENTICATION COMMAND message to "No procedure transaction identity assigned"

the SMF shall set the service-level-AA payload in the Service-level-AA container IE of the SERVICE-LEVEL AUTHENTICATION COMMAND message to the payload provided by the DN via the NEF if a payload type associated with the payload is provided by the DN via the NEF the SMF shall set the service-level-AA payload type with the value set to the payload type

NOTE 1 in case of UUAA the service-level-AA payload is provided by the DN via the UAS-NF

the SMF shall send the SERVICE-LEVEL AUTHENTICATION COMMAND message and the SMF shall start timer T3594 (see example in figure 6.3.1A.1-1)

upon receipt of the SERVICE-LEVEL AUTHENTICATION COMMAND message if the UE provided a DNN during the PDU session establishment the UE shall stop timer T3396 if it is running for the DNN provided by the UE if the UE did not provide a DNN during the PDU session establishment the UE shall stop the timer T3396 associated with no DNN if it is running in an SNPN the timer T3396 to be stopped includes

a) the timer T3396 applied for all the equivalent SNPNs associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

b) the timer T3396 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

upon receipt of the SERVICE-LEVEL AUTHENTICATION COMMAND message if the UE provided an S-NSSAI and a DNN during the PDU session establishment the UE shall stop timer T3584 if it is running for the [S-NSSAI of the PDU session DNN] combination if the UE provided a DNN but did not provide an S-NSSAI during the PDU session establishment the UE shall stop timer T3584 if it is running for the same [no S-NSSAI DNN] combination provided by the UE if the UE provided an S-NSSAI but did not provide a DNN during the PDU session establishment the UE shall stop timer T3584 if it is running for the same [S-NSSAI no DNN] combination provided by the UE if the UE provided neither a DNN nor an S-NSSAI during the PDU session establishment the UE shall stop timer T3584 if it is running for the same [no S-NSSAI no DNN] combination provided by the UE the timer T3584 to be stopped includes

a) in a PLMN

1) the timer T3584 applied for all the PLMNs if running and

2) the timer T3584 applied for the registered PLMN if running; or

b) in an SNPN

1) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

2) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

upon receipt of the SERVICE-LEVEL AUTHENTICATION COMMAND message if the UE provided an S-NSSAI during the PDU session establishment the UE shall stop timer T3585 if it is running for the S-NSSAI of the PDU session if the UE did not provide an S-NSSAI during the PDU session establishment the UE shall stop the timer T3585 associated with no S-NSSAI if it is running the timer T3585 to be stopped includes

a) in a PLMN

- the timer T3585 applied for all the PLMNs and for the access over which the SERVICE-LEVEL AUTHENTICATION COMMAND message is received if running;

- the timer T3585 applied for all the PLMNs and for both 3GPP access type and non-3GPP access type if running;

- the timer T3585 applied for the registered PLMN and for the access over which the SERVICE-LEVEL AUTHENTICATION COMMAND message is received if running; and

- the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type if running; or

b) in an SNPN

1) the timer T3585 applied for all the equivalent SNPNs and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

2) the timer T3585 applied for all the equivalent SNPNs and for both 3GPP access type and non-3GPP access type associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

3) the timer T3585 applied for the registered SNPN and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

4) the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

NOTE 2 upon receipt of the SERVICE-LEVEL AUTHENTICATION COMMAND message for a PDU session if the UE provided a DNN (or no DNN) and an S-NSSAI (or no S-NSSAI) when the PDU session is established timer T3396 associated with the DNN (or no DNN if no DNN was provided by the UE) is running and timer T3584 associated with the DNN (or no DNN if no DNN was provided by the UE) and the S-NSSAI (or no S-NSSAI if no S-NSSAI was provided by the UE) is running then the UE stops both the timer T3396 and the timer T3584

NOTE 3 upon receipt of the SERVICE-LEVEL AUTHENTICATION COMMAND message for a PDU session if the UE provided a DNN (or no DNN) and an S-NSSAI (or no S-NSSAI) when the PDU session is established timer T3585 associated with the S-NSSAI (or no S-NSSAI if no S-NSSAI was provided by the UE) is running and timer T3584 associated with the DNN (or no DNN if no DNN was provided by the UE) and the S-NSSAI (or no S-NSSAI if no S-NSSAI was provided by the UE) is running then the UE stops both the timer T3585 and the timer T3584

upon receipt of a SERVICE-LEVEL AUTHENTICATION COMMAND message and a PDU session ID using the NAS transport procedure as specified in subclause 5.4.5 the UE passes to the upper layers the service-level-AA payload received in the Service-level-AA container IE of the SERVICE-LEVEL AUTHENTICATION COMMAND message apart from this action the service-level authentication and authorization procedure initiated by the DN is transparent to the 5GSM layer of the UE

#### 6.3.1A.3 Service-level authentication and authorization procedure accepted by the UE

when the upper layers provide a service-level-AA payload the UE shall create a SERVICE-LEVEL AUTHENTICATION COMPLETE message and set the service-level-AA payload of the Service-level-AA container IE to the service-level-AA payload received from the upper layers and if the service-level-AA payload type is received in the SERVICE-LEVEL AUTHENTICATION COMMAND message from the SMF set the service-level-AA payload type of the Service-level-AA container IE to the service-level-AA payload type received from the SMF

the UE shall transport the SERVICE-LEVEL AUTHENTICATION COMPLETE message and the PDU session ID using the NAS transport procedure as specified in subclause 5.4.5 apart from this action the service-level authentication and authorization procedure initiated by the DN is transparent to the 5GSM layer of the UE

upon receipt of a SERVICE-LEVEL AUTHENTICATION COMPLETE message the SMF shall stop timer T3594 and provides the service-level-AA payload received in the Service-level-AA container IE of the SERVICE-LEVEL AUTHENTICATION COMPLETE message to the DN

#### 6.3.1A.4 abnormal cases on the network side

the following abnormal cases can be identified

a) expiry of timer T3594

on the first expiry of the timer T3594 the SMF shall resend the SERVICE-LEVEL AUTHENTICATION COMMAND message and shall reset and restart timer T3594 this retransmission is repeated four times i.e. on the fifth expiry of timer T3594 the SMF shall abort the procedure and send PDU SESSION ESTABLISHMENT REJECT message with the 5GSM cause #29 "user authentication or authorization failed" as specified in subclause 6.4.1.4.1

#### 6.3.1A.5 abnormal cases in the UE

the following abnormal case can be identified

a) collision of UE-requested PDU session release procedure and a service-level authentication and authorization procedure

when the UE receives a SERVICE-LEVEL AUTHENTICATION COMMAND message during the UE-requested PDU session release procedure and the PDU session indicated in SERVICE-LEVEL AUTHENTICATION COMMAND message is the PDU session that the UE has requested to release the UE shall ignore the SERVICE-LEVEL AUTHENTICATION COMMAND message and proceed with the UE-requested PDU session release procedure

### 6.3.2 Network-requested PDU session modification procedure

#### 6.3.2.1 general

the purpose of the network-requested PDU session modification procedure is to enable the network to modify a PDU session re-negotiate header compression configuration associated to a PDU session convey a port management information container to trigger EAS rediscovery provide updated DNS server address(es) due to the newly selected local DNS server or the newly selected EASDF provide updated ECS configuration information remove joined UE from one or more multicast MBS sessions associated with a PDU session update ATSSS parameters (e.g ATSSS rules) update the MBS service area or the security information of multicast MBS session that the UE has joined or to inform about the result of service-level AA procedure or C2 authorization for UAS services

#### 6.3.2.2 Network-requested PDU session modification procedure initiation

in order to initiate the network-requested PDU session modification procedure the SMF shall create a PDU SESSION MODIFICATION COMMAND message

if the authorized QoS rules of the PDU session is modified or is marked as to be synchronised with the UE the SMF shall set the authorized QoS rules IE of the PDU SESSION MODIFICATION COMMAND message to the authorized QoS rules of the PDU session the SMF shall ensure that the number of the packet filters used in the authorized QoS rules of the PDU session does not exceed the maximum number of packet filters supported by the UE for the PDU session the SMF may bind service data flows for which the UE has requested traffic segregation to a dedicated QoS flow for the PDU session if possible otherwise the SMF may bind the service data flows to an existing QoS flow the SMF shall use only one dedicated QoS flow for traffic segregation if the UE has requested traffic segregation for multiple service data flows with different QoS handling the SMF shall bind all these service data flows to a single QoS flow if the SMF allows traffic segregation for service data flows in a QoS rule then the SMF shall create a new authorized QoS rule for these service data flows and shall delete packet filters corresponding to these service data flows from the other authorized QoS rules

if the authorized QoS flow descriptions of the PDU session is modified or is marked as to be synchronised with the UE the SMF shall set the authorized QoS flow descriptions IE of the PDU SESSION MODIFICATION COMMAND message to the authorized QoS flow descriptions of the PDU session

if SMF creates a new authorized QoS rule for a new QoS flow then SMF shall include the authorized QoS flow description for that QoS flow in the authorized QoS flow descriptions IE of the PDU SESSION MODIFICATION COMMAND message if

a) the newly created authorized QoS rules is for a new GBR QoS flow;

b) the QFI of the new QoS flow is not the same as the 5QI of the QoS flow identified by the QFI;

c) the new QoS flow can be mapped to an EPS bearer as specified in subclause 4.11.1 of 3GPP TS 23.502 [9]; or

d) the new QoS flow is established for the PDU session used for relaying as specified in subclause 5.6.2.1 of 3GPP TS 23.304 [6E]

NOTE 0 in cases other than above listed cases it is up to the SMF implementation to include the authorized QoS flow description of the new QoS flow for the new authorized QoS rule in the authorized QoS flow descriptions IE of the PDU SESSION MODIFICATION COMMAND message

if the session-AMBR of the PDU session is modified the SMF shall set the selected Session-AMBR IE of the PDU SESSION MODIFICATION COMMAND message to the session-AMBR of the PDU session

if interworking with EPS is supported for the PDU session and if the mapped EPS bearer contexts of the PDU session is modified the SMF shall set the mapped EPS bearer contexts IE of the PDU SESSION MODIFICATION COMMAND message to the mapped EPS bearer contexts of the PDU session if the association between a QoS flow and the mapped EPS bearer context is changed the SMF shall set the EPS bearer identity parameter in authorized QoS flow descriptions IE of the PDU SESSION MODIFICATION COMMAND message to the new EPS bearer identity associated with the QoS flow

NOTE 0A the SMF can include multiple mapped EPS bearer context fields with the same EPS bearer identity in the mapped EPS bearer contexts IE of the PDU SESSION MODIFICATION COMMAND message in cases e.g the packet filters need to be modified and the modification requires more than one TFT operation codes or the mapped traffic flow template needs to be modified and the modification exceeds the maximum size of the TFT IE

if the network-requested PDU session modification procedure is triggered by a UE-requested PDU session modification procedure and the PDU SESSION MODIFICATION REQUEST message includes a 5GSM capability IE the SMF shall

a) if the RQoS bit is set to

1) "Reflective QoS supported" consider that the UE supports reflective QoS for this PDU session; or

2) "Reflective QoS not supported" consider that the UE does not support reflective QoS for this PDU session; and;

b) if the MH6-PDU bit is set to

1) "Multi-homed IPv6 PDU session supported" consider that this PDU session is supported to use multiple IPv6 prefixes; or

2) "Multi-homed IPv6 PDU session not supported" consider that this PDU session is not supported to use multiple IPv6 prefixes

if the SMF considers that reflective QoS is supported for QoS flows belonging to this PDU session the SMF may include the RQ timer IE set to an RQ timer value in the PDU SESSION MODIFICATION COMMAND message

if a port management information container needs to be delivered (see 3GPP TS 23.501 [8] and 3GPP TS 23.502 [9]) and the UE has set the TPMIC bit to "Transfer of port management information containers supported" in the 5GSM capability IE the SMF shall include a port management information container IE in the PDU SESSION MODIFICATION COMMAND message

for a PDN connection established when in S1 mode upon an inter-system change from S1 mode to N1 mode if the network-requested PDU session modification procedure is triggered by a UE-requested PDU session modification procedure and a UE-requested PDU session modification procedure has not been successfully performed yet the PDU session type is "IPv4" "IPv6" "IPv4v6" or "Ethernet" and the PDU SESSION MODIFICATION REQUEST message includes a maximum number of supported packet filters IE the SMF shall consider this number as the maximum number of packet filters that can be supported by the UE for this PDU session otherwise the SMF considers that the UE supports 16 packet filters for this PDU session

for a PDN connection established when in S1 mode upon an inter-system change from S1 mode to N1 mode if the network-requested PDU session modification procedure is triggered by a UE-requested PDU session modification procedure and a UE-requested PDU session modification procedure has not been successfully performed yet the SMF shall consider that the maximum data rate per UE for user-plane integrity protection supported by the UE for uplink and the maximum data rate per UE for user-plane integrity protection supported by the UE for downlink are valid for the lifetime of the PDU session

for a PDN connection established when in S1 mode upon an inter-system change from S1 mode to N1 mode if the network-requested PDU session modification procedure is triggered by a UE-requested PDU session modification procedure and a UE-requested PDU session modification procedure has not been successfully performed yet and the SMF determines based on local policies or configurations in the SMF and the Always-on PDU session requested IE in the PDU SESSION MODIFICATION REQUEST message (if available) that either

a) the requested PDU session needs to be an always-on PDU session the SMF shall include the Always-on PDU session indication IE in the PDU SESSION MODIFICATION COMMAND message and shall set the value to "Always-on PDU session required"; or

b) the requested PDU session shall not be an always-on PDU session and

1) if the UE included the Always-on PDU session requested IE the SMF shall include the Always-on PDU session indication IE in the PDU SESSION MODIFICATION COMMAND message and shall set the value to "Always-on PDU session not allowed"; or

2) if the UE did not include the Always-on PDU session requested IE the SMF shall not include the Always-on PDU session indication IE in the PDU SESSION MODIFICATION COMMAND message

for a PDN connection established when in S1 mode upon an inter-system change from S1 mode to N1 mode if the network-requested PDU session modification procedure is triggered by a UE-requested PDU session modification procedure a UE-requested PDU session modification procedure has not been successfully performed yet the UE supports EDC and the network allows the use of EDC then the SMF shall include the extended protocol configuration options IE in the PDU SESSION MODIFICATION COMMAND message with the EDC usage allowed indicator

for a PDN connection established when in S1 mode upon an inter-system change from S1 mode to N1 mode if the network-requested PDU session modification procedure is triggered by a UE-requested PDU session modification procedure a UE-requested PDU session modification procedure has not been successfully performed yet the UE supports EDC and the network requires the use of EDC then the SMF shall include the extended protocol configuration options IE in the PDU SESSION MODIFICATION COMMAND message with the EDC usage required indicator

if a QoS flow for URLLC is created in a PDU session and the SMF has not provided the Always-on PDU session indication IE with the value set to "Always-on PDU session required" in the UE-requested PDU session establishment procedure or a network-requested PDU session modification procedure for the PDU session the SMF shall include the Always-on PDU session indication IE in the PDU SESSION MODIFICATION COMMAND message and shall set the value to "Always-on PDU session required"

for a PDN connection upon an inter-system change from S1 mode to N1 mode if the network-requested PDU session modification procedure is triggered by a UE-requested PDU session modification procedure and a UE-requested PDU session modification procedure has not been successfully performed yet the PDU session is a single access PDU session over 3GPP access with IP PDU session type the SMF may decide to provide the protocol description associated with the PDU session and may include the protocol description IE in the PDU SESSION MODIFICATION COMMAND message

if the value of the RQ timer is set to "deactivated" or has a value of zero the UE considers that RQoS is not applied for this PDU session and remove the derived QoS rule(s) associated with the PDU session if any

if the network-requested PDU session modification procedure is triggered by a UE-requested PDU session modification procedure the SMF shall set the PTI IE of the PDU SESSION MODIFICATION COMMAND message to the PTI of the PDU SESSION MODIFICATION REQUEST message received as part of the UE-requested PDU session modification procedure

if the network-requested PDU session modification procedure is triggered by a UE-requested PDU session modification procedure and the UE has included the requested MBS container IE in the PDU SESSION MODIFICATION REQUEST message with the MBS operation set to "Join multicast MBS session" the SMF

a) shall include the TMGI for the multicast MBS session IDs that the UE is allowed to join if any in the received MBS container IE shall set the MBS decision to "MBS join is accepted" for each of those received MBS information may include the MBS start time to indicate the time when the multicast MBS session starts and shall include the MBS security container in each of those received MBS information if security protection is applied for that multicast MBS session and the control plane security procedure is used as specified in subclause W.4.1.2 in 3GPP TS 33.501 [24] and shall use separate QoS flows dedicated for multicast by including the authorized QoS flow descriptions IE if no separate QoS flows dedicated for multicast exist or if the SMF wants to establish new QoS flows dedicated for multicast;

NOTE 1 the network determines whether security protection applies or not for the multicast MBS session as specified in 3GPP TS 33.501 [24]

b) shall include the TMGI for multicast MBS session IDs that the UE is rejected to join if any in the received MBS container IE shall set the MBS decision to "MBS join is rejected" for each of those received MBS information shall set the rejection cause for each of those received MBS information with the reason of rejection and if the rejection cause is set to "multicast MBS session has not started or will not start soon" may include an MBS back-off timer value; and

c) may include in the received MBS container IE the MBS service area for each multicast MBS session and include in it the MBS TAI list the NR CGI list or both that identify the service area(s) for the local MBS service;

NOTE 2 for an multicast MBS session that has multiple MBS service areas the MBS service areas are indicated to the UE using MBS service announcement as described in 3GPP TS 23.247 [53] which is out of scope of this specification

in the PDU SESSION MODIFICATION COMMAND message if the UE has set the type of multicast MBS session ID to "Source specific IP multicast address" in the requested MBS container IE for certain multicast MBS session(s) in the PDU SESSION MODIFICATION REQUEST message the SMF shall include the source IP address information and destination IP address information in the received MBS information together with the TMGI for each of those multicast MBS sessions

NOTE 3 including the source IP address information and destination IP address information in the received MBS information in that case is to allow the UE to perform the mapping between the requested multicast MBS session ID and the provided TMGI

NOTE 4 in SNPN TMGI is used together with NID to identify an MBS session

if

a) the SMF wants to remove joined UE from one or more multicast MBS sessions; or

b) the network-requested PDU session modification procedure is triggered by a UE-requested PDU session modification procedure and the UE has included the requested MBS container IE in the PDU SESSION MODIFICATION REQUEST message with the MBS operation set to "Leave multicast MBS session"

the SMF shall include the multicast MBS session IDs that the UE is removed from if any in the received MBS container IE in the PDU SESSION MODIFICATION COMMAND message and shall set the MBS decision to "Remove UE from multicast MBS session" for each of those received MBS information the SMF may include the updated MBS service area in each of the received MBS information if any the SMF may delete the QoS flows associated for the multicast by including the authorized QoS flow descriptions IE in the PDU SESSION MODIFICATION COMMAND message if the UE is removed from multicast MBS session due to the MBS session release the SMF shall set the rejection cause to "multicast MBS session is released" the SMF shall include the rejection cause for each of the received MBS information if any and set its value with the reason of removing the UE from the corresponding multicast MBS session

NOTE 5 based on operator's policy e.g after a locally configured time period the SMF is allowed to trigger the removal of joined UE from an multicast MBS session when the UE moves outside all the MBS service area(s) of that multicast MBS session

if the SMF wants to update the MBS security information of an multicast MBS session that the UE has joined the SMF shall include the corresponding multicast MBS session ID and the MBS security container in the received MBS container IE in the PDU SESSION MODIFICATION COMMAND message and shall set the MBS decision to "MBS security information update" in the received MBS information

if the SMF wants to update the MBS service area of an multicast MBS session that the UE has joined the SMF shall include the corresponding multicast MBS session ID and the updated MBS service area in the received MBS container IE in the PDU SESSION MODIFICATION COMMAND message and shall set the MBS decision to "MBS service area update" in the received MBS information

NOTE 6 the MBS service area of an multicast MBS session is also allowed to be updated to the UE using the MBS service announcement as described in 3GPP TS 23.247 [53] which is out of scope of this specification

if the network needs to update ATSSS parameters (see subclause 5.2.4 of 3GPP TS 24.193 [13B]) the SMF shall include the ATSSS container IE with the updates of ATSSS parameters in the PDU SESSION MODIFICATION COMMAND message

if the network-requested PDU session modification procedure is not triggered by a UE-requested PDU session modification procedure the SMF shall set the PTI IE of the PDU SESSION MODIFICATION COMMAND message to "No procedure transaction identity assigned"

if the selected SSC mode of the PDU session is "SSC mode 3" and the SMF requests the relocation of SSC mode 3 PDU session anchor with multiple PDU sessions as specified in 3GPP TS 23.502 [9] the SMF shall include 5GSM cause #39 "reactivation requested" in the PDU SESSION MODIFICATION COMMAND message and may include the PDU session address lifetime in a PDU session address lifetime parameter in the extended protocol configuration options IE of the PDU SESSION MODIFICATION COMMAND message if the selected SSC mode of the PDU session is "SSC mode 3" the S-NSSAI or the mapped S-NSSAI associated with the PDU session needs to be replaced and the SMF determines that the PDU session needs to be re-established on the alternative S-NSSAI the SMF shall include the alternative S-NSSAI IE and 5GSM cause #39 "reactivation requested" in the PDU SESSION MODIFICATION COMMAND message if the selected SSC mode of the PDU session is "SSC mode 3" the replaced S-NSSAI is available and the SMF determines that the PDU session needs to be re-established on the replaced S-NSSAI the SMF shall include and 5GSM cause #39 "reactivation requested" and include the replaced S-NSSAI in the PDU SESSION MODIFICATION COMMAND message

NOTE 7 the relocation of SSC mode 3 PDU session anchor with multiple PDU sessions can also be initiated by the SMF in case of the SMF is requested by the AMF to release the PDU session due to the network slice instance of the PDU session is changed as specified in subclause 5.15.5.3 of 3GPP TS 23.501 [8]

the SMF shall send the PDU SESSION MODIFICATION COMMAND message and the SMF shall start timer T3591 (see example in figure 6.3.2.2.1)

NOTE 8 if the SMF requests the relocation of SSC mode 3 PDU session anchor with multiple PDU sessions as specified in 3GPP TS 23.502 [9] the reallocation requested indication indicating whether the SMF is to be reallocated or the SMF is to be reused is provided to the AMF

if the control plane CIoT 5GS optimization is enabled for a PDU session and the IP header compression configuration IE was included in the PDU SESSION ESTABLISHMENT REQUEST message or the PDU SESSION MODIFICATION REQUEST message and the SMF supports control plane CIoT 5GS optimization and IP header compression for control plane CIoT 5GS optimization the SMF may include the IP header compression configuration IE in the PDU SESSION MODIFICATION COMMAND message to re-negotiate IP header compression configuration associated to the PDU session

if the control plane CIoT 5GS optimization is enabled for a PDU session and the ethernet header compression configuration IE was included in the PDU SESSION ESTABLISHMENT REQUEST message or the PDU SESSION MODIFICATION REQUEST message and the SMF supports control plane CIoT 5GS optimization and ethernet header compression for control plane CIoT 5GS optimization the SMF may include the ethernet header compression configuration IE in the PDU SESSION MODIFICATION COMMAND message to re-configure ethernet header compression configuration associated with the PDU session

if the network-requested PDU session modification procedure is associated with C2 authorization procedure the SMF shall send the PDU SESSION MODIFICATION COMMAND message by including the Service-level-AA container IE containing

a) the service-level-AA response with the value of C2AR field set to the "C2 authorization was successful";

b) if a payload is provided from the UAS-NF the service-level-AA payload with the value set to the payload; and

c) if a payload type associated with the payload is provided from the UAS-NF the service-level-AA payload type with the value set to the payload type; and

d) if the CAA-level UAV ID is provided from the UAS-NF the service-level device ID set to the CAA-level UAV ID

NOTE 9 the C2 authorization payload in the service-level-AA payload can include one some or all of the pairing information for C2 communication and the pairing information for direct C2 communication

NOTE 9A the C2 authorization payload in the service-level-AA payload can include the security information for C2 session as specified in TS 33.256 [24B]

if the service-level-AA procedure is triggered for the established PDU session for UAS services with re-authentication purpose and the SMF is provided by the UAS-NF with the successful UUAA-SM result the SMF shall transmit a PDU SESSION MODIFICATION COMMAND message to the UE where the PDU SESSION MODIFICATION COMMAND message shall include the Service-level-AA container IE containing

a) the service-level-AA response with the value of SLAR field set to "Service level authentication and authorization was successful";

b) if received the CAA-level UAV ID from the UAS-NF the service-level device ID with the value set to the CAA-level UAV ID;

c) if received a payload from the UAS-NF the service-level-AA payload with the value set to the payload; and

d) if received a payload type associated with the payload the service-level-AA payload type with the value set to the payload type

if the SMF needs to provide new ECS configuration information to the UE and the UE has indicated support for ECS configuration information provisioning in the PDU SESSION ESTABLISHMENT REQUEST message or while in S1 mode then the SMF may include the extended protocol configuration options IE in the PDU SESSION MODIFICATION COMMAND message with

a) at least one of ECS IPv4 Address(es) ECS IPv6 Address(es) ECS FQDN(s);

b) at least one associated ECSP identifier;

c) optionally spatial validity conditions associated with the ECS address;

d) optionally ECS authentication methods associated with the ECS address; and

e) optionally ECS supported PLMNs information list including the associated ECSP information for which the EDN configuration information can be provided by the ECS

NOTE 10 the IP address(es) FQDN(s) or both are associated with the ECSP identifier and replace previously provided ECS configuration information associated with the same ECSP identifier if any

if the SMF needs to provide DNS server address(es) to the UE and the UE has provided the DNS server IPv4 address request the DNS server IPv6 address request or both of them in the PDU SESSION ESTABLISHMENT REQUEST message or a PDU SESSION MODIFICATION REQUEST message then the SMF shall include the extended protocol configuration options IE in the PDU SESSION MODIFICATION COMMAND message with one or more DNS server IPv4 address(es) one or more DNS server IPv6 address(es) or both of them

if the SMF needs to trigger EAS rediscovery and the UE has indicated support of the EAS rediscovery in the PDU SESSION ESTABLISHMENT REQUEST message or the PDU SESSION MODIFICATION REQUEST message then the SMF shall include the extended protocol configuration options IE in the PDU SESSION MODIFICATION COMMAND message

a) with the EAS rediscovery indication without indicated impact; or

b) with the following

1) one or more EAS rediscovery indication(s) with impacted EAS IPv4 address range if the UE supports EAS rediscovery indication(s) with impacted EAS IPv4 address range;

2) one or more EAS rediscovery indication(s) with impacted EAS IPv6 address range if the UE supports EAS rediscovery indication(s) with impacted EAS IPv6 address range;

3) one or more EAS rediscovery indication(s) with impacted EAS FQDN if the UE supports EAS rediscovery indication(s) with impacted EAS FQDN; or

4) any combination of the above

when UE has requested P-CSCF IPv6 address or P-CSCF IPv4 address and the SMF has provided P-CSCF address(es) during the PDU session establishment procedure if the network-requested PDU session modification procedure is triggered for P-CSCF restoration the SMF shall include the P-CSCF IP address(es) in the extended protocol configuration options IE in the PDU SESSION MODIFICATION COMMAND message as specified in subclause 5.8.2.2 of 3GPP TS 23.380 [54]

if the S-NSSAI or the mapped S-NSSAI of the PDU session needs to be replaced and the SMF determines that the PDU session needs to be retained the SMF shall include the alternative S-NSSAI IE in the PDU SESSION MODIFICATION COMMAND message if the replaced S-NSSAI is available and the SMF determines that the PDU session needs to be retained the SMF include replaced S-NSSAI in the PDU SESSION MODIFICATION COMMAND message

if the SMF includes the authorized QoS flow descriptions and the SMF determines to provide the N3QAI to the UE the SMF shall include the N3QAI IE in the PDU SESSION MODIFICATION COMMAND message

if the PDU session was a single access PDU session established over 3GPP access with IP PDU session type and based on operator policy the SMF determines to provide the protocol description for UL PDU set handling to the UE the SMF may include the protocol description IE in the PDU SESSION MODIFICATION COMMAND message

if the UE has indicated support for (S)RTP multiplexed media information in the PDU SESSION ESTABLISHMENT REQUEST message then the SMF may include the (S)RTP multiplexed media packet filter component in the packet filters of the QoS rules IE in the PDU SESSION MODIFICATION COMMAND message

if the PDU session was a single access PDU session established over wireline access with IP PDU session type and based on operator policy the SMF determines the ECN marking for L4S for the 5G-RG (see subclause 4.17.2 of 3GPP TS 23.316 [6D]) the SMF may include the ECN marking for L4S indication IE in the PDU SESSION MODIFICATION COMMAND message

figure 6.3.2.2.1 Network-requested PDU session modification procedure

#### 6.3.2.3 Network-requested PDU session modification procedure accepted by the UE

upon receipt of the PDU SESSION MODIFICATION COMMAND message if the UE provided a DNN during the PDU session establishment the UE shall stop timer T3396 if it is running for the DNN provided by the UE if the UE did not provide a DNN during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop the timer T3396 associated with no DNN if it is running if the PDU SESSION MODIFICATION COMMAND message was received for an emergency PDU session the UE shall not stop the timer T3396 associated with no DNN if it is running in an SNPN the timer T3396 to be stopped includes

b) the timer T3396 applied for all the equivalent SNPNs associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

a) the timer T3396 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

upon receipt of the PDU SESSION MODIFICATION COMMAND message if the UE provided an S-NSSAI and a DNN during the PDU session establishment the UE shall stop timer T3584 if it is running for the [S-NSSAI of the PDU session DNN] combination provided by the UE if the UE provided a DNN and did not provide an S-NSSAI during the PDU session establishment the UE shall stop timer T3584 if it is running for the same [no S-NSSAI DNN] combination provided by the UE if the UE provided an S-NSSAI and did not provide a DNN during the PDU session establishment the UE shall stop timer T3584 if it is running for the same [S-NSSAI no DNN] combination provided by the UE if the UE provided neither a DNN nor an S-NSSAI during the PDU session establishment the UE shall stop timer T3584 if it is running for the same [no S-NSSAI no DNN] combination provided by the UE the timer T3584 to be stopped includes

a) in a PLMN

1) the timer T3584 applied for all the PLMNs if running; and

2) the timer T3584 applied for the registered PLMN if running; or

b) in an SNPN

1) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

2) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

upon receipt of the PDU SESSION MODIFICATION COMMAND message if the UE provided an S-NSSAI during the PDU session establishment the UE shall stop timer T3585 if it is running for the S-NSSAI of the PDU session if the UE did not provide an S-NSSAI during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop the timer T3585 associated with no S-NSSAI if it is running the timer T3585 to be stopped includes

a) in a PLMN

1) the timer T3585 applied for all the PLMNs and for the access over which the PDU SESSION MODIFICATION COMMAND is received if running;

2) the timer T3585 applied for all the PLMNs and for both 3GPP access type and non-3GPP access type if running;

3) the timer T3585 applied for the registered PLMN and for the access over which the PDU SESSION MODIFICATION COMMAND is received if running; and

4) the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type if running; or

b) in an SNPN

1) the timer T3585 applied for all the equivalent SNPNs and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

2) the timer T3585 applied for all the equivalent SNPNs and for both 3GPP access type and non-3GPP access type associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

3) the timer T3585 applied for the registered SNPN and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

4) the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

if the PDU SESSION MODIFICATION COMMAND message was received for an emergency PDU session the UE shall not stop the timer T3585 associated with no S-NSSAI if it is running

NOTE 1 upon receipt of the PDU SESSION MODIFICATION COMMAND message for a PDU session if the UE provided a DNN (or no DNN) and an S-NSSAI (or no S-NSSAI) when the PDU session is established timer T3396 associated with the DNN (or no DNN if no DNN was provided by the UE) is running and timer T3584 associated with the DNN (or no DNN if no DNN was provided by the UE) and the S-NSSAI of the PDU session (or no S-NSSAI if no S-NSSAI was provided by the UE) is running then the UE stops both the timer T3396 and the timer T3584

NOTE 2 upon receipt of the PDU SESSION MODIFICATION COMMAND message for a PDU session if the UE provided a DNN (or no DNN) and an S-NSSAI (or no S-NSSAI) when the PDU session is established timer T3585 associated with the S-NSSAI of the PDU session (or no S-NSSAI if no S-NSSAI was provided by the UE) is running and timer T3584 associated with the DNN (or no DNN if no DNN was provided by the UE) and the S-NSSAI of the PDU session (or no S-NSSAI if no S-NSSAI was provided by the UE) is running then the UE stops both the timer T3585 and the timer T3584

if the PDU SESSION MODIFICATION COMMAND message includes the authorized QoS rules IE the UE shall process the QoS rules sequentially starting with the first QoS rule

if the PDU SESSION MODIFICATION COMMAND message includes the authorized QoS rules IE with the rule operation code is set to "Delete existing QoS rule" for one or more QoS rules the UE shall delete the protocol descriptions associated with the QoS rules if any

if the PDU SESSION MODIFICATION COMMAND message includes the authorized QoS rules IE with the rule operation code set to "Delete existing QoS rule" for one or more QoS rules the 5G-RG shall delete the ECN marking for L4S indication associated with the QoS rules if any

if the PDU SESSION MODIFICATION COMMAND message includes the mapped EPS bearer contexts IE the UE shall process the mapped EPS bearer contexts sequentially starting with the first mapped EPS bearer context

if the PDU SESSION MODIFICATION COMMAND message includes the authorized QoS flow descriptions IE the UE shall process the QoS flow descriptions sequentially starting with the first QoS flow description if the PDU session has the association between the QoS flow and the mapped EPS bearer context and the PDU SESSION MODIFICATION COMMAND message includes the authorized QoS flow descriptions IE with the authorized QoS flow descriptions but without the EPS bearer identity parameter associated with the QoS flow the UE shall consider that the association between the QoS flow and the mapped EPS bearer context has not been changed

the UE shall replace the stored authorized QoS rules authorized QoS flow descriptions and session-AMBR of the PDU session with the received value(s) if any in the PDU SESSION MODIFICATION COMMAND message

if the PDU SESSION MODIFICATION COMMAND message includes a mapped EPS bearer contexts IE the UE shall check each mapped EPS bearer context for different types of errors as follows

NOTE 3 an error detected in a mapped EPS bearer context does not cause the UE to discard the authorized QoS rules IE and authorized QoS flow descriptions IE included in the PDU SESSION MODICATION COMMAND message if any

a) semantic error in the mapped EPS bearer operation

1) operation code = "Create new EPS bearer" and there is already an existing mapped EPS bearer context with the same EPS bearer identity associated with any PDU session

2) operation code = "Delete existing EPS bearer" and there is no existing mapped EPS bearer context with the same EPS bearer identity associated with the PDU session that is being modified

3) operation code = "Modify existing EPS bearer" and there is no existing mapped EPS bearer context with the same EPS bearer identity associated with the PDU session that is being modified

4) operation code = "Create new EPS bearer" or "Modify existing EPS bearer" and the resulting mapped EPS bearer context has invalid mandatory parameters or missing mandatory parameters (e.g. mapped EPS QoS parameters or traffic flow template for a dedicated EPS bearer context)

in case 1 if the existing mapped EPS bearer context is associated with the PDU session that is being modified the UE shall not diagnose an error further process the create request and if it was process successfully delete the old EPS bearer context

in case 2 the UE shall not diagnose an error further process the delete request and if it was processed successfully consider the mapped EPS bearer context as successfully deleted

otherwise after sending the PDU SESSION MODIFICATION COMPLETE for the ongoing PDU session modification procedure the UE shall initiate a PDU session modification procedure by sending a PDU SESSION MODIFICATION REQUEST message to delete the mapped EPS bearer context with 5GSM cause #85 "Invalid mapped EPS bearer identity"

b) if the mapped EPS bearer context includes a traffic flow template the UE shall check the traffic flow template for different types of TFT IE errors as follows

1) semantic errors in TFT operations

i) TFT operation = "Create new TFT" when there is already an existing TFT for the EPS bearer context

ii) when the TFT operation is an operation other than "Create a new TFT" and there is no TFT for the EPS bearer context

iii) TFT operation = "Delete packet filters from existing TFT" when it would render the TFT empty

iv) TFT operation = "Delete existing TFT" for a dedicated EPS bearer context

in case iv after sending the PDU SESSION MODIFICATION COMPLETE for the ongoing PDU session modification procedure the UE shall initiate a PDU session modification procedure by sending a PDU SESSION MODIFICATION REQUEST message to delete the mapped EPS bearer context with 5GSM cause #41 "semantic error in the TFT operation"

in the other cases the UE shall not diagnose an error and perform the following actions to resolve the inconsistency

in case i the UE shall further process the new activation request to create a new TFT and if it was processed successfully delete the old TFT

in case ii the UE shall

- process the new request and if the TFT operation is "Delete existing TFT" or "Delete packet filters from existing TFT" and if no error according to items 2 3 and 4 was detected consider the TFT as successfully deleted;

- process the new request as an activation request if the TFT operation is "Add packet filters in existing TFT" or "Replace packet filters in existing TFT"

in case iii if the packet filters belong to a dedicated EPS bearer context the UE shall process the new deletion request and if no error according to items 2 3 and 4 was detected after sending the PDU SESSION MODIFICATION COMPLETE for the ongoing PDU session modification procedure the UE shall initiate a PDU session modification procedure by sending a PDU SESSION MODIFICATION REQUEST message to delete the mapped EPS bearer context with 5GSM cause #41 "semantic error in the TFT operation"

in case iii if the packet filters belong to the default EPS bearer context the UE shall process the new deletion request and if no error according to items 2 3 and 4 was detected then delete the existing TFT this corresponds to using match-all packet filter for the default EPS bearer context

2) syntactical errors in TFT operations

i) when the TFT operation = "Create new TFT" "Add packet filters in existing TFT" "Replace packet filters in existing TFT" or "Delete packet filters from existing TFT" and the packet filter list in the TFT IE is empty

ii) TFT operation = "Delete existing TFT" or "No TFT operation" with a non-empty packet filter list in the TFT IE

iii) TFT operation = "Replace packet filters in existing TFT" when the packet filter to be replaced does not exist in the original TFT

iv) TFT operation = "Delete packet filters from existing TFT" when the packet filter to be deleted does not exist in the original TFT

v) void

vi) when there are other types of syntactical errors in the coding of the TFT IE such as a mismatch between the number of packet filters subfield and the number of packet filters in the packet filter list

in case iii the UE shall not diagnose an error further process the replace request and if no error according to items 3 and 4 was detected include the packet filters received to the existing TFT

in case iv the UE shall not diagnose an error further process the deletion request and if no error according to items 3 and 4 was detected consider the respective packet filter as successfully deleted

otherwise after sending the PDU SESSION MODIFICATION COMPLETE for the ongoing PDU session modification procedure the UE shall initiate a PDU session modification procedure by sending a PDU SESSION MODIFICATION REQUEST message to delete the mapped EPS bearer context with 5GSM cause #42 "syntactical error in the TFT operation"

NOTE 3a an implementation that strictly follows packet filter list as defined in subclause 10.5.6.12 in 3GPP TS 24.008 [12] might not detect case 2) ii)

3) semantic errors in packet filters

i) when a packet filter consists of conflicting packet filter components which would render the packet filter ineffective i.e no IP packet will ever fit this packet filter how the UE determines a semantic error in a packet filter is outside the scope of the present document

ii) when the resulting TFT which is assigned to a dedicated EPS bearer context does not contain any packet filter applicable for the uplink direction among the packet filters created on request from the network

after sending the PDU SESSION MODIFICATION COMPLETE for the ongoing PDU session modification procedure the UE shall initiate a PDU session modification procedure by sending a PDU SESSION MODIFICATION REQUEST message to delete the mapped EPS bearer context with 5GSM cause #44 "semantic errors in packet filter(s)"

4) syntactical errors in packet filters

i) when the TFT operation = "Create new TFT" "Add packet filters to existing TFT" or "Replace packet filters in existing TFT" and two or more packet filters in the resultant TFT would have identical packet filter identifiers

ii) when the TFT operation = "Create new TFT" "Add packet filters to existing TFT" or "Replace packet filters in existing TFT" and two or more packet filters among all TFTs associated with this PDN connection would have identical packet filter precedence values

iii) when there are other types of syntactical errors in the coding of packet filters such as the use of a reserved value for a packet filter component identifier

in case i if two or more packet filters with identical packet filter identifiers are contained in the new request after sending the PDU SESSION MODIFICATION COMPLETE for the ongoing PDU session modification procedure the UE shall initiate a PDU session modification procedure by sending a PDU SESSION MODIFICATION REQUEST message to delete the mapped EPS bearer context with 5GSM cause #45 "syntactical error in packet filter(s)" otherwise the UE shall not diagnose an error further process the new request and if it was processed successfully delete the old packet filters which have the identical packet filter identifiers

in case ii if the old packet filters do not belong to the default EPS bearer context the UE shall not diagnose an error shall further process the new request and if it was processed successfully shall delete the old packet filters which have identical filter precedence values

in case ii if one or more old packet filters belong to the default EPS bearer context after sending the PDU SESSION MODIFICATION COMPLETE for the ongoing PDU session modification procedure the UE shall initiate a PDU session modification procedure by sending a PDU SESSION MODIFICATION REQUEST message to delete the mapped EPS bearer context with 5GSM cause #45 "syntactical errors in packet filter(s)"

otherwise after sending the PDU SESSION MODIFICATION COMPLETE for the ongoing PDU session modification procedure the UE shall initiate a PDU session modification procedure by sending a PDU SESSION MODIFICATION REQUEST message to delete the mapped EPS bearer context with 5GSM cause #45 "syntactical error in packet filter(s)"

and if a new EPS bearer identity parameter in authorized QoS flow descriptions IE is received for a QoS flow which can be transferred to EPS the UE shall update the association between the QoS flow and the mapped EPS bearer context based on the new EPS bearer identity and the mapped EPS bearer contexts if the "Delete existing EPS bearer" operation code in the mapped EPS bearer contexts IE was received the UE shall discard the association between the QoS flow and the corresponding mapped EPS bearer context and delete the corresponding mapped EPS bearer context

if

a) the UE detects different errors in the mapped EPS bearer contexts as described above which requires sending a PDU SESSION MODIFICATION REQUEST message to delete the erroneous mapped EPS bearer contexts; and

b) optionally if the UE detects errors in QoS rules that require to delete at least one QoS rule as described in subclause 6.3.2.4 which requires sending a PDU SESSION MODIFICATION REQUEST message to delete the erroneous QoS rules;

the UE after sending the PDU SESSION MODIFICATION COMPLETE message for the ongoing PDU session modification procedure may send a single PDU SESSION MODIFICATION REQUEST message to delete the erroneous mapped EPS bearer contexts and optionally to delete the erroneous QoS rules the UE shall include a 5GSM cause IE in the PDU SESSION MODIFICATION REQUEST message

NOTE 4 the 5GSM cause to use cannot be different from #41 "semantic error in the TFT operation" #42 "syntactical error in the TFT operation" #44 "semantic error in packet filter(s)" #45 "syntactical errors in packet filter(s)" #83 "semantic error in the QoS operation" #84 "syntactical error in the QoS operation" or #85 "Invalid mapped EPS bearer identity" the selection of a 5GSM cause is up to UE implementation

upon receipt of a PDU SESSION MODIFICATION COMMAND message and a PDU session ID using the NAS transport procedure as specified in subclause 5.4.5 if the UE accepts the PDU SESSION MODIFICATION COMMAND message the UE considers the PDU session as modified and the UE shall create a PDU SESSION MODIFICATION COMPLETE message

if the PDU SESSION MODIFICATION COMMAND message contains the PTI value allocated in the UE-requested PDU session modification procedure the UE shall stop the timer T3581 the UE should ensure that the PTI value assigned to this procedure is not released immediately

NOTE 5 the way to achieve this is implementation dependent for example the UE can ensure that the PTI value assigned to this procedure is not released during the time equal to or greater than the default value of timer T3591

while the PTI value is not released the UE regards any received PDU SESSION MODIFICATION COMMAND message with the same PTI value as a network retransmission (see subclause 7.3.1)

if the selected SSC mode of the PDU session is "SSC mode 3" and the PDU SESSION MODIFICATION COMMAND message includes 5GSM cause #39 "reactivation requested" the UE can provide to the upper layers the PDU session address lifetime if received in the PDU session address lifetime parameter of the extended protocol configuration options IE of the PDU SESSION MODIFICATION COMMAND message after the completion of the network-requested PDU session modification procedure

a) if the PDU session is an MA PDU session

1) established over both 3GPP access and non-3GPP access and

- the UE is registered over both 3GPP access and non-3GPP access in the same PLMN

- the UE should re-initiate a UE-requested PDU session establishment procedure as specified in subclause 6.4.1 over the access the PDU SESSION MODIFICATION COMMAND message is received; or

- the UE is registered over both 3GPP access and non-3GPP access in different PLMNs

- the UE should re-initiate UE-requested PDU session establishment procedures as specified in subclause 6.4.1 over both accesses the UE should re-initiate the UE-requested PDU session establishment procedure over the access the PDU SESSION MODIFICATION COMMAND message is received first; or

2) established over only single access

- the UE should re-initiate a UE-requested PDU session establishment procedure as specified in subclause 6.4.1 over the access the user plane resources were established; or

b) if the PDU session is a single access PDU session

- the UE should re-initiate a UE-requested PDU session establishment procedure as specified in subclause 6.4.1 over the access the PDU session was associated with; and

for the re-initiated UE-requested PDU session establishment procedure(s) the UE should set a new PDU session ID different from the PDU session ID associated with the present PDU session and should set

a) the PDU session type to the PDU session type associated with the present PDU session;

b) the SSC mode to the SSC mode associated with the present PDU session;

c) the DNN to the DNN associated with the present PDU session;

d) the S-NSSAI to

1) the S-NSSAI associated with (if available in roaming scenarios) a mapped S-NSSAI if provided in the UE-requested PDU session establishment procedure of the present PDU session; or

2) the S-NSSAI received in the PDU SESSION ESTABLISHMENT ACCEPT message of the existing PDU session if the UE received the alternative S-NSSAI IE in the PDU SESSION MODIFICATION COMMAND message; and

e) the alternative S-NSSAI to the S-NSSAI associated with (if available in roaming scenarios) a mapped S-NSSAI if received in the alternative S-NSSAI IE of the PDU SESSION MODIFICATION COMMAND message

if the UE has indicated support for CIoT 5GS optimizations and receives a small data rate control parameters container in the extended protocol configuration options IE in the PDU SESSION MODIFICATION COMMAND message the UE shall store the small data rate control parameters value and use the stored small data rate control parameters value as the maximum allowed limit of uplink user data for the PDU session in accordance with 3GPP TS 23.501 [8] if the UE has a previously stored small data rate control parameter value for the PDU session the UE shall replace the stored small data rate control parameters value for the PDU session with the received small data rate control parameters value in the extended protocol configuration options IE in the PDU SESSION MODIFICATION COMMAND message

if the UE has indicated support for CIoT 5GS optimizations and receives an additional small data rate control parameters for exception data container in the extended protocol configuration options IE in the PDU SESSION MODIFICATION COMMAND message the UE shall store the additional small data rate control parameters for exception data value and use the stored additional small data rate control parameters for exception data value as the maximum allowed limit of uplink exception data for the PDU session in accordance with 3GPP TS 23.501 [8] if the UE has a previously stored additional small data rate control parameters for exception data value for the PDU session the UE shall replace the stored additional small data rate control parameters for exception data value for the PDU session with the received additional small data rate control parameters for exception data value in the extended protocol configuration options IE in the PDU SESSION MODIFICATION COMMAND message

the UE shall include the PDU session ID of the old PDU session which is about to get released in the old PDU session ID IE of the UL NAS TRANSPORT message that transports the PDU SESSION ESTABLISHMENT REQUEST message

NOTE 6 the UE is expected to maintain the PDU session for which the PDU SESSION MODIFICATION COMMAND message including 5GSM cause #39 "reactivation requested" is received during the time indicated by the PDU session address lifetime value or until receiving an indication from upper layers (e.g that the old PDU session is no more needed)

if the selected PDU session type of the PDU session is "Unstructured" the UE supports inter-system change from N1 mode to S1 mode the UE does not support establishment of a PDN connection for the PDN type set to "non-IP" in S1 mode and the parameters list field of one or more authorized QoS flow descriptions received in the authorized QoS flow descriptions IE of the PDU SESSION MODIFICATION COMMAND message contains an EPS bearer identity (EBI) then the UE shall locally remove the EPS bearer identity (EBI) from the parameters list field of such one or more authorized QoS flow descriptions after sending the PDU SESSION MODIFICATION COMPLETE message for the ongoing PDU session modification procedure the UE shall initiate a PDU session modification procedure by sending a PDU SESSION MODIFICATION REQUEST message to delete the mapped EPS bearer context with 5GSM cause #85 "Invalid mapped EPS bearer identity"

if the selected PDU session type of the PDU session is "Ethernet" the UE supports inter-system change from N1 mode to S1 mode the UE does not support establishment of a PDN connection for the PDN type set to "non-IP" in S1 mode the UE the network or both of them do not support ethernet PDN type in S1 mode and the parameters list field of one or more authorized QoS flow descriptions received in the authorized QoS flow descriptions IE of the PDU SESSION MODIFICATION COMMAND message contains an EPS bearer identity (EBI) the UE shall locally remove the EPS bearer identity (EBI) from the parameters list field of such one or more authorized QoS flow descriptions after sending the PDU SESSION MODIFICATION COMPLETE message for the ongoing PDU session modification procedure the UE shall initiate a PDU session modification procedure by sending a PDU SESSION MODIFICATION REQUEST message to delete the mapped EPS bearer context with 5GSM cause #85 "Invalid mapped EPS bearer identity"

for a UE which is registered for disaster roaming services and for a PDU session which is not a PDU session for emergency services

a) if the parameters list field of one or more authorized QoS flow descriptions received in the authorized QoS flow descriptions IE of the PDU SESSION MODIFICATION COMMAND message contains an EPS bearer identity (EBI) then the UE shall locally remove the EPS bearer identity (EBI) from the parameters list field of such one or more authorized QoS flow descriptions; and

b) the UE shall locally delete the contents of the mapped EPS bearer contexts IE if it is received in the PDU SESSION MODIFICATION COMMAND message

if the Always-on PDU session indication IE is included in the PDU SESSION MODIFICATION COMMAND message and

a) the value of the IE is set to "Always-on PDU session required" the UE shall consider the established PDU session as an always-on PDU session; or

b) the value of the IE is set to "Always-on PDU session not allowed" the UE shall not consider the established PDU session as an always-on PDU session

if the UE does not receive the Always-on PDU session indication IE in the PDU SESSION MODIFICATION COMMAND message

a) if the network-requested PDU session modification procedure is triggered by a UE-requested PDU session modification procedure upon an inter-system change from S1 mode to N1 mode for a PDN connection established when in S1 mode the UE shall not consider the modified PDU session as an always-on PDU session; or

b) otherwise

1) if the UE has received the Always-on PDU session indication IE with the value set to "Always-on PDU session required" for this PDU session the UE shall consider the PDU session as an always-on PDU session; or

2) otherwise the UE shall not consider the PDU session as an always-on PDU session

if the PDU SESSION MODIFICATION COMMAND message contains a port management information container IE the UE shall forward the contents of the port management information container IE to the DS-TT (see 3GPP TS 23.501 [8] and 3GPP TS 23.502 [9])

if the UE receives a serving PLMN rate control IE in the PDU SESSION MODIFICATION COMMAND message the UE shall store the serving PLMN rate control IE value replacing any existing value and use the stored serving PLMN rate control value as the maximum allowed limit of uplink control plane user data for the corresponding PDU session in accordance with 3GPP TS 23.501 [8]

if the PDU SESSION MODIFICATION COMMAND message includes the received MBS container IE for each of the received MBS informations

a) if MBS decision is set to "MBS join is accepted" the UE shall consider that it has successfully joined the multicast MBS session the UE shall store the received TMGI and shall use it for any further operation on that multicast MBS session the UE shall store the received MBS service area associated with the received TMGI if any and provide the received TMGI to lower layers the UE may provide the MBS start time if it is included in the received MBS information to upper layers;

b) if MBS decision is set to "MBS join is rejected" the UE shall consider the requested join as rejected the UE shall store the received MBS service area associated with the received TMGI if any if the received rejection cause is set to "User is outside of local MBS service area" the UE shall not request to join the same multicast MBS session if neither current TAI nor CGI of the current cell is part of the received MBS service area if the received rejection cause is set to "multicast MBS session has not started or will not start soon" and an MBS back-off timer value is included with value that indicates neither zero nor deactivated the UE shall start a back-off timer T3587 with the value provided in the MBS back-off timer value for the received TMGI and shall not attempt to join the multicast MBS session with the same TMGI the source IP address information of the TMGI or the destination IP address information of the TMGI until the expiry of T3587 if the MBS back-off timer value indicates that this timer is deactivated the UE shall not attempt to join the multicast MBS session with the same TMGI until the UE is switched off the USIM is removed or the entry in the "list of subscriber data" for the current SNPN is updated if the MBS back-off timer value indicates zero the UE may attempt to join the MBS session with the same TMGI;

c) if the MBS decision is set to "Remove UE from multicast MBS session" the UE shall consider that it has successfully left the multicast MBS session and if the received rejection cause is set to "multicast MBS session is released" the UE shall consider the multicast MBS session as released then the UE shall indicate to lower layers to delete the stored TMGI;

d) if the MBS decision is set to "MBS service area update" the UE shall store the received MBS service area associated with the received TMGI and replace the current MBS service area with the received one or

e) if the MBS decision is set to "MBS security information update" the UE shall replace the current MBS security information with the MBS security information received in the MBS security container associated with the received TMGI

if the UE is switched off when the timer T3587 is running the UE may behave as follows when the UE is switched on and the USIM in the UE remains the same

let t1 be the time remaining for T3587 timeout at switch off and let t be the time elapsed between switch off and switch on if t1 is greater than t then the timer shall be restarted with the value t1 – t if t1 is equal to or less than t then the timer need not be restarted

if the UE has indicated support for ECS configuration information provisioning in the SESSION ESTABLISHMENT REQUEST message or while in S1 mode then upon receiving

a) one or more ECS IPv4 address(es) ECS IPv6 address(es) ECS FQDN(s);

b) one or more associated ECSP identifier(s);

c) optionally spatial validity conditions associated with the ECS address;

d) optionally ECS authentication methods associated with the ECS address; and

e) optionally ECS supported PLMNs information list including the associated ECSP information for which the EDN configuration information can be provided by the ECS

in the extended protocol configuration options IE of the PDU SESSION MODIFICATION COMMAND message then the UE shall pass them to the upper layers

if the UE supports receiving DNS server addresses in protocol configuration options and receives one or more DNS server IPv4 address(es) one or more DNS server IPv6 address(es) or both of them in the extended protocol configuration options IE of the PDU SESSION MODIFICATION COMMAND message then the UE shall pass the received DNS server IPv4 address(es) if any and the received DNS server IPv6 address(es) if any to upper layers

NOTE 7 the received DNS server address(es) replace previously provided DNS server address(es) if any

if the UE supports the EAS rediscovery and receives

a) the EAS rediscovery indication without indicated impact; or

b) the following

1) one or more EAS rediscovery indication(s) with impacted EAS IPv4 address range if supported by the UE;

2) one or more EAS rediscovery indication(s) with impacted EAS IPv6 address range if supported by the UE;

3) one or more EAS rediscovery indication(s) with impacted EAS FQDN if supported by the UE; or

4) any combination of the above;

in the extended protocol configuration options IE of the PDU SESSION MODIFICATION COMMAND message then the UE shall pass the EAS rediscovery indication and the received impacted EAS IPv4 address range(s) if supported and included the received EAS IPv6 address range(s) if supported and included and the received EAS FQDN(s) if supported and included to upper layers

NOTE 8 the upper layers handle the EAS rediscovery indication and the impacted EAS IPv4 address range(s) if any the impacted EAS IPv6 address range(s) if any and the received EAS FQDN(s) if any according to 3GPP TS 23.548 [10A]

upon receipt of PDU SESSION MODIFICATION COMMAND message if the network-requested PDU session modification procedure is triggered by a UE-requested PDU session modification procedure the Service-level-AA container IE is included then the UE shall forward the service-level-AA contents of the Service-level-AA container IE to the upper layers

if the UE supports EDC and receives the EDC usage allowed indicator in the extended protocol configuration options IE of the PDU SESSION MODIFICATION COMMAND message the UE shall indicate to upper layers that network allows the use of EDC

if the UE supports EDC and receives the EDC usage required indicator in the extended protocol configuration options IE of the PDU SESSION MODIFICATION COMMAND message the UE shall indicate to upper layers that network requires the use of EDC

NOTE 9 handling of indication that network allows the use of EDC or that network requires the use of EDC is specified in 3GPP TS 23.548 [182]

if the alternative S-NSSAI IE is included in the PDU SESSION MODIFICATION COMMAND message the UE shall replace the S-NSSAI or the mapped S-NSSAI associated with the PDU session according to the alternative S-NSSAI IE the S-NSSAI for the established PDU session shall be the S-NSSAI to be replaced and the alternative S-NSSAI on the UE side

if the protocol description IE is included in the PDU SESSION MODIFICATION COMMAND message for each existing QoS rule

a) for the protocol description field with the value of the length of protocol description field set to 1 for the associated QoS rule the UE shall delete any previously stored protocol description for the QoS rule indicated by the QRI field of the protocol description field; and

b) for the protocol description field with the value of the length of protocol description field greater than 1 for the associated QoS rule the UE shall store the associated protocol description if there is no stored protocol description or replace any previously stored protocol description with the new received protocol description when there is stored protocol description for the QoS rule

the UE may use the protocol description information associated with the QoS rule(s) provided by the protocol description IE to identify PDUs belonging to PDU sets for the uplink direction

NOTE 10 whether and how to use the protocol description information to identify PDU sets is up to the UE implementation

if the ECN marking for L4S indication IE is included in the PDU SESSION MODIFICATION COMMAND message for each existing QoS rule

a) for the ECN marking for L4S indication field with the value of the length of protocol description field set to 1 for the associated QoS rule the 5G-RG shall delete any previously stored ECN marking for L4S indication for all QoS rule(s) if any; and

b) for the ECN marking for L4S indication field with the value of the length of ECN marking for L4S indication field greater than 1 for the associated QoS rule the 5G-RG shall store the associated ECN marking for L4S indication if there is no stored ECN marking for L4S indication or delete the previously stored ECN marking for L4S indication for the QoS rule not indicated by the QRI field of the ECN marking for L4S indication field

the 5G-RG may perform the ECN marking for L4S for the corresponding QoS flow based on the ECN marking for L4S indication

NOTE 11 how to perform the ECN marking for L4S for 5G-RG is out of the scope of this specification

the UE shall transport the PDU SESSION MODIFICATION COMPLETE message and the PDU session ID using the NAS transport procedure as specified in subclause 5.4.5

after sending the PDU SESSION MODIFICATION COMPLETE message if the "Create new EPS bearer" operation code in the mapped EPS bearer contexts IE was received in the PDU SESSION MODIFICATION COMMAND message and there is neither a corresponding authorized QoS flow descriptions IE in the PDU SESSION MODIFICATION COMMAND message nor an existing QoS flow description corresponding to the EPS bearer identity included in the mapped EPS bearer context the UE shall send a PDU SESSION MODIFICATION REQUEST message including a mapped EPS bearer contexts IE to delete the mapped EPS bearer context

after sending the PDU SESSION MODIFICATION COMPLETE message if for the PDU session being modified there are mapped EPS bearer context(s) but none of them is associated with the default QoS rule the UE shall locally delete the mapped EPS bearer context(s) and shall locally delete the stored EPS bearer identity (EBI) in all the QoS flow descriptions of the PDU session if any

if a port management information container needs to be delivered (see 3GPP TS 23.501 [8] and 3GPP TS 23.502 [9]) the UE shall include a port management information container IE in the PDU SESSION MODIFICATION COMPLETE message

upon receipt of a PDU SESSION MODIFICATION COMPLETE message the SMF shall stop timer T3591 and shall consider the PDU session as modified if the selected SSC mode of the PDU session is "SSC mode 3" and the PDU SESSION MODIFICATION COMMAND message included 5GSM cause #39 "reactivation requested" the SMF shall start timer T3593 if the PDU session address lifetime value is sent to the UE in the PDU SESSION MODIFICATION COMMAND message then timer T3593 shall be started with the same value otherwise it shall use a default value if the PDU SESSION MODIFICATION COMPLETE message contains a port management information container IE the SMF shall handle the contents of the port management information container IE as specified in 3GPP TS 23.501 [8] and 3GPP TS 23.502 [9]

#### 6.3.2.4 Network-requested PDU session modification procedure not accepted by the UE

upon receipt of a PDU SESSION MODIFICATION COMMAND message and a PDU session ID using the NAS transport procedure as specified in subclause 5.4.5 if the UE rejects the PDU SESSION MODIFICATION COMMAND message the UE shall create a PDU SESSION MODIFICATION COMMAND REJECT message

if the PDU SESSION MODIFICATION COMMAND message contains the PTI value allocated in the UE-requested PDU session modification procedure the UE shall stop the timer T3581 the UE should ensure that the PTI value assigned to this procedure is not released immediately

NOTE 1 the way to achieve this is implementation dependent for example the UE can ensure that the PTI value assigned to this procedure is not released during the time equal to or greater than the default value of timer T3591

while the PTI value is not released the UE regards any received PDU SESSION MODIFICATION COMMAND message with the same PTI value as a network retransmission (see subclause 7.3.1)

the UE shall set the 5GSM cause IE of the PDU SESSION MODIFICATION COMMAND REJECT message to indicate the reason for rejecting the PDU session modification

the 5GSM cause IE typically indicates one of the following 5GSM cause values

#26 insufficient resources;

#44 semantic error in packet filter(s);

#45 syntactical error in packet filter(s);

#83 semantic error in the QoS operation; or

#84 syntactical error in the QoS operation

if the selected SSC mode of the PDU session is "SSC mode 3" and the PDU SESSION MODIFICATION COMMAND messages includes 5GSM cause #39 "reactivation requested" while the UE does not have sufficient resources for initiating the PDU session establishment procedure as specified in subclause 6.4.1 then the UE shall set cause IE to #26 "insufficient resources"

if the PDU SESSION MODIFICATION COMMAND message includes a request to add a new authorized QoS rule or a request to modify the authorized QoS rules or both and the UE decides to reject the request due to e.g the supported number of authorized QoS rules or number of packet filters associated with a PDU session having reached the maximum number then the UE shall set the 5GSM cause IE to #26 "insufficient resources"

NOTE 2 the maximum number of supported authorized QoS rules or packet filters associated with a PDU session is implementation specific

if the PDU SESSION MODIFICATION COMMAND message includes a request to add a new authorized QoS flow description or a request to modify the authorized QoS flow descriptions or both and the UE decides to reject the request due to e.g the supported number of authorized QoS flow descriptions then the UE shall set the 5GSM cause IE to #26 "insufficient resources"

NOTE 3 the maximum number of supported authorized QoS flow descriptions associated with a PDU session is implementation specific

if the PDU SESSION MODIFICATION COMMAND message includes the authorized QoS rules IE the UE shall process the QoS rules sequentially starting with the first QoS rule the UE shall check the QoS rule and the QoS flow description provided in the PDU SESSION MODIFICATION COMMAND message for different types of errors as follows

NOTE 4 if an error is detected in a QoS rule or a QoS flow description which requires rejecting the PDU SESSION MODIFICATION COMMAND message then the authorized QoS rules IE the authorized QoS flow descriptions IE the mapped EPS bearer contexts IE and any other IE (RQ timer value IE Always-on PDU session indication IE etc) included in the PDU SESSION MODIFICATION COMMAND message are discarded if any

a) semantic errors in QoS operations

1) when the rule operation is "Modify existing QoS rule and add packet filters" "Modify existing QoS rule and replace all packet filters" "Modify existing QoS rule and delete packet filters" or "Modify existing QoS rule without modifying packet filters" on the default QoS rule and the DQR bit is set to "the QoS rule is not the default QoS rule"

2) when the rule operation is "Modify existing QoS rule and add packet filters" "Modify existing QoS rule and replace all packet filters" "Modify existing QoS rule and delete packet filters" or "Modify existing QoS rule without modifying packet filters" on a QoS rule which is not the default QoS rule and the DQR bit is set to "the QoS rule is the default QoS rule"

3) when the rule operation is "Create new QoS rule" and the DQR bit is set to "the QoS rule is the default QoS rule" when there's already a default QoS rule with different QoS rule identifier

4) when the rule operation is "Delete existing QoS rule" on the default QoS rule

5) when the rule operation is "Create new QoS rule" "Modify existing QoS rule and add packet filters" "Modify existing QoS rule and replace all packet filters" "Modify existing QoS rule and delete packet filters " or "Modify existing QoS rule without modifying packet filters" and two or more QoS rules associated with this PDU session would have identical precedence values and the UE is not in NB-N1 mode

6) when the rule operation is "Modify existing QoS rule and delete packet filters" the QoS rule is a QoS rule of a PDU session of IPv4 IPv6 IPv4v6 or ethernet PDU session type and the packet filter list in the resultant QoS rule is empty

7) when the rule operation is "Create new QoS rule" there is already an existing QoS rule with the same QoS rule identifier and the UE is not in NB-N1 mode

8) when the rule operation is "Modify existing QoS rule and add packet filters" "Modify existing QoS rule and replace all packet filters" "Modify existing QoS rule and delete packet filters" or "Modify existing QoS rule without modifying packet filters" the associated QoS rule does not exist and the UE is not in NB-N1 mode

9) when the rule operation is different than "Delete existing QoS rule" the DQR bit of the QoS rule is set to "the QoS rule is not the default QoS rule" and the UE is in NB-N1 mode

10) when the rule operation is "Create new QoS rule" the DQR bit is set to "the QoS rule is not the default QoS rule" and the PDU session type of the PDU session is "Unstructured"

11) when the rule operation is "Delete existing QoS rule" and there is no existing QoS rule with the same QoS rule identifier

12) when the flow description operation is "Create new QoS flow description" there is already an existing QoS flow description with the same QoS flow identifier and the UE is not in NB-N1 mode

13) when the flow description operation is "Modify existing QoS flow description" the associated QoS flow description does not exist and the UE is not in NB-N1 mode

14) when the flow description operation is "Delete existing QoS flow description" and there is no existing QoS flow description with the same QoS flow identifier

15) when the flow description operation is different than "Delete existing QoS flow description" the QFI is not the same as the QFI of the default QoS rule and the UE is in NB-N1 mode

16) when the flow description operation is "Create new QoS flow description" or "Modify existing QoS flow description" the QFI associated with the QoS flow description is not the same as the QFI of the default QoS rule and the PDU session type of the PDU session is "Unstructured"

17) when the rule operation is "Modify existing QoS rule and add packet filters" the "packet filter list" field contains a match-all packet filter the resultant QoS rule is the default QoS rule and there is already an existing match-all packet filter associated with the default QoS rule

18) when the rule operation is "Create new QoS rule" and the DQR bit is set to "the QoS rule is not the default QoS rule" or the rule operation is "Modify existing QoS rule and add packet filters" on a QoS rule which is not the default QoS rule or "Modify existing QoS rule and replace all packet filters" on a QoS rule which is not the default QoS rule and one match-all packet filter is to be associated with the resultant QoS rule

in case 4 the UE shall initiate a PDU session release procedure by sending a PDU SESSION RELEASE REQUEST message with 5GSM cause #83 "semantic error in the QoS operation"

in case 5 if the old QoS rule (i.e the QoS rule that existed before the PDU SESSION MODIFICATION COMMAND message was received) is not the default QoS rule the UE shall not diagnose an error shall further process the new request and if it was processed successfully shall delete the old QoS rule which has identical precedence value furthermore after sending the PDU SESSION MODIFICATION COMPLETE for the ongoing PDU session modification procedure the UE shall send a PDU SESSION MODIFICATION REQUEST message with 5GSM cause #83 "semantic error in the QoS operation" to delete the QoS rule

in case 5 if the old QoS rule (i.e the QoS rule that existed before the PDU SESSION MODIFICATION COMMAND message was received) is the default QoS rule the UE shall initiate a PDU session release procedure by sending a PDU SESSION RELEASE REQUEST message with 5GSM cause #83 "semantic error in the QoS operation"

in case 6 if the QoS rule is not the default QoS rule after sending the PDU SESSION MODIFICATION COMPLETE for the ongoing PDU session modification procedure the UE shall send a PDU SESSION MODIFICATION REQUEST message with 5GSM cause #83 "semantic error in the QoS operation" to delete the QoS rule

in case 6 if the QoS rule is the default QoS rule the UE shall initiate a PDU session release procedure by sending a PDU SESSION RELEASE REQUEST message with 5GSM cause #83 "semantic error in the QoS operation"

in case 7 if the existing QoS rule is not the default QoS rule and the DQR bit of the new QoS rule is set to "the QoS rule is not the default QoS rule" the UE shall not diagnose an error further process the create request and if it was processed successfully delete the old QoS rule (i.e the QoS rule that existed when case 7 was detected) if the existing QoS rule is the default QoS rule or the DQR bit of the new QoS rule is set to "the QoS rule is the default QoS rule" the UE shall reject the PDU SESSION MODIFICATION COMMAND message with 5GSM cause #83 "semantic error in the QoS operation"

in case 9 or case 10 after sending the PDU SESSION MODIFICATION COMPLETE for the ongoing PDU session modification procedure the UE shall send a PDU SESSION MODIFICATION REQUEST message with 5GSM cause #83 "semantic error in the QoS operation" to delete the QoS rule

in case 11 the UE shall not diagnose an error further process the delete request and if it was processed successfully consider the respective QoS rule as successfully deleted

in case 12 the UE shall not diagnose an error further process the create request and if it was processed successfully delete the old QoS flow description (i.e the QoS flow description that existed when case 12 was detected)

in case 14 the UE shall not diagnose an error further process the delete request and if it was processed successfully consider the respective QoS flow description as successfully deleted

in case 15 or case 16 after sending the PDU SESSION MODIFICATION COMPLETE for the ongoing PDU session modification procedure the UE shall send a PDU SESSION MODIFICATION REQUEST message with 5GSM cause #83 "semantic error in the QoS operation" to delete the QoS flow description

otherwise the UE shall reject the PDU SESSION MODIFICATION COMMAND message with 5GSM cause #83 "semantic error in the QoS operation"

b) syntactical errors in QoS operations

1) when the rule operation is "Create new QoS rule" "Modify existing QoS rule and add packet filters" "Modify existing QoS rule and replace all packet filters" or "Modify existing QoS rule and delete packet filters" the PDU session type of the PDU session is IPv4 IPv6 IPv4v6 or ethernet PDU session type and the packet filter list in the QoS rule is empty

2) when the rule operation is "Delete existing QoS rule" or "Modify existing QoS rule without modifying packet filters" with a non-empty packet filter list in the QoS rule

3) when the rule operation is "Modify existing QoS rule and delete packet filters" and the packet filter to be deleted does not exist in the original QoS rule

4) void

5) when there are other types of syntactical errors in the coding of the authorized QoS rules IE or the authorized QoS flow descriptions IE such as a mismatch between the number of packet filters subfield and the number of packet filters in the packet filter list when the rule operation is "delete existing QoS rule" or "create new QoS rule" or the number of packet filters subfield is larger than the maximum possible number of packet filters in the packet filter list (i.e. there is no QoS rule precedence subfield included in the QoS rule IE) the QoS rule identifier is set to "no QoS rule identifier assigned" when the rule operation is not "delete existing QoS rule" or the QoS flow identifier is set to "no QoS flow identifier assigned" when the flow description operation is not "Delete existing QoS flow description"

6) when the rule operation is "Modify existing QoS rule and add packet filters" or "Modify existing QoS rule and replace all packet filters" the DQR bit is set to "the QoS rule is the default QoS rule" the PDU session type of the PDU session is "Unstructured" and the packet filter list in the QoS rule is not empty

7) when the

A) rule operation is "Create new QoS rule" "Modify existing QoS rule and add packet filters" "Modify existing QoS rule and replace all packet filters" "Modify existing QoS rule and delete packet filters" or "Modify existing QoS rule without modifying packet filters" there is no QoS flow description with a QFI corresponding to the QFI of the resulting QoS rule and the UE determines by using the QoS rule’s QFI as the 5QI that there is a resulting QoS rule for a GBR QoS flow (as described in 3GPP TS 23.501 [8] table 5.7.4-1)

B) flow description operation is "Delete existing QoS flow description" and the UE determines by using the QoS rule’s QFI as the 5QI that there is a resulting QoS rule for a GBR QoS flow (as described in 3GPP TS 23.501 [8] table 5.7.4-1) with a QFI corresponding to the QFI of the QoS flow description that is deleted (i.e there is no associated QoS flow description with the same QFI)

8) when the flow description operation is "Create new QoS flow description" or "Modify existing QoS flow description" and the UE determines that there is a QoS flow description of a GBR QoS flow (as described in 3GPP TS 23.501 [8] table 5.7.4-1) which lacks at least one of the mandatory parameters (i.e. GFBR uplink GFBR downlink MFBR uplink and MFBR downlink) if the QoS flow description does not include a 5QI the UE determines this by using the QFI as the 5QI

in case 3 the UE shall not diagnose an error further process the deletion request and if no error according to items c and d was detected consider the respective packet filter as successfully deleted

in case 6 after completion of the PDU session modification procedure the UE shall send a PDU SESSION MODIFICATION REQUEST message with 5GSM cause #84 "syntactical error in the QoS operations" to delete all the packet filters for the default QoS rule

in case 7 if the authorized QoS rules IE contains at least one other valid QoS rule the UE shall not diagnose an error and shall further process the request if no error according to items c and d was detected after completion of the PDU session modification procedure if the resulting QoS rule for a GBR QoS flow which has no QoS flow description is the default QoS rule the UE shall initiate a PDU session release procedure by sending a PDU SESSION RELEASE REQUEST message with 5GSM cause #84 "syntactical error in the QoS operation" otherwise the UE shall delete the QoS rule for which no corresponding QoS flow description is available and initiate UE-requested PDU session modification procedure with 5GSM cause #84 "syntactical error in the QoS operation" to delete the QoS rule for which it has deleted

in case 8 if the default QoS rule is associated with the QoS flow description which lacks at least one of the mandatory parameters the UE shall initiate a PDU session release procedure by sending a PDU SESSION RELEASE REQUEST message with 5GSM cause #84 "syntactical error in the QoS operation" otherwise if the authorized QoS rules IE contains at least one other valid QoS rule or the QoS flow description IE contains at least one other valid QoS flow description the UE shall not diagnose an error and shall further process the request if no error according to items c and d was detected after completion of the PDU session modification procedure the UE shall delete the QoS flow description which lacks at least one of the mandatory parameters and the associated QoS rule(s) if any and initiate UE-requested PDU session modification procedure with 5GSM cause #84 "syntactical error in the QoS operation" to delete the QoS flow description and the associated QoS rule(s) if any which it has deleted

otherwise the UE shall reject the PDU SESSION MODIFICATION COMMAND message with 5GSM cause #84 "syntactical error in the QoS operation"

NOTE 5 it is not considered an error if the UE determines that after processing all QoS operations on QoS rules and QoS flow descriptions there is a QoS flow description that is not associated with any QoS rule and the UE is not in NB-N1 mode

NOTE 5A an implementation that strictly follows QoS rule operation as defined in subclause 9.11.4.13 might not detect case 2)

c) semantic errors in packet filters

1) when a packet filter consists of conflicting packet filter components which would render the packet filter ineffective i.e no IP packet will ever fit this packet filter how the UE determines a semantic error in a packet filter is outside the scope of the present document

the UE shall reject the PDU SESSION MODIFICATION COMMAND message with 5GSM cause #44 "semantic error in packet filter(s)"

d) syntactical errors in packet filters

1) when the rule operation is "Create new QoS rule" "Modify existing QoS rule and add packet filters" or "Modify existing QoS rule and replace all packet filters" and two or more packet filters in the resultant QoS rule would have identical packet filter identifiers

2) when there are other types of syntactical errors in the coding of packet filters such as the use of a reserved value for a packet filter component identifier

in case 1 if two or more packet filters with identical packet filter identifiers are contained in the PDU SESSION MODIFICATION COMMAND message the UE shall reject the PDU SESSION MODIFICATION COMMAND with 5GSM cause #45 "syntactical errors in packet filter(s)" otherwise the UE shall not diagnose an error further process the PDU SESSION MODIFICATION COMMAND message and if it was processed successfully replace the old packet filter with the new packet filter which have the identical packet filter identifiers

otherwise the UE shall reject the PDU SESSION MODIFICATION COMMAND message with 5GSM cause #45 "syntactical errors in packet filter(s)"

if

a) the UE detects errors in QoS rules that require to delete at least one QoS rule as described above which requires sending a PDU SESSION MODIFICATION REQUEST message to delete the erroneous mapped EPS bearer contexts; and

b) optionally if the UE detects different errors in the mapped EPS bearer contexts as described in subclause 6.3.2.3 which requires sending a PDU SESSION MODIFICATION REQUEST message to delete the erroneous QoS rules;

the UE after sending the PDU SESSION MODIFICATION COMPLETE message for the ongoing PDU session modification procedure may send a single PDU SESSION MODIFICATION REQUEST message to delete the erroneous QoS rules and optionally to delete the erroneous mapped EPS bearer contexts the UE shall include a 5GSM cause IE in the PDU SESSION MODIFICATION REQUEST message

NOTE 6 the 5GSM cause to use cannot be different from #41 "semantic error in the TFT operation" #42 "syntactical error in the TFT operation" #44 "semantic error in packet filter(s)" #45 "syntactical errors in packet filter(s)" #83 "semantic error in the QoS operation" #84 "syntactical error in the QoS operation" or #85 "Invalid mapped EPS bearer identity" the selection of a 5GSM cause is up to UE implementation

the UE shall transport the PDU SESSION MODIFICATION COMMAND REJECT message and the PDU session ID using the NAS transport procedure as specified in subclause 5.4.5

upon receipt of a PDU SESSION MODIFICATION COMMAND REJECT message with 5GSM cause value in state PDU SESSION MODIFICATION PENDING the SMF shall stop timer T3591 enter the state PDU SESSION ACTIVE and abort the PDU session modification procedure

#### 6.3.2.5 abnormal cases on the network side

the following abnormal cases can be identified

a) expiry of timer T3591

on the first expiry of the timer T3591 the SMF shall resend the PDU SESSION MODIFICATION COMMAND message and shall reset and restart timer T3591 this retransmission is repeated four times i.e on the fifth expiry of timer T3591 the SMF shall abort the procedure and enter the state PDU SESSION ACTIVE

the SMF may continue to use the previous configuration of the PDU session or initiate the network-requested PDU session release procedure if the SMF decides to continue to use the previous configuration of the PDU session and

i) the authorized QoS rules IE is included in the PDU SESSION MODIFICATION COMMAND message the SMF may mark the corresponding authorized QoS rule(s) of the PDU session as to be synchronised with the UE; and

ii) the authorized QoS flow descriptions IE is included in the PDU SESSION MODIFICATION COMMAND message the SMF may mark the corresponding authorized QoS flow description(s) of the PDU session as to be synchronised with the UE

b) void

c) collision of UE-requested PDU session release procedure and network-requested PDU session modification procedure

if the SMF receives a PDU SESSION RELEASE REQUEST message during the network-requested PDU session modification procedure and the PDU session indicated in the PDU SESSION RELEASE REQUEST message is the PDU session that the SMF had requested to modify the SMF shall abort the PDU session modification procedure and proceed with the UE-requested PDU session release procedure

d) collision of UE-requested PDU session modification procedure and network-requested PDU session modification procedure

if the network receives a PDU SESSION MODIFICATION REQUEST message during the network-requested PDU session modification procedure and the PDU session indicated in the PDU SESSION MODIFICATION REQUEST message is the PDU session that the network had requested to modify the network shall

i) if the received PDU SESSION MODIFICATION REQUEST message includes the URSP rule enforcement reports IE ignore the PDU SESSION MODIFICATION REQUEST message received in the state PDU SESSION MODIFICATION PENDING except for the URSP rule enforcement reports IE and proceed with the network-requested PDU session modification procedure; or

ii) otherwise ignore the PDU SESSION MODIFICATION REQUEST message received in the state PDU SESSION MODIFICATION PENDING and proceed with the network-requested PDU session modification procedure as if no PDU SESSION MODIFICATION REQUEST message was received from the UE

e) 5G access network cannot forward the message

if the SMF determines based on content of the n2SmInfo attribute specified in 3GPP TS 29.502 [20A] that the DL NAS TRANSPORT message carrying the PDU SESSION MODIFICATION COMMAND message was not forwarded to the UE by the 5G access network then the SMF shall abort the procedure and enter the state PDU SESSION ACTIVE

f) 5G access network cannot forward the message due to handover

if the SMF determines based on content of the n2SmInfo attribute specified in 3GPP TS 29.502 [20A] that the DL NAS TRANSPORT message carrying the PDU SESSION MODIFICATION COMMAND message was not forwarded to the UE by the 5G access network due to handover then the SMF shall abort the procedure and enter the state PDU SESSION ACTIVE

the SMF may re-initiate up to a pre-configured number of times the network-requested PDU session modification procedure when the SMF detects that the handover is completed successfully or has failed or at the expiry of the configured guard timer as specified in 3GPP TS 23.502 [9]

g) collision of re-establishment of the user-plane resources and network-requested PDU session modification procedure for the same PDU session

if the SMF receives an indication from the AMF to re-establish the user-plane resources during the network-requested PDU session modification procedure for the same PDU session the network shall abort the network-requested PDU session modification procedure and proceed with re-establishment of the user-plane resources for the PDU session as specified in 3GPP TS 29.502 [20A] subclause 5.2.2.3.2.2

NOTE after the completion of re-establishment of the user-plane resources for the PDU session the SMF can re-initiate the network-requested PDU session modification procedure for the PDU session

h) collision of UE-requested PDU session establishment procedure and network-requested PDU session modification procedure

if the network receives a PDU SESSION ESTABLISHMENT REQUEST message with request type set to "existing PDU session" or "existing emergency PDU session" during the network-requested PDU session modification procedure and the PDU session ID indicated in the PDU SESSION ESTABLISHMENT REQUEST message is the PDU session that the network had requested to modify the network shall abort the network-requested PDU session modification procedure and proceed with the UE-requested PDU session establishment procedure

#### 6.3.2.6 abnormal cases in the UE

the following abnormal cases can be identified

a) PDU session inactive for the received PDU session ID

if the PDU session ID in the PDU SESSION MODIFICATION COMMAND message belongs to any PDU session in state PDU SESSION INACTIVE in the UE the UE shall set the 5GSM cause IE to #43 "Invalid PDU session identity" in the 5GSM STATUS message and set the PDU session ID to the received PDU session ID in the UL NAS TRANSPORT message as specified in subclause 5.4.5

b) collision of network-requested PDU session modification procedure and UE-requested PDU session modification procedure

if the UE receives a PDU SESSION MODIFICATION COMMAND message during the UE-requested PDU session modification procedure the PTI IE of the PDU SESSION MODIFICATION COMMAND message is set to "No procedure transaction identity assigned" and the PDU session indicated in the PDU SESSION MODIFICATION COMMAND message is the PDU session that the UE had requested to modify the UE shall abort internally the UE-requested PDU session modification procedure enter the state PDU SESSION ACTIVE and proceed with the network-requested PDU session modification procedure

c) a semantic error in QoS operations or a sematic error in packet filters is detected in a PDU SESSION MODIFICATION COMMAND message that contains other optional information elements

if the UE diagnoses a semantic error in QoS operations or a semantic error in packet filters in the PDU SESSION MODIFICATION COMMAND as specified in subclause 6.3.2.4 and the message contains other optional information elements the UE shall discard the other optional information elements and shall send the PDU SESSION MODIFICATION REJECT message as specified in subclause 6.3.2.4

### 6.3.3 Network-requested PDU session release procedure

#### 6.3.3.1 general

the purpose of the network-requested PDU session release procedure is to enable the network to release a PDU session or the user-plane resources on a single access of an MA PDU session

#### 6.3.3.2 Network-requested PDU session release procedure initiation

in order to initiate the network-requested PDU session release procedure the SMF shall create a PDU SESSION RELEASE COMMAND message

the SMF shall set the 5GSM cause IE of the PDU SESSION RELEASE COMMAND message to indicate the reason for releasing the PDU session

the 5GSM cause IE typically indicates one of the following 5GSM cause values

#8 operator determined barring;

#26 insufficient resources;

#29 user authentication or authorization failed;

#36 regular deactivation;

#38 network failure;

#39 reactivation requested;

#46 out of LADN service area;

#67 insufficient resources for specific slice and DNN;

#69 insufficient resources for specific slice

if the selected SSC mode of the PDU session is "SSC mode 2" and the SMF requests the relocation of SSC mode 2 PDU session anchor with different PDU sessions as specified in 3GPP TS 23.502 [9] the SMF shall include 5GSM cause #39 "reactivation requested" if the selected SSC mode of the PDU session is "SSC mode 2" or "SSC mode 1" the S-NSSAI or the mapped S-NSSAI of the PDU session needs to be replaced the SMF shall include the alternative S-NSSAI IE and 5GSM cause #39 "reactivation requested" in the PDU SESSION RELEASE COMMAND message if the selected SSC mode of the PDU session is "SSC mode 2" or "SSC mode 1" replaced S-NSSAI is available and the SMF determines that the PDU session needs to be re-established on the replaced S-NSSAI the SMF shall include 5GSM cause #39 "reactivation requested" and the replaced S-NSSAI in the PDU SESSION RELEASE COMMAND message

NOTE 1 the relocation of SSC mode 2 PDU session anchor with different PDU sessions can also be initiated by the SMF in case of the SMF is requested by the AMF to release the PDU session due to the network slice instance of the PDU session is changed as specified in subclause 5.15.5.3 of 3GPP TS 23.501 [8]

if the network-requested PDU session release procedure is triggered by a UE-requested PDU session release procedure the SMF shall set the PTI IE of the PDU SESSION RELEASE COMMAND message to the PTI of the PDU SESSION RELEASE REQUEST message received as part of the UE-requested PDU session release procedure and shall not include the access type IE in the PDU SESSION RELEASE COMMAND

if the network-requested PDU session release procedure is not triggered by a UE-requested PDU session release procedure the SMF shall set the PTI IE of the PDU SESSION RELEASE COMMAND message to "No procedure transaction identity assigned"

if the PDU session ID included in PDU SESSION RELEASE COMMAND message is associated with one or more multicast MBS sessions and either the access type IE is not included or the access type IE indicates "3GPP access" the SMF shall consider the UE as removed from the associated multicast MBS sessions

based on the local policy and user's subscription data if the SMF decides to release the PDU session after determining

a) the UE has moved between a tracking area in NB-N1 mode and a tracking area in WB-N1 mode;

b) the UE has moved between a tracking area in NB-S1 mode and a tracking area in WB-N1 mode;

c) the UE has moved between a tracking area in WB-S1 mode and a tracking area in NB-N1 mode; or

d) a PDU session is not only for control plane CIoT 5GS optimization any more

the SMF shall

a) include the 5GSM cause value #39 "reactivation requested" in the 5GSM cause IE of the PDU SESSION RELEASE COMMAND message; or

b) include a 5GSM cause value other than #39 "reactivation requested" in the 5GSM cause IE of the PDU SESSION RELEASE COMMAND message

NOTE 2 the included 5GSM cause value is up to the network implementation

if the SMF receives UE presence in LADN service area from the AMF indicating that the UE is out of the LADN service area and the SMF decides to release the PDU session the SMF shall include the 5GSM cause value #46 "out of LADN service area" in the 5GSM cause IE of the PDU SESSION RELEASE COMMAND message upon receipt of the 5GSM cause value #46 "out of LADN service area" in the 5GSM cause IE of the PDU SESSION RELEASE COMMAND message the UE shall release the PDU session

the SMF may include a Back-off timer value IE in the PDU SESSION RELEASE COMMAND message when the 5GSM cause value #26 "insufficient resources" is included in the PDU SESSION RELEASE COMMAND message if the 5GSM cause value is #26 "insufficient resources" and the PDU SESSION RELEASE COMMAND message is sent to a UE configured for high priority access in selected PLMN or SNPN or the request type was set to "initial emergency request" or "existing emergency PDU session" for the establishment of the PDU session the network shall not include a Back-off timer value IE

the SMF may include a Back-off timer value IE in the PDU SESSION RELEASE COMMAND message when the 5GSM cause value #67 "insufficient resources for specific slice and DNN" is included in the PDU SESSION RELEASE COMMAND message if the 5GSM cause value is #67 "insufficient resources for specific slice and DNN" and the PDU SESSION RELEASE COMMAND message is sent to a UE configured for high priority access in selected PLMN or SNPN or the request type was set to "initial emergency request" or "existing emergency PDU session" for the establishment of the PDU session the network shall not include a Back-off timer value IE

the SMF may include a Back-off timer value IE in the PDU SESSION RELEASE COMMAND message when the 5GSM cause #69 "insufficient resources for specific slice" is included in the PDU SESSION RELEASE COMMAND message if the 5GSM cause value is #69 "insufficient resources for specific slice" and the PDU SESSION RELEASE COMMAND message is sent to a UE configured for high priority access in selected PLMN or SNPN or the request type was set to "initial emergency request" or "existing emergency PDU session" for the establishment of the PDU session the network shall not include a Back-off timer value IE

the SMF should include a Back-off timer value IE in the PDU SESSION RELEASE COMMAND message when the 5GSM cause value #29 "user authentication or authorization failed" is included in the PDU SESSION RELEASE COMMAND message

if the service-level-AA procedure is triggered for the established PDU session for UAS services with re-authentication purpose and the SMF is informed by the UAS-NF that UUAA-SM is unsuccessful or if the SMF receives UUAA revocation notification message from the UAS-NF as described in 3GPP TS 23.256 [6AB] the SMF shall transmit the PDU SESSION RELEASE COMMAND message to the UE including

a) the service-level-AA response in the Service-level-AA container IE with the SLAR field set to the value of "Service level authentication and authorization was not successful or service level authorization is revoked"; and

b) the 5GSM cause value #29 "user authentication or authorization failed" in the 5GSM cause IE of the PDU SESSION RELEASE COMMAND message

if the PDU session was established for C2 communication and the SMF is informed by UAS-NF that C2 authorization is revoked the SMF shall include

a) the service-level-AA response with the value of the C2AR field set to the "C2 authorization was not successful or C2 authorization is revoked" in the service-level-AA container IE of the PDU SESSION RELEASE COMMAND message and

b) the 5GSM cause value #29 "user authentication or authorization failed" in the 5GSM cause IE of the PDU SESSION RELEASE COMMAND message

the SMF shall send

a) the PDU SESSION RELEASE COMMAND message; and

b) the N1 SM delivery skip allowed indication

1) if the SMF allows the AMF to skip sending the N1 SM container to the UE and the 5GSM cause IE is not set to #39 "reactivation requested"; or

2) if the SMF allows the AMF to skip sending the N1 SM container to the UE and the access type IE is not included

towards the AMF and the SMF shall start timer T3592 (see example in figure 6.3.3.2.1)

figure 6.3.3.2.1 Network-requested PDU session release procedure

#### 6.3.3.3 Network-requested PDU session release procedure accepted by the UE

for a single access PDU session upon receipt of a PDU SESSION RELEASE COMMAND message and a PDU session ID using the NAS transport procedure as specified in subclause 5.4.5 the UE considers the PDU session as released and the UE shall create a PDU SESSION RELEASE COMPLETE message

for an MA PDU session upon receipt of the PDU SESSION RELEASE COMMAND message the UE shall behave as follows

a) if the PDU SESSION RELEASE COMMAND message includes the access type IE and the MA PDU session has user-plane resources established on both 3GPP access and non-3GPP access the UE shall consider the user-plane resources on the access indicated in the access type IE as released and shall create a PDU SESSION RELEASE COMPLETE message if the access type IE indicates "3GPP access" and there is one or more multicast MBS sessions associated with the MA PDU session the UE shall locally leave these associated multicast MBS sessions;

b) if the PDU SESSION RELEASE COMMAND message includes the access type IE and the MA PDU session has user-plane resources established on only the access indicated in the access type IE the UE shall consider the MA PDU session as released and shall create a PDU SESSION RELEASE COMPLETE message; and

c) if the PDU SESSION RELEASE COMMAND message does not include the access type IE the UE shall consider the MA PDU session as released and shall create a PDU SESSION RELEASE COMPLETE message

if the UE is configured with on-demand S-NSSAI including slice deregistration inactivity timer

a) if the PDU session associated with an on-demand S-NSSAI is released and there are no established user plane resources of an MA PDU session associated with this on-demand S-NSSAI and there is no PDU session associated with this on-demand S-NSSAI the UE shall start the slice deregistration inactivity timer for this on-demand S-NSSAI over the corresponding access type;

b) if the MA PDU session associated with an on-demand S-NSSAI is released

for each registered access type if there is no PDU session associated with this on-demand S-NSSAI and there are no established user plane resources of an MA PDU session associated with this on-demand S-NSSAI over the registered access type the UE shall start the slice deregistration inactivity timer for this on-demand S-NSSAI over the corresponding registered access type; or

c) if the user plane resources of an MA PDU session associated with on-demand S-NSSAI are released over the access type and there is no PDU session associated with this on-demand S-NSSAI and there are no established user plane resources of an MA PDU session associated with this on-demand S-NSSAI over the corresponding access type then UE shall start the slice deregistration inactivity timer over the corresponding access type

if there is one or more multicast MBS sessions associated with the PDU session the UE considers as released the UE shall locally leave these associated multicast MBS sessions

if the PDU SESSION RELEASE COMMAND message contains the PTI value allocated in the UE-requested PDU session release procedure the UE shall stop the timer T3582 the UE should ensure that the PTI value assigned to this procedure is not released immediately

NOTE 1 the way to achieve this is implementation dependent for example the UE can ensure that the PTI value assigned to this procedure is not released during the time equal to or greater than the default value of timer T3592

while the PTI value is not released the UE regards any received PDU SESSION RELEASE COMMAND message with the same PTI value as a network retransmission (see subclause 7.3.1)

if the PDU SESSION RELEASE COMMAND message includes 5GSM cause #39 "reactivation requested" then after completion of the network-requested PDU session release procedure the UE should re-initiate the UE-requested PDU session establishment procedure as specified in subclause 6.4.1 for

a) the PDU session type associated with the released PDU session;

b) the SSC mode associated with the released PDU session;

c) the DNN associated with the released PDU session; and

d) the S-NSSAI associated with (if available in roaming scenarios) a mapped S-NSSAI if provided in the UE-requested PDU session establishment procedure of the released PDU session if the PDU SESSION RELEASE COMMAND message contains the alternative S-NSSAI IE the UE shall include both the S-NSSAI to be replaced and the alternative S-NSSAI during the UE-requested PDU session establishment procedure

NOTE 2 user interaction is necessary in some cases when the UE cannot re-initiate the UE-requested PDU session establishment procedure automatically

if the PDU SESSION RELEASE COMMAND message is received without the Back-off timer value IE or includes 5GSM cause #39 "reactivation requested" and the UE provided an S-NSSAI during the PDU session establishment the UE shall stop timer T3585 if it is running for the S-NSSAI of the PDU session if the UE did not provide an S-NSSAI during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop the timer T3585 associated with no S-NSSAI if it is running if the PDU SESSION RELEASE COMMAND message was received for an emergency PDU session the UE shall not stop the timer T3585 associated with no S-NSSAI if it is running the timer T3585 to be stopped includes

a) in a PLMN

1) the timer T3585 applied for all the PLMNs and for the access over which the PDU SESSION RELEASE COMMAND is received if running;

2) the timer T3585 applied for all the PLMNs and for both 3GPP access type and non-3GPP access type if running;

3) the timer T3585 applied for the registered PLMN and for the access over which the PDU SESSION RELEASE COMMAND is received if running; and

4) the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type if running; or

b) in an SNPN

1) the timer T3585 applied for all the equivalent SNPNs and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

2) the timer T3585 applied for all the equivalent SNPNs and for both 3GPP access type and non-3GPP access type associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

3) the timer T3585 applied for the registered SNPN and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

4) the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

if the PDU SESSION RELEASE COMMAND message is received without the Back-off timer value IE or includes 5GSM cause #39 "reactivation requested" and the UE provided a DNN during the PDU session establishment the UE shall stop timer T3396 if it is running for the DNN provided by the UE if the UE did not provide a DNN during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop the timer T3396 associated with no DNN if it is running if the PDU SESSION RELEASE COMMAND message was received for an emergency PDU session the UE shall not stop the timer T3396 associated with no DNN if it is running in an SNPN the timer T3396 to be stopped includes

a) the timer T3396 applied for all the equivalent SNPNs associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

b) the timer T3396 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

if the PDU SESSION RELEASE COMMAND message is received without the Back-off timer value IE or includes 5GSM cause #39 "reactivation requested" and the UE provided an S-NSSAI and a DNN during the PDU session establishment the UE shall stop timer T3584 if it is running for the [S-NSSAI of the PDU session DNN] combination provided by the UE if the UE did not provide an S-NSSAI during the PDU session establishment the UE shall stop the timer T3584 associated with [no S-NSSAI DNN] if it is running if the UE did not provide a DNN during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop the timer T3584 associated with [S-NSSAI of the PDU session no DNN] combination if it is running if the PDU SESSION RELEASE COMMAND message was received for an emergency PDU session the UE shall not stop the timer T3584 associated with [S-NSSAI of the PDU session no DNN] if it is running if the UE provided neither a DNN nor an S-NSSAI during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop the timer T3584 associated with [no S-NSSAI no DNN] if it is running if the PDU SESSION RELEASE COMMAND message was received for an emergency PDU session the UE shall not stop the timer T3584 associated with [no S-NSSAI no DNN] if it is running the timer T3584 to be stopped includes

a) in a PLMN

1) the timer T3584 applied for all the PLMNs if running; and

2) the timer T3584 applied for the registered PLMN if running; or

b) in an SNPN

1) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

2) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

NOTE 3 if the PDU SESSION RELEASE COMMAND message is received without the Back-off timer value IE or includes 5GSM cause #39 "reactivation requested" for a PDU session the UE provided a DNN (or no DNN) and an S-NSSAI (or no S-NSSAI) when the PDU session is established timer T3396 associated with the DNN (or no DNN if no DNN was provided by the UE) is running and timer T3584 associated with the DNN (or no DNN if no DNN was provided by the UE) and the S-NSSAI of the PDU session (or no S-NSSAI if no S-NSSAI was provided by the UE) is running then the UE stops both the timer T3396 and the timer T3584

NOTE 4 if the PDU SESSION RELEASE COMMAND message is received without the Back-off timer value IE or includes 5GSM cause #39 "reactivation requested" for a PDU session the UE provided a DNN (or no DNN) and an S-NSSAI of the PDU session (or no S-NSSAI) when the PDU session is established timer T3585 associated with the S-NSSAI of the PDU session (or no S-NSSAI if no S-NSSAI was provided by the UE) is running and timer T3584 associated with the DNN (or no DNN if no DNN was provided by the UE) and the S-NSSAI of the PDU session (or no S-NSSAI if no S-NSSAI was provided by the UE) is running then the UE stops both the timer T3585 and the timer T3584

if the PDU SESSION RELEASE COMMAND message includes 5GSM cause #26 "insufficient resources" and the Back-off timer value IE the UE shall ignore the 5GSM congestion re-attempt indicator IE provided by the network if any and the UE shall take different actions depending on the timer value received for timer T3396 in the Back-off timer value

a) if the timer value indicates neither zero nor deactivated and a DNN was provided during the PDU session establishment the UE shall stop timer T3396 associated with the corresponding DNN if it is running if the timer value indicates neither zero nor deactivated and no DNN was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop timer T3396 associated with no DNN if it is running in an SNPN the timer T3396 to be stopped includes

1) the timer T3396 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

2) the timer T3396 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE shall then start timer T3396 with the value provided in the Back-off timer value IE and

1) shall not send a PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for the same DNN that was sent by the UE until timer T3396 expires or timer T3396 is stopped; and

2) shall not send a PDU SESSION ESTABLISHMENT REQUEST message without an DNN and with request type different from "initial emergency request" and different from "existing emergency PDU session" or a PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for a non-emergency PDU session established without an DNN provided by the UE if no DNN was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" until timer T3396 expires or timer T3396 is stopped

the UE shall not stop timer T3396 upon a PLMN change SNPN change or inter-system change;

b) if the timer value indicates that this timer is deactivated and a DNN was provided during the PDU session establishment the UE shall stop timer T3396 associated with the corresponding DNN if it is running if the timer value indicates that this timer is deactivated and no DNN was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop timer T3396 associated with no DNN if it is running in an SNPN the timer T3396 to be stopped includes

1) the timer T3396 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

2) the timer T3396 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE

1) shall not send a PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for the same DNN until the UE is switched off the USIM is removed the entry in the "list of subscriber data" for the current SNPN is updated or the UE receives a PDU SESSION MODIFICATION COMMAND message for the same DNN from the network or a PDU SESSION AUTHENTICATION COMMAND message for the same DNN or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE or including 5GSM cause #39 "reactivation requested" for the same DNN from the network; and

2) shall not send a PDU SESSION ESTABLISHMENT REQUEST message without a DNN and with request type different from "initial emergency request" and different from "existing emergency PDU session" or a PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for a non-emergency PDU session established without a DNN provided by the UE if no DNN was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" until the UE is switched off the USIM is removed the entry in the "list of subscriber data" for the current SNPN is updated or the UE receives a PDU SESSION MODIFICATION COMMAND message for a non-emergency PDU session established without an DNN provided by the UE or a PDU SESSION AUTHENTICATION COMMAND message for a non-emergency PDU session established without a DNN provided by the UE or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE or including 5GSM cause #39 "reactivation requested" for a non-emergency PDU session established without a DNN provided by the UE

the timer T3396 remains deactivated upon a PLMN change SNPN change or inter-system change; and

c) if the timer value indicates zero the UE

1) shall stop timer T3396 associated with the corresponding DNN if running in an SNPN the timer T3396 to be stopped includes

i) the timer T3396 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

ii) the timer T3396 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE may send a PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same DNN; and

2) if no DNN was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop timer T3396 associated with no DNN if running in an SNPN the timer T3396 to be stopped includes

i) the timer T3396 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

ii) the timer T3396 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE may send a PDU SESSION ESTABLISHMENT REQUEST message without a DNN or a PDU SESSION MODIFICATION REQUEST message without an DNN provided by the UE

in an SNPN if the UE supports equivalent SNPNs then the UE shall apply the timer T3396 for all the equivalent SNPNs otherwise the UE shall apply the timer T3396 for the registered SNPN

if the PDU SESSION RELEASE COMMAND message includes 5GSM cause #26 "insufficient resources" and the Back-off timer value IE is not included then the UE may send a PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same DNN or without a DNN

when the timer T3396 is running or the timer is deactivated the UE is allowed to initiate a PDU session establishment procedure for emergency services

if the timer T3396 is running when the UE enters state 5GMM-DEREGISTERED the UE remains switched on and the USIM in the UE (if any) remains the same and the entry in the "list of subscriber data" for the SNPN to which timer T3396 is associated (if any) is not updated then timer T3396 is kept running until it expires or it is stopped

if the UE is switched off when the timer T3396 is running and if the USIM in the UE (if any) remains the same and the entry in the "list of subscriber data" for the SNPN to which timer T3396 is associated (if any) is not updated when the UE is switched on the UE shall behave as follows

- let t1 be the time remaining for T3396 timeout at switch off and let t be the time elapsed between switch off and switch on if t1 is greater than t then the timer shall be restarted with the value t1 – t if t1 is equal to or less than t then the timer need not be restarted if the UE is not capable of determining t then the UE shall restart the timer with the value t1

if the 5GSM cause value is #39 "reactivation requested" the UE shall ignore the Back-off timer value IE provided by the network if any

if the 5GSM cause value is #67 "insufficient resources for specific slice and DNN" and the Back-off timer value IE is included the UE shall take different actions depending on the timer value received for timer T3584 in the Back-off timer value

a) if the timer value indicates neither zero nor deactivated and both an S-NSSAI and a DNN were provided by the UE during the PDU session establishment the UE shall stop timer T3584 associated with the [S-NSSAI of the PDU session DNN] combination if it is running if the timer value indicates neither zero nor deactivated an S-NSSAI and no DNN was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop timer T3584 associated with [S-NSSAI of the PDU session no DNN] combination if it is running if the timer value indicates neither zero nor deactivated no S-NSSAI and a DNN was provided during the PDU session establishment the UE shall stop timer T3584 associated with the [no S-NSSAI DNN] combination if it is running if the timer value indicates neither zero nor deactivated and neither S-NSSAI nor DNN was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop timer T3584 associated with the [no S-NSSAI no DNN] combination if it is running the timer T3584 to be stopped includes

1) in a PLMN

i) the timer T3584 applied for all the PLMNs if running; and

ii) the timer T3584 applied for the registered PLMN if running; or

2) in an SNPN

i) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

ii) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE shall then start timer T3584 with the value provided in the Back-off timer value IE

1) the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message with request type different from "initial emergency request" and different from "existing emergency PDU session" or PDU SESSION MODIFICATION REQUEST message with the exception of those identified in subclause 6.4.2.1 for the [S-NSSAI of the PDU session DNN] combination until timer T3584 expires or timer T3584 is stopped;

2) shall not send another PDU SESSION ESTABLISHMENT REQUEST message with request type different from "initial emergency request" and different from "existing emergency PDU session" or another PDU SESSION MODIFICATION REQUEST message with the exception of those identified in subclause 6.4.2.1 for the [S-NSSAI of the PDU session no DNN] combination if no DNN was provided during the PDU session establishment until timer T3584 expires or timer T3584 is stopped;

3) shall not send another PDU SESSION ESTABLISHMENT REQUEST message or another PDU SESSION MODIFICATION REQUEST message with the exception of those identified in subclause 6.4.2.1 for the same [no S-NSSAI DNN] combination if no S-NSSAI was provided during the PDU session establishment until timer T3584 expires or timer T3584 is stopped; and

4) shall not send another PDU SESSION ESTABLISHMENT REQUEST message with request type different from "initial emergency request" and different from "existing emergency PDU session" or another PDU SESSION MODIFICATION REQUEST message with the exception of those identified in subclause 6.4.2.1 for the same [no S-NSSAI no DNN] combination if neither S-NSSAI nor DNN was provided during the PDU session establishment until timer T3584 expires or timer T3584 is stopped

the UE shall not stop timer T3584 upon a PLMN change SNPN change or inter-system change;

b) if the timer value indicates that this timer is deactivated

1) if both S-NSSAI and DNN were provided by the UE during the PDU session establishment the UE shall stop timer T3584 associated with the [S-NSSAI of the PDU session DNN] combination if running the timer T3584 to be stopped includes

i) in a PLMN

A) the timer T3584 applied for all the PLMNs if running; and

B) the timer T3584 applied for the registered PLMN if running; or

ii) in an SNPN

A) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

B) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message with request type different from "initial emergency request" and different from "existing emergency PDU session" or PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for the [S-NSSAI of the PDU session DNN] combination that was sent by the UE until the UE is switched off the USIM is removed the entry in the "list of subscriber data" for the current SNPN is updated or the UE receives a PDU SESSION MODIFICATION COMMAND message for the [S-NSSAI of the PDU session DNN] combination from the network or a PDU SESSION AUTHENTICATION COMMAND message for the [S-NSSAI of the PDU session DNN] combination from the network or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE or including 5GSM cause #39 "reactivation requested" for the [S-NSSAI of the PDU session DNN] combination from the network;

2) if an S-NSSAI was provided but a DNN was not provided by the UE during the PDU session establishment the UE shall stop timer T3584 associated with the [S-NSSAI of the PDU session no DNN] combination if running the timer T3584 to be stopped includes

i) in a PLMN

A) the timer T3584 applied for all the PLMNs if running; and

B) the timer T3584 applied for the registered PLMN if running; or

ii) in an SNPN

A) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

B) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE shall not send a PDU SESSION ESTABLISHMENT REQUEST message with request type different from "initial emergency request" and different from "existing emergency PDU session" or a PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for the [S-NSSAI of the PDU session no DNN] combination if no DNN was provided during the PDU session establishment until the UE is switched off the USIM is removed the entry in the "list of subscriber data" for the current SNPN is updated or the UE receives an PDU SESSION MODIFICATION COMMAND message for a non-emergency PDU session established for the [S-NSSAI of the PDU session no DNN] combination from the network or a PDU SESSION AUTHENTICATION COMMAND message for a non-emergency PDU session established the [S-NSSAI of the PDU session DNN] combination from the network or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE or including 5GSM cause #39 "reactivation requested" for a non-emergency PDU session established for the [S-NSSAI of the PDU session no DNN] combination from the network;

3) if an S-NSSAI was not provided but a DNN was provided by the UE during the PDU session establishment the UE shall stop timer T3584 associated with the [no S-NSSAI DNN] combination if running the timer T3584 to be stopped includes

i) in a PLMN

A) the timer T3584 applied for all the PLMNs if running; and

B) the timer T3584 applied for the registered PLMN if running; or

ii) in an SNPN

A) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

B) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE shall not send a PDU SESSION ESTABLISHMENT REQUEST message or a PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for the [no S-NSSAI DNN] if no S-NSSAI was provided during the PDU session establishment until the UE is switched off the USIM is removed the entry in the "list of subscriber data" for the current SNPN is updated or the UE receives an PDU SESSION MODIFICATION COMMAND message for the [no S-NSSAI DNN] combination from the network or a PDU SESSION AUTHENTICATION COMMAND message for the [no S-NSSAI DNN] combination from the network or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE or including 5GSM cause #39 "reactivation requested" for the same [no S-NSSAI DNN] combination from the network; and

4) if neither S-NSSAI nor DNN were provided by the UE during the PDU session establishment the UE shall stop timer T3584 associated with the [no S-NSSAI no DNN] combination if running the timer T3584 to be stopped includes

i) in a PLMN

A) the timer T3584 applied for all the PLMNs if running; and

B) the timer T3584 applied for the registered PLMN if running; or

ii) in an SNPN

A) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

B) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE shall not send a PDU SESSION ESTABLISHMENT REQUEST message with request type different from "initial emergency request" and different from "existing emergency PDU session" or a PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for the [no S-NSSAI no DNN] combination if neither S-NSSAI nor DNN was provided during the PDU session establishment until the UE is switched off the USIM is removed the entry in the "list of subscriber data" for the current SNPN is updated or the UE receives an PDU SESSION MODIFICATION COMMAND message for a non-emergency PDU session established for the [no S-NSSAI no DNN] combination from the network or a PDU SESSION AUTHENTICATION COMMAND message for a non-emergency PDU session established for the [no S-NSSAI no DNN] combination from the network or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE or including 5GSM cause #39 "reactivation requested" for a non-emergency PDU session established for the [no S-NSSAI no DNN] combination from the network

the timer T3584 remains deactivated upon a PLMN change SNPN change or inter-system change; and

c) if the timer value indicates zero

1) if both S-NSSAI and DNN were provided by the UE during the PDU session establishment the UE shall stop timer T3584 associated with the [S-NSSAI of the PDU session DNN] combination if running the timer T3584 to be stopped includes

i) in a PLMN

A) the timer T3584 applied for all the PLMNs if running; and

B) the timer T3584 applied for the registered PLMN if running; or

ii) in an SNPN

A) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

B) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the [S-NSSAI of the PDU session DNN] combination;

2) if an S-NSSAI was provided but a DNN was not provided by the UE during the PDU session establishment the UE shall stop timer T3584 associated with the [S-NSSAI of the PDU session no DNN] combination if running the timer T3584 to be stopped includes

i) in a PLMN

A) the timer T3584 applied for all the PLMNs if running; and

B) the timer T3584 applied for the registered PLMN if running; or

ii) in an SNPN

A) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

B) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the [S-NSSAI of the PDU session no DNN] combination if the request type was different from "initial emergency request" and different from "existing emergency PDU session";

3) if an S-NSSAI was not provided but a DNN was provided by the UE during the PDU session establishment the UE shall stop timer T3584 associated with the [no S-NSSAI DNN] combination if running the timer T3584 to be stopped includes

i) in a PLMN

A) the timer T3584 applied for all the PLMNs if running; and

B) the timer T3584 applied for the registered PLMN if running; or

ii) in an SNPN

A) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

B) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the [no S-NSSAI DNN] combination; and

4) if neither S-NSSAI nor DNN were provided by the UE during the PDU session establishment the UE shall stop timer T3584 associated with the [no S-NSSAI no DNN] combination if running the timer T3584 to be stopped includes

i) in a PLMN

A) the timer T3584 applied for all the PLMNs if running; and

B) the timer T3584 applied for the registered PLMN if running; or

ii) in an SNPN

A) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

B) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the [no S-NSSAI no DNN] combination if the request type was different from "initial emergency request" and different from "existing emergency PDU session"

if the 5GSM congestion re-attempt indicator IE with the ABO bit set to "The back-off timer is applied in all PLMNs or all equivalent SNPNs " is included in the PDU SESSION RELEASE COMMAND message with the 5GSM cause value #67 "insufficient resources for specific slice and DNN" then the UE shall apply the timer T3584 for all the PLMNs or all the equivalent SNPNs otherwise the UE shall apply the timer T3584 for the registered PLMN or the registered SNPN

if the 5GSM cause value is #67 "insufficient resources for specific slice and DNN" and the Back-off timer value IE is not included then the UE may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same [S-NSSAI DNN] combination

when the timer T3584 is running or the timer is deactivated the UE is allowed to initiate a PDU session establishment procedure for emergency services

if the timer T3584 is running when the UE enters state 5GMM-DEREGISTERED the UE remains switched on and the USIM in the UE (if any) remains the same and the entry in the "list of subscriber data" for the SNPN to which timer T3584 is associated (if any) is not updated then timer T3584 is kept running until it expires or it is stopped

if the UE is switched off when the timer T3584 is running and if the USIM in the UE (if any) remains the same and the entry in the "list of subscriber data" for the SNPN to which timer T3584 is associated (if any) is not updated when the UE is switched on the UE shall behave as follows

- let t1 be the time remaining for T3584 timeout at switch off and let t be the time elapsed between switch off and switch on if t1 is greater than t then the timer shall be restarted with the value t1 – t if t1 is equal to or less than t then the timer need not be restarted if the UE is not capable of determining t then the UE shall restart the timer with the value t1

if the 5GSM cause value is #69 "insufficient resources for specific slice" and the Back-off timer value IE is included the UE shall take different actions depending on the timer value received for timer T3585 in the Back-off timer value

a) if the timer value indicates neither zero nor deactivated and an S-NSSAI was provided during the PDU session establishment the UE shall stop timer T3585 associated with the S-NSSAI of the PDU session if it is running if the timer value indicates neither zero nor deactivated and no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop timer T3585 associated with no S-NSSAI if it is running the timer T3585 to be stopped includes

1) in a PLMN

i) the timer T3585 applied for all the PLMNs and for the access over which the PDU SESSION RELEASE COMMAND is received if running;

ii) the timer T3585 applied for all the PLMNs and for both 3GPP access type and non-3GPP access type if running;

iii) the timer T3585 applied for the registered PLMN and for the access over which the PDU SESSION RELEASE COMMAND is received if running; and

iv) the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type if running; or

2) in an SNPN

i) the timer T3585 applied for all the equivalent SNPNs and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

ii) the timer T3585 applied for all the equivalent SNPNs and for both 3GPP access type and non-3GPP access type associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

iii) the timer T3585 applied for the registered SNPN and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

iv) the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE shall then start timer T3585 with the value provided in the Back-off timer value IE and

1) if an S-NSSAI was provided by the UE during the PDU session establishment the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for the S-NSSAI of the PDU session until timer T3585 expires or timer T3585 is stopped; and

2) if the request type was different from "initial emergency request" and from "existing emergency PDU session" and an S-NSSAI was not provided by the UE during the PDU session establishment the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message without an S-NSSAI and with request type different from "initial emergency request" and different from "existing emergency PDU session" or another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for a non-emergency PDU session established without an S-NSSAI provided by the UE until timer T3585 expires or timer T3585 is stopped

the UE shall not stop timer T3585 upon a PLMN change SNPN change or inter-system change;

b) if the timer value indicates that this timer is deactivated and an S-NSSAI was provided during the PDU session establishment the UE shall stop timer T3585 associated with the S-NSSAI of the PDU session if it is running if the timer value indicates that this timer is deactivated and no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop timer T3585 associated with no S-NSSAI if it is running the timer T3585 to be stopped includes

1) in a PLMN

i) the timer T3585 applied for all the PLMNs and for the access over which the PDU SESSION RELEASE COMMAND is received if running;

ii) the timer T3585 applied for all the PLMNs and for both 3GPP access type and non-3GPP access type if running;

iii) the timer T3585 applied for the registered PLMN and for current access type or both 3GPP access type and non-3GPP access type if running; and

iv) the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type if running; or

2) in an SNPN

i) the timer T3585 applied for all the equivalent SNPNs and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

ii) the timer T3585 applied for all the equivalent SNPNs and for both 3GPP access type and non-3GPP access type associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

iii) the timer T3585 applied for the registered SNPN and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

iv) the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

in addition

1) if an S-NSSAI was provided by the UE during the PDU session establishment the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST or PDU SESSION MODIFICATION REQUEST with exception of those identified in subclause 6.4.2.1 for the S-NSSAI of the PDU session until the UE is switched off the USIM is removed the entry in the "list of subscriber data" for the current SNPN is updated or a PDU SESSION MODIFICATION COMMAND message for the S-NSSAI of the PDU session from the network or a PDU SESSION AUTHENTICATION COMMAND message for the S-NSSAI of the PDU session from the network or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE or including 5GSM cause #39 "reactivation requested" for the S-NSSAI of the PDU session from the network; and

2) if the request type was different from "initial emergency request" and from "existing emergency PDU session" and an S-NSSAI was not provided by the UE during the PDU session establishment the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message without an S-NSSAI and with request type different from "initial emergency request" and different from "existing emergency PDU session" or another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for a non-emergency PDU session established without an S-NSSAI provided by the UE until the UE is switched off the USIM is removed the entry in the "list of subscriber data" for the current SNPN is updated or a PDU SESSION MODIFICATION COMMAND message for a non-emergency PDU session established without an S-NSSAI provided by the UE or a PDU SESSION AUTHENTICATION COMMAND message for a non-emergency PDU session established without an S-NSSAI provided by the UE or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE or including 5GSM cause #39 "reactivation requested" for a non-emergency PDU session established without an S-NSSAI provided by the UE

the timer T3585 remains deactivated upon a PLMN change SNPN change or inter-system change; and

c) if the timer value indicates zero

1) if an S-NSSAI was provided by the UE during the PDU session establishment the UE shall stop timer T3585 associated with the S-NSSAI of the PDU session if running the timer T3585 to be stopped includes

i) in a PLMN

A) the timer T3585 applied for all the PLMNs and for the access over which the PDU SESSION RELEASE COMMAND is received if running;

B) the timer T3585 applied for all the PLMNs and for the access over which the PDU SESSION RELEASE COMMAND is received if running;

C) the timer T3585 applied for the registered PLMN and for current access type or both 3GPP access type and non-3GPP access type if running; and

D) the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type if running; or

ii) in an SNPN

A) the timer T3585 applied for all the equivalent SNPNs and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

B) the timer T3585 applied for all the equivalent SNPNs and for both 3GPP access type and non-3GPP access type associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

C) the timer T3585 applied for the registered SNPN and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

D) the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE may send another PDU SESSION ESTABLISHMENT REQUEST or PDU SESSION MODIFICATION REQUEST message for the S-NSSAI of the PDU session; and

2) if no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop timer T3585 associated with no S-NSSAI

i) in a PLMN

A) the timer T3585 applied for all the PLMNs and for the access over which the PDU SESSION RELEASE COMMAND is received if running,;

B) the timer T3585 applied for all the PLMNs and for the access over which the PDU SESSION RELEASE COMMAND is received if running;

C) the timer T3585 applied for the registered PLMN and for current access type or both 3GPP access type and non-3GPP access type if running; and

D) the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type if running; or

ii) in an SNPN

A) the timer T3585 applied for all the equivalent SNPNs and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

B) the timer T3585 applied for all the equivalent SNPNs and for both 3GPP access type and non-3GPP access type associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

C) the timer T3585 applied for the registered SNPN and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

D) the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE may send another PDU SESSION ESTABLISHMENT REQUEST message without an S-NSSAI or another PDU SESSION MODIFICATION REQUEST message without an S-NSSAI provided by the UE

if the 5GSM congestion re-attempt indicator IE with the ABO bit set to "The back-off timer is applied in all PLMNs or all equivalent SNPNs " is included in the PDU SESSION RELEASE COMMAND message with the 5GSM cause value #69 "insufficient resources for specific slice" then the UE shall apply the timer T3585 for all the PLMNs or all the equivalent SNPNs otherwise the UE shall apply the timer T3585 for the registered PLMN or the registered SNPN

if the 5GSM cause value is #69 "insufficient resources for specific slice" and the Back-off timer value IE is not included then the UE may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same S-NSSAI or without an S-NSSAI

when the timer T3585 is running or the timer is deactivated the UE is allowed to initiate a PDU session establishment procedure for emergency services

if the timer T3585 is running when the UE enters state 5GMM-DEREGISTERED the UE remains switched on and the USIM in the UE (if any) remains the same and the entry in the "list of subscriber data" for the SNPN to which timer T3585 is associated (if any) is not updated then timer T3585 is kept running until it expires or it is stopped

if the UE is switched off when the timer T3585 is running and if the USIM in the UE (if any) remains the same and the entry in the "list of subscriber data" for the SNPN to which timer T3585 is associated (if any) is not updated when the UE is switched on the UE shall behave as follows

- let t1 be the time remaining for T3585 timeout at switch off and let t be the time elapsed between switch off and switch on if t1 is greater than t then the timer shall be restarted with the value t1 – t if t1 is equal to or less than t then the timer need not be restarted if the UE is not capable of determining t then the UE shall restart the timer with the value t1

NOTE 5 as described in this subclause upon PLMN change SNPN change or inter-system change the UE does not stop the timer T3584 or T3585 this means the timer T3584 or T3585 can still be running or be deactivated for the given 5GSM procedure the PLMN or SNPN the S-NSSAI and optionally the DNN combination when the UE returns to the PLMN or SNPN or when it performs inter-system change back from S1 mode to N1 mode thus the UE can still be prevented from sending another PDU SESSION ESTABLISHMENT REQUEST or PDU SESSION MODIFICATION REQUEST message in the PLMN for the same S-NSSAI and optionally the same DNN

upon PLMN change or SNPN change if T3584 applied for the registered PLMN or the registered SNPN is running or is deactivated for an S-NSSAI a DNN and old PLMN or old SNPN but T3584 is not running and is not deactivated for the S-NSSAI the DNN and new PLMN or new SNPN then the UE is allowed to send a PDU SESSION ESTABLISHMENT REQUEST message for the same S-NSSAI and the same DNN in the new PLMN or new SNPN

upon PLMN change or SNPN change if T3585 applied for the registered PLMN or the registered SNPN is running or is deactivated for an S-NSSAI and old PLMN or old SNPN but T3585 is not running and is not deactivated for the S-NSSAI and new PLMN or new SNPN then the UE is allowed to send a PDU SESSION ESTABLISHMENT REQUEST message for the same S-NSSAI in the new PLMN or new SNPN

upon SNPN change if T3584 applied for all the equivalent SNPNs is running or is deactivated for an S-NSSAI a DNN and old SNPN but T3584 is not running and is not deactivated for the S-NSSAI the DNN and new non-equivalent SNPN then the UE is allowed to send a PDU SESSION ESTABLISHMENT REQUEST message for the same S-NSSAI and the same DNN in the new SNPN

upon SNPN change if T3585 applied for all the equivalent SNPNs is running or is deactivated for an S-NSSAI and old SNPN but T3585 is not running and is not deactivated for the S-NSSAI and new non-equivalent SNPN then the UE is allowed to send a PDU SESSION ESTABLISHMENT REQUEST message for the same S-NSSAI in the new SNPN

if the PDU SESSION RELEASE COMMAND message includes 5GSM cause #29 "user authentication or authorization failed" and the Back-off timer value IE the UE shall behave as follows

a) if the timer value indicates neither zero nor deactivated and

1) if the UE provided a DNN and S-NSSAI to the network during the PDU session establishment the UE shall start the back-off timer with the value provided in the Back-off timer value IE for the PDU session establishment procedure and

i) in a PLMN [PLMN DNN (mapped) HPLMN S-NSSAI] combination the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same DNN and (mapped) HPLMN S-NSSAI in the current PLMN until the back-off timer expires the UE is switched off or the USIM is removed; or

ii) in an SNPN [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN (mapped) subscribed SNPN S-NSSAI] combination the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same DNN and (mapped) subscribed SNPN S-NSSAI in the current SNPN using the selected entry of the "list of subscriber data" or selected PLMN subscription until the back-off timer expires the UE is switched off the USIM is removed or the selected entry of the "list of subscriber data" is updated;

2) if the UE provided a DNN to the network during the PDU session establishment the UE shall start the back-off timer with the value provided in the Back-off timer value IE for the PDU session establishment procedure and

i) in a PLMN [PLMN DNN] combination the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same DNN in the current PLMN until the back-off timer expires the UE is switched off or the USIM is removed; or

ii) in an SNPN [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN] combination the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same DNN in the current PLMN using the selected entry of the "list of subscriber data" or selected PLMN subscription until the back-off timer expires the UE is switched off the USIM is removed or the selected entry of the "list of subscriber data" is updated;

3) if the UE did not provide a DNN or S-NSSAI or any of the two parameters to the network during the PDU session establishment it shall start the back-off timer accordingly for the PDU session establishment procedure and

i) in a PLMN the [PLMN DNN no S-NSSAI] [PLMN no DNN (mapped) HPLMN S-NSSAI] or [PLMN no DNN no S-NSSAI] combination dependent on the combination the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same [PLMN DNN no S-NSSAI] [PLMN no DNN (mapped) HPLMN S-NSSAI] or [PLMN no DNN no S-NSSAI] combination in the current PLMN until the back-off timer expires the UE is switched off or the USIM is removed; or

ii) in an SNPN [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN no S-NSSAI] [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN (mapped) subscribed SNPN S-NSSAI] or [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN no S-NSSAI] combination dependent on the combination the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN no S-NSSAI] [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN (mapped) subscribed SNPN S-NSSAI] or [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN no S-NSSAI] combination in the current PLMN using the selected entry of the "list of subscriber data" or selected PLMN subscription until the back-off timer expires the UE is switched off the USIM is removed or the selected entry of the "list of subscriber data" is updated; or

4) if the UE did not provide a DNN to the network during the PDU session establishment it shall start the back-off timer accordingly for the PDU session establishment procedure and

i) in a PLMN the [PLMN no DNN] combination the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same [PLMN no DNN] in the current PLMN until the back-off timer expires the UE is switched off or the USIM is removed; or

ii) in an SNPN [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN] combination the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN] in the current SNPN using the selected entry of the "list of subscriber data" or selected PLMN subscription until the back-off timer expires the UE is switched off the USIM is removed or the selected entry of the "list of subscriber data" is updated;

b) if the timer value indicates that this timer is deactivated and

1) if the UE provided a DNN and S-NSSAI to the network during the PDU session establishment the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for

i) in a PLMN the same DNN and (mapped) HPLMN S-NSSAI in the current PLMN until the UE is switched off or the USIM is removed; or

ii) in an SNPN the same DNN and (mapped) subscribed SNPN S-NSSAI in the current SNPN using the selected entry of the "list of subscriber data" or selected PLMN subscription until the UE is switched off or the USIM is removed or the selected entry of the "list of subscriber data" is updated;

2) if the UE provided a DNN to the network during the PDU session establishment the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for

i) in a PLMN the same DNN in the current PLMN until the UE is switched off or the USIM is removed; or

ii) in an SNPN the same DNN in the current SNPN using the selected entry of the "list of subscriber data" or selected PLMN subscription until the UE is switched off or the USIM is removed or the selected entry of the "list of subscriber data" is updated;

3) if the UE did not provide a DNN or S-NSSAI or any of the two parameters to the network during the PDU session establishment the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for

i) in a PLMN the same [PLMN DNN no S-NSSAI] [PLMN no DNN (mapped) HPLMN S-NSSAI] or [PLMN no DNN no S-NSSAI] combination in the current PLMN until the UE is switched off or the USIM is removed; or

ii) in an SNPN the same [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN no S-NSSAI] [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN (mapped) subscribed SNPN S-NSSAI] or [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN no S-NSSAI] combination in the current SNPN using the selected entry of the "list of subscriber data" or selected PLMN subscription until the UE is switched off or the USIM is removed or the selected entry of the "list of subscriber data" is updated; or

4) if the UE did not provide a DNN to the network during the PDU session establishment the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for

i) in a PLMN the same [PLMN no DNN] in the current PLMN until the UE is switched off or the USIM is removed; or

ii) in an SNPN the same [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN] combination in the current SNPN using the selected entry of the "list of subscriber data" or selected PLMN subscription until the UE is switched off or the USIM is removed or the selected entry of the "list of subscriber data" is updated; and

c) if the timer value indicates zero the UE may send another PDU SESSION ESTABLISHMENT REQUEST message

1) in a PLMN for the same combination of [PLMN DNN (mapped) HPLMN S-NSSAI] [PLMN DNN no S-NSSAI] [PLMN no DNN (mapped) HPLMN S-NSSAI] or [PLMN no DNN no S-NSSAI] in the current PLMN; or

2) in an SNPN for the same combination of [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN (mapped) subscribed SNPN S-NSSAI] [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN no S-NSSAI] [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN (mapped) subscribed SNPN S-NSSAI] or [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN no S-NSSAI] in the current SNPN

the UE shall not stop any back-off timer

a) upon a PLMN or SNPN change;

b) upon an inter-system change; or

c) upon registration over another access type

if the PDU SESSION RELEASE COMMAND message includes

a) 5GSM cause #29 "user authentication or authorization failed"; and

b) the service-level-AA response in the Service-level-AA container IE with the SLAR field set to the value of "Service level authentication and authorization was not successful or service level authorization is revoked"

the UE shall forward the service-level-AA response to the upper layers so the UUAA authorization data is deleted as specified in 3GPP TS 33.256 [24B]

the UE shall transport the PDU SESSION RELEASE COMPLETE message and the PDU session ID using the NAS transport procedure as specified in subclause 5.4.5

upon receipt of a PDU SESSION RELEASE COMPLETE message the SMF shall stop timer T3592 and shall consider the PDU session as released

#### 6.3.3.4 N1 SM delivery skipped

if the PDU SESSION RELEASE COMMAND message was sent along the N1 SM delivery skip allowed indication towards AMF then upon receipt of an indication that N1 SM delivery was skipped the SMF shall stop timer T3592 and shall consider the PDU session as released

#### 6.3.3.5 abnormal cases on the network side

the following abnormal cases can be identified

a) expiry of timer T3592

the SMF shall on the first expiry of the timer T3592 retransmit the PDU SESSION RELEASE COMMAND message and shall reset and start timer T3592 this retransmission is repeated four times i.e on the fifth expiry of timer T3592 the SMF shall abort the procedure

b) collision of network-requested PDU session release procedure and UE-requested PDU session modification procedure

when the SMF receives a PDU SESSION MODIFICATION REQUEST message during the network-requested PDU session release procedure and the PDU session indicated in PDU SESSION MODIFICATION REQUEST message is the PDU session that the SMF had requested to release the SMF shall ignore the PDU SESSION MODIFICATION REQUEST message and proceed with the PDU session release procedure

c) collision of network-requested PDU session release procedure and UE-requested PDU session release procedure

if the SMF receives a PDU SESSION RELEASE REQUEST message after sending a PDU SESSION RELEASE COMMAND message with the PTI IE set to "No procedure transaction identity assigned" to the UE and the PDU session ID in the PDU SESSION RELEASE REQUEST message is the same as the PDU session ID in the PDU SESSION RELEASE COMMAND message

- if the access type IE is included in the PDU SESSION RELEASE COMMAND message and the PDU session is an MA PDU session and having user-plane resources established on the access different from the access indicated in the access type IE in the PDU SESSION RELEASE COMMAND message the SMF shall proceed both the UE-requested PDU session release procedure and network-requested PDU session release procedure;

- otherwise the SMF shall ignore the PDU SESSION RELEASE REQUEST message and proceed with the network-requested PDU session release procedure

d) collision of re-establishment of the user-plane resources and network-requested PDU session release procedure for the same PDU session

if the SMF receives an indication from the AMF to re-establish the user-plane resources during the network-requested PDU session release procedure for the same PDU session the SMF shall not re-establish the user-plane resources for the PDU session as specified in 3GPP TS 29.502 [20A] subclause 5.2.2.3.2.2 and proceed with the network-requested PDU session release procedure

#### 6.3.3.6 abnormal cases in the UE

the following abnormal cases can be identified

a) PDU session inactive for the received PDU session ID

if the PDU session ID in the PDU SESSION RELEASE COMMAND message belongs to any PDU session in state PDU SESSION INACTIVE in the UE the UE shall include the 5GSM cause #43 "Invalid PDU session identity" in the 5GSM STATUS message and set the PDU session ID to the received PDU session ID in the UL NAS TRANSPORT message as specified in subclause 5.4.5

b) User-plane resources of the MA PDU session on the access indicated in the access type IE not established

if the PDU session is an MA PDU session and has user-plane resources established on a single access different from the access indicated in the access type IE the UE shall not diagnose an error further process the release command and consider the user-plane resources of the MA PDU session on the access indicated in the access type IE as successfully released

## 6.4 UE-requested 5GSM procedures

### 6.4.1 UE-requested PDU session establishment procedure

#### 6.4.1.1 general

the purpose of the UE-requested PDU session establishment procedure is to establish a new PDU session with a DN to perform handover of an existing PDU session between 3GPP access and non-3GPP access to transfer an existing PDN connection in the EPS to the 5GS to transfer an existing PDN connection in an untrusted non-3GPP access connected to the EPC to the 5GS or to establish an MA PDU session to support ATSSS (see 3GPP TS 24.193 [13B]) or to relay the service associated with the RSC for 5G ProSe layer-3 UE-to-network relay (see 3GPP TS 24.554 [19E]) if accepted by the network the PDU session enables exchange of PDUs between the UE and the DN

the UE shall not request a PDU session establishment

a) for an LADN if the DNN used for that LADN is included in the LADN information IE and the UE is located outside the LADN service area indicated in the LADN information IE;

a1) for an LADN if the DNN used for that LADN is included in the extended LADN information IE and there is no S-NSSAI used for PDU session establishment;

a2) for an LADN if the DNN used for that LADN is included in the extended LADN information IE and the S-NSSAI used for PDU session establishment is not associated with that LADN;

a3) for an LADN if the DNN and the S-NSSAI used for that LADN are included in the extended LADN information IE and the UE is located outside the LADN service area indicated in the extended LADN information IE;

b) to transfer a PDU session from non-3GPP access to 3GPP access when the 3GPP PS data off UE status is "activated" and the UE is not using the PDU session to send uplink IP packets for any of the 3GPP PS data off exempt services (see subclause 6.2.10);

c) when the UE is in NB-N1 mode the UE has indicated preference for user plane CIoT 5GS optimization the network has accepted the use of user plane CIoT 5GS optimization for the UE and the number of PDU sessions that currently has user-plane resources established equals to the UE's maximum number of supported user-plane resources;

d) to transfer a PDU session from 3GPP access to non-3GPP access when the UE has indicated preference for control plane CIoT 5GS optimization the network has accepted the use of control plane CIoT 5GS optimization for the UE and the control plane only indication IE was received in the PDU SESSION ESTABLISHMENT ACCEPT message;

e) to transfer a PDU session from the non-3GPP access to the 3GPP access when the UE is in NB-N1 mode the UE has indicated preference for user plane CIoT 5GS optimization the network has accepted the use of user plane CIoT 5GS optimization for the UE and the number of PDU sessions that currently has user-plane resources established equals to the UE's maximum number of supported user-plane resources;

f) associated to an S-NSSAI when the UE is not in the NS-AoS of the S-NSSAI; or

g) associated to an S-NSSAI included in the partially allowed NSSAI when the current TA is not in the list of TAs where the S-NSSAI is allowed

#### 6.4.1.2 UE-requested PDU session establishment procedure initiation

in order to initiate the UE-requested PDU session establishment procedure the UE shall create a PDU SESSION ESTABLISHMENT REQUEST message

NOTE 0 when IMS voice is available over either 3GPP access or non-3GPP access the "voice centric" UE in 5GMM-REGISTERED state will receive a request from upper layers to establish the PDU session for IMS signalling if the conditions for performing an initial registration with IMS indicated in 3GPP TS 24.229 [14] subclause U.3.1.2 are satisfied

if the UE requests to establish a new PDU session the UE shall allocate a PDU session ID which is not currently being used by another PDU session over either 3GPP access or non-3GPP access if the N5CW device supporting 3GPP access requests to establish a new PDU session via 3GPP access the N5CW device supporting 3GPP access shall refrain from allocating "PDU session identity value 15" if the TWIF acting on behalf of the N5CW device requests to establish a new PDU session the TWIF acting on behalf of the N5CW device shall allocate the "PDU session identity value 15"

the UE shall allocate a PTI value currently not used and shall set the PTI IE of the PDU SESSION ESTABLISHMENT REQUEST message to the allocated PTI value

if the UE is registered for emergency services over the current access the UE shall not request establishing a non-emergency PDU session over the current access if the UE is registered for emergency services over the current access it shall not request establishing an emergency PDU session over the non-current access except if the request is for transferring the emergency PDU session to the non-current access before transferring an emergency PDU session from non-3GPP access to 3GPP access or before transferring a PDN connection for emergency bearer services from untrusted non-3GPP access connected to EPC to 3GPP access the UE shall check whether emergency services are supported in the NG-RAN cell (either an NR cell or an E-UTRA cell) on which the UE is camping

NOTE 1 transfer of an existing emergency PDU session or PDN connection for emergency bearer services between 3GPP access and non-3GPP access is needed e.g if the UE determines that the current access is no longer available

if the UE requests to establish a new emergency PDU session the UE shall include the PDU session type IE in the PDU SESSION ESTABLISHMENT REQUEST message and shall set the IE to the IP version capability as specified in subclause 6.2.4.2

if the UE requests to establish a new non-emergency PDU session with a DN the UE shall include the PDU session type IE in the PDU SESSION ESTABLISHMENT REQUEST message and shall set the IE to one of the following values "IPv4" "IPv6" "IPv4v6" "Ethernet" or "Unstructured" based on the URSP rules or based on UE local configuration (see 3GPP TS 24.526 [19]) and based on the IP version capability as specified in subclause 6.2.4.2

NOTE 2 when the UE initiates the UE-requested PDU session establishment procedure to transfer an existing non-IP PDN connection in the EPS to the 5GS the UE can use locally available information associated with the PDN connection to select the PDU session type between "Ethernet" and "Unstructured"

if the UE requests to establish a new non-emergency PDU session with a DN and the UE requests an SSC mode the UE shall set the SSC mode IE of the PDU SESSION ESTABLISHMENT REQUEST message to the SSC mode if the UE requests to establish a PDU session of "IPv4" "IPv6" or "IPv4v6" PDU session type the UE shall either omit the SSC mode IE or set the SSC mode IE to "SSC mode 1" "SSC mode 2" or "SSC mode 3" if the UE requests to establish a PDU session of "Ethernet" or "Unstructured" PDU session type the UE shall either omit the SSC mode IE or set the SSC mode IE to "SSC mode 1" or "SSC mode 2" if the UE requests transfer of an existing PDN connection in the EPS to the 5GS or the UE requests transfer of an existing PDN connection in an untrusted non-3GPP access connected to the EPC to the 5GS the UE shall set the SSC mode IE to "SSC mode 1"

if the UE requests to establish a new emergency PDU session the UE shall set the SSC mode IE of the PDU SESSION ESTABLISHMENT REQUEST message to "SSC mode 1"

a UE supporting PDU connectivity service shall support SSC mode 1 and may support SSC mode 2 and SSC mode 3 as specified in 3GPP TS 23.501 [8]

if the UE requests to establish a new non-emergency PDU session with a DN the UE may include the SM PDU DN request container IE with a DN-specific identity of the UE complying with network access identifier (NAI) format as specified in IETF RFC 7542 [37]

NOTE 3 the UE can avoid including both the SM PDU DN request container IE and the extended protocol configuration options IE with PAP/CHAP protocol identifiers in the PDU SESSION ESTABLISHMENT REQUEST message the way to achieve this is implementation dependent

if the UE requests to

a) establish a new PDU session;

b) perform handover of an existing PDU session from non-3GPP access to 3GPP access;

c) transfer an existing PDN connection in the EPS to the 5GS according to subclause 4.8.2.3.1;

d) transfer an existing PDN connection in untrusted non-3GPP access connected to the EPC to the 5GS; or

e) establish user plane resources over 3GPP access of an MA PDU session established over non-3GPP access only;

and the UE at the same time intends to join one or more multicast MBS sessions that is associated to the PDU session the UE should include the requested MBS container IE in the PDU SESSION ESTABLISHMENT REQUEST message in that case the UE shall set the MBS operation to "Join multicast MBS session" and include the multicast MBS session information(s) and shall set the type of multicast MBS session ID for each of the multicast MBS session information to either "Temporary mobile group identity (TMGI)" or "Source specific IP multicast address" depending on the type of the multicast MBS session ID available in the UE then the remaining values of each of the multicast MBS session information shall be set as following

a) if the type of multicast MBS session ID is set to "Temporary mobile group identity (TMGI)" the UE shall set the multicast MBS session ID to the TMGI; or

b) if the type of multicast MBS session ID is set to "Source specific IP multicast address for IPv4" or " source specific IP multicast address for IPv6" the UE shall set the source IP address information and the destination IP address information to the corresponding values

the UE should not request to join a multicast MBS session for local MBS service if neither current TAI nor CGI of the current cell is part of the MBS service area(s) of the multicast MBS session if the UE has valid information of the MBS service area(s) of the multicast MBS session

NOTE 4 the UE obtains the details of the MBS session ID(s) e.g. TMGI source IP address information and destination IP address information as a pre-configuration in the UE or during the MBS service announcement which is out of scope of this specification Pre-configuration can be provided in one or more of the following ways

a) in a UE implementation-specific way (e.g factory configuration);

b) in the USIM (see EF5MBSUECONFIG file in 3GPP TS 31.102 [22]); or

c) in the UE pre-configuration MO for MBS (see 3GPP TS 24.575 [65)

the UE should set the RQoS bit to "Reflective QoS supported" in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message if the UE supports reflective QoS and

a) the UE requests to establish a new PDU session of "IPv4" "IPv6" "IPv4v6" or "Ethernet" PDU session type;

b) the UE requests to transfer an existing PDN connection in the EPS of "IPv4" "IPv6" "IPv4v6" or "Ethernet" PDN type or of "Non-IP" PDN type mapping to "Ethernet" PDU session type to the 5GS; or

c) the UE requests to transfer an existing PDN connection in an untrusted non-3GPP access connected to the EPC of "IPv4" "IPv6" or "IPv4v6" PDN type to the 5GS

NOTE 5 the determination to not request the usage of reflective QoS by the UE for a PDU session is implementation dependent

the UE shall indicate the maximum number of packet filters that can be supported for the PDU session in the maximum number of supported packet filters IE of the PDU SESSION ESTABLISHMENT REQUEST message if

a) the UE requests to establish a new PDU session of "IPv4" "IPv6" "IPv4v6" or "Ethernet" PDU session type and the UE can support more than 16 packet filters for this PDU session;

b) the UE requests to transfer an existing PDN connection in the EPS of "IPv4" "IPv6" "IPv4v6" or "Ethernet" PDN type or of "Non-IP" PDN type mapping to "Ethernet" PDU session type to the 5GS and the UE can support more than 16 packet filters for this PDU session; or

c) the UE requests to transfer an existing PDN connection in an untrusted non-3GPP access connected to the EPC of "IPv4" "IPv6" or "IPv4v6" PDN type to the 5GS and the UE can support more than 16 packet filters for this PDU session

the UE shall include the integrity protection maximum data rate IE in the PDU SESSION ESTABLISHMENT REQUEST message to indicate the maximum data rate per UE for user-plane integrity protection supported by the UE for uplink and the maximum data rate per UE for user-plane integrity protection supported by the UE for downlink

the UE shall set the MH6-PDU bit to "Multi-homed IPv6 PDU session supported" in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message if the UE supports multi-homed IPv6 PDU session and

a) the UE requests to establish a new PDU session of "IPv6" or "IPv4v6" PDU session type; or

b) the UE requests to transfer an existing PDN connection of "IPv6" or "IPv4v6" PDN type in the EPS or in an untrusted non-3GPP access connected to the EPC to the 5GS

the UE shall set the EPT-S1 bit to "Ethernet PDN type in S1 mode supported" in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message if the UE supports ethernet PDN type in S1 mode and requests "Ethernet" PDU session type

if the UE requests to establish a new PDU session as an always-on PDU session (e.g because the PDU session is for time synchronization or TSC) the UE shall include the Always-on PDU session requested IE and set the value of the IE to "Always-on PDU session requested" in the PDU SESSION ESTABLISHMENT REQUEST message

NOTE 6 determining whether a PDU session is for time synchronization or TSC is UE implementation dependent

if the UE has an emergency PDU session the UE shall not perform the UE-requested PDU session establishment procedure to establish another emergency PDU session the UE may perform the UE-requested PDU session establishment procedure to transfer an existing emergency PDU session or an existing PDN connection for emergency services

if

a) the UE requests to perform handover of an existing PDU session between 3GPP access and non-3GPP access;

b) the UE requests to perform transfer an existing PDN connection in the EPS to the 5GS; or

c) the UE requests to perform transfer an existing PDN connection in an untrusted non-3GPP access connected to the EPC to the 5GS;

the UE shall

a) set the PDU session ID in the PDU SESSION ESTABLISHMENT REQUEST message and in the UL NAS TRANSPORT message to the stored PDU session ID corresponding to the PDN connection; and

b) set the S-NSSAI in the UL NAS TRANSPORT message to the stored S-NSSAI associated with the PDU session ID of a non-emergency PDU session the UE shall not request to perform handover of an existing non-emergency PDU session

1) between 3GPP access and non-3GPP access if the S-NSSAI is not included in the allowed NSSAI for the target access; or

2) from non-3GPP access to 3GPP access

i) if the S-NSSAI is not in the partially allowed NSSAI for 3GPP access; or

ii) if the S-NSSAI is in the partially allowed NSSAI for 3GPP access but the current TAI is not in the list of TAs for which the S-NSSAI is supported

if the N5CW device supporting 3GPP access requests to perform handover of an existing PDU session from non-3GPP access to 3GPP access the N5CW device supporting 3GPP access shall set the PDU session ID in the PDU SESSION ESTABLISHMENT REQUEST message and in the UL NAS TRANSPORT message to "PDU session identity value 15"

if the UE is registered to a network which supports ATSSS and the UE requests to establish a new PDU session the UE may allow the network to upgrade the requested PDU session to an MA PDU session in order to allow the network to upgrade the requested PDU session to an MA PDU session the UE shall set "MA PDU session network upgrade is allowed" in the MA PDU session information IE and shall set the request type to "initial request" in the UL NAS TRANSPORT message if the UE is registered to a network which does not support ATSSS the UE shall not perform the procedure to allow the network to upgrade the requested PDU session to an MA PDU session

if the UE is registered to a network which supports ATSSS the UE may request to establish an MA PDU session if the UE requests to establish an MA PDU session the UE shall set the request type to "MA PDU request" in the UL NAS TRANSPORT message if the UE is registered to a network which does not support ATSSS the UE shall not request to establish an MA PDU session

when the UE is registered over both 3GPP access and non-3GPP access in the same PLMN and the UE requests to establish a new MA PDU session the UE may provide an S-NSSAI in the UL NAS TRANSPORT message only if the S-NSSAI is included in the allowed NSSAIs of both accesses

NOTE 7 if the UE requested DNN corresponds to an LADN DNN the AMF does not forward the MA PDU session information IE to the SMF but sends the message back to the UE to inform of the unhandled request (see subclause 5.4.5.2.5)

if the UE is registered to a network which supports ATSSS and the UE has already an MA PDU session established over one access the UE may perform the UE-requested PDU session establishment procedure to establish user-plane resources over the other access for the MA PDU session as specified in subclause 4.22 of 3GPP TS 23.502 [9] and the S-NSSAI associated with the MA PDU session is included in the allowed NSSAI of the other access if the UE establishes user-plane resources over the other access for the MA PDU session the UE shall

a) set the request type to "MA PDU request" in the UL NAS TRANSPORT message;

b) set the PDU session ID to the stored PDU session ID corresponding to the established MA PDU session in the PDU SESSION ESTABLISHMENT REQUEST message and in the UL NAS TRANSPORT message; and

c) set the S-NSSAI in the UL NAS TRANSPORT message to the stored S-NSSAI associated with the PDU session ID

if the UE requests to establish a new MA PDU session or if the UE requests to establish a new PDU session and the UE allows the network to upgrade the requested PDU session to an MA PDU session

a) if the UE supports ATSSS Low-Layer functionality with any steering mode (i.e. any steering mode allowed for ATSSS Low-Layer functionality) as specified in subclause 5.32.6 of 3GPP TS 23.501 [8] the UE shall set the ATSSS-ST bits to "ATSSS Low-Layer functionality with any steering mode allowed for ATSSS-LL supported" in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message;

NOTE 8 the ATSSS Low-Layer functionality cannot be used together with the redundant steering mode when the UE indicates that it is capable of supporting the ATSSS Low-Layer functionality with any steering mode it implies that the UE supports the ATSSS Low-Layer functionality with any steering mode except the redundant steering mode

b) if the UE supports MPTCP functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode as specified in subclause 5.32.6 of 3GPP TS 23.501 [8] the UE shall set the ATSSS-ST bits to "MPTCP functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode supported" in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message;

c) if the UE supports MPTCP functionality with any steering mode and ATSSS-LL functionality with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) as specified in subclause 5.32.6 of 3GPP TS 23.501 [8] the UE shall set the ATSSS-ST bits to "MPTCP functionality with any steering mode and ATSSS-LL functionality with any steering mode allowed for ATSSS-LL supported" in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message;

d) if a performance measurement function in the UE can perform access performance measurements using the QoS flow of the non-default QoS rule as specified in subclause 5.32.5 of 3GPP TS 23.501 [8] the UE shall set the APMQF bit to "Access performance measurements per QoS flow supported" in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message;

e) if the UE supports MPQUIC functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode as specified in subclause 5.32.6 of 3GPP TS 23.501 [8] the UE shall set the ATSSS-ST bits to "MPQUIC functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode supported" in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message;

f) if the UE supports MPQUIC functionality with any steering mode and ATSSS-LL functionality with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) as specified in subclause 5.32.6 of 3GPP TS 23.501 [8] the UE shall set the ATSSS-ST bits to "MPQUIC functionality with any steering mode and ATSSS-LL functionality with any steering mode allowed for ATSSS-LL supported" in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message;

g) if the UE supports MPTCP functionality with any steering mode MPQUIC functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode as specified in subclause 5.32.6 of 3GPP TS 23.501 [8] the UE shall set the ATSSS-ST bits to "MPTCP functionality with any steering mode MPQUIC functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode supported" in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message; and

h) if the UE supports MPTCP functionality with any steering mode MPQUIC functionality with any steering mode and ATSSS-LL functionality with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) as specified in subclause 5.32.6 of 3GPP TS 23.501 [8] the UE shall set the ATSSS-ST bits to "MPTCP functionality with any steering mode MPQUIC functionality with any steering mode and ATSSS-LL functionality with any steering mode allowed for ATSSS-LL supported" in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message

upon receipt of a PDU SESSION ESTABLISHMENT REQUEST message for MA PDU session establishment the SMF shall check if the 5GSM capability IE in the PDU SESSION ESTABLISHMENT REQUEST message includes

a) the ATSSS-ST bits set to "MPTCP functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode supported" and

i) if the DNN configuration allows for the MPTCP functionality with any steering mode and ATSSS-LL functionality with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) but does not allow RTT measurement without using PMF protocol the SMF shall ensure that the established PDU session has the capability of MPTCP with any steering mode and ATSSS-LL with only active-standby steering mode load balancing steering mode or priority based steering mode steering mode in the downlink and MPTCP with any steering mode and ATSSS-LL with only active-standby steering mode in the uplink;

ii) if the DNN configuration allows for the MPTCP functionality with any steering mode and ATSSS-LL functionality with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) and allows RTT measurement without using PMF protocol the SMF shall ensure that the established PDU session has the capability of MPTCP with any steering mode and ATSSS-LL with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) in the downlink and MPTCP with any steering mode and ATSSS-LL with only active-standby steering mode in the uplink; or

iii) if the DNN configuration allows for the MPTCP functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode the SMF shall ensure that the established PDU session has the capability of MPTCP with any steering mode and ATSSS-LL with only active-standby steering mode in the downlink and the uplink;

b) the ATSSS-ST bits set to "MPQUIC functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode supported" and

i) if the DNN configuration allows for the MPQUIC functionality with any steering mode and ATSSS-LL functionality with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) but does not allow RTT measurement without using PMF protocol the SMF shall ensure that the established PDU session has the capability of MPQUIC with any steering mode and ATSSS-LL with only active-standby steering mode load balancing steering mode or priority based steering mode steering mode in the downlink and MPQUIC with any steering mode and ATSSS-LL with only active-standby steering mode in the uplink;

ii) if the DNN configuration allows for the MPQUIC functionality with any steering mode and ATSSS-LL functionality with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) and allows RTT measurement without using PMF protocol the SMF shall ensure that the established PDU session has the capability of MPQUIC with any steering mode and ATSSS-LL with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) in the downlink and MPQUIC with any steering mode and ATSSS-LL with only active-standby steering mode in the uplink; or

iii) if the DNN configuration allows for the MPQUIC functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode the SMF shall ensure that the established PDU session has the capability of MPQUIC with any steering mode and ATSSS-LL with only active-standby steering mode in the downlink and the uplink;

c) the ATSSS-ST bits set to "MPQUIC functionality with any steering mode and ATSSS-LL functionality with any steering mode allowed for ATSSS-LL supported" and if the DNN configuration allows for the MPQUIC functionality with any steering mode and ATSSS-LL functionality with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) the SMF shall ensure that the established PDU session has the capability of MPQUIC with any steering mode and ATSSS-LL with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) in the downlink and the uplink;

d) the ATSSS-ST bits set to "ATSSS Low-Layer functionality with any steering mode allowed for ATSSS-LL supported" and if the DNN configuration allows for the ATSSS-LL functionality with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) the SMF shall ensure that the established PDU session has the capability of ATSSS-LL with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) in the downlink and the uplink;

e) the ATSSS-ST bits set to "MPTCP functionality with any steering mode and ATSSS-LL functionality with any steering mode allowed for ATSSS-LL supported" and if the DNN configuration allows for the MPTCP functionality with any steering mode and ATSSS-LL functionality with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) the SMF shall ensure that the established PDU session has the capability of MPTCP with any steering mode and ATSSS-LL with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) in the downlink and the uplink;

f) the ATSSS-ST bits set to "MPTCP functionality with any steering mode MPQUIC functionality with any steering mode and ATSSS-LL functionality with any steering mode allowed for ATSSS-LL supported" and if the DNN configuration allows for the MPTCP functionality with any steering mode the MPQUIC functionality with any steering mode and ATSSS-LL functionality with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) the SMF shall ensure that the established PDU session has the capability of MPTCP with any steering mode the MPQUIC with any steering mode and ATSSS-LL with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) in the downlink and the uplink; or

g) the ATSSS-ST bits set to "MPTCP functionality with any steering mode MPQUIC functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode supported" and

i) if the DNN configuration allows for the MPTCP functionality with any steering mode the MPQUIC functionality with any steering mode and ATSSS-LL functionality with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) but does not allow RTT measurement without using PMF protocol the SMF shall ensure that the established PDU session has the capability of MPTCP with any steering mode MPQUIC with any steering mode and ATSSS-LL with only active-standby steering mode load balancing steering mode or priority based steering mode in the downlink and MPTCP with any steering mode MPQUIC with steering mode and ATSSS-LL with only active-standby steering mode in the uplink;

ii) if the DNN configuration allows for the MPTCP functionality with any steering mode the MPQUIC functionality with any steering mode and ATSSS-LL functionality with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) and allows RTT measurement without using PMF protocol the SMF shall ensure that the established PDU session has the capability of MPTCP with any steering mode MPQUIC with any steering mode and ATSSS-LL with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) in the downlink and MPTCP with any steering mode MPQUIC with steering mode and ATSSS-LL with only active-standby steering mode in the uplink; or

iii) if the DNN configuration allows for the MPTCP functionality with any steering mode the MPQUIC functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode the SMF shall ensure that the established PDU session has the capability of MPTCP with any steering mode MPQUIC with any steering mode and ATSSS-LL with only active-standby steering mode in the downlink and the uplink

if the UE requests to establish a new MA PDU session and the UE supports to establish a PDN connection as the user plane resource of an MA PDU session the UE shall include the ATSSS request parameter in the extended protocol configuration options IE of the PDU SESSION ESTABLISHMENT REQUEST message

if the UE is registered to a network which does not support ATSSS and the UE has already an MA PDU session established over one access the UE shall not attempt to establish user-plane resources for the MA PDU session over the network which does not support ATSSS as specified in subclause 4.22 of 3GPP TS 23.502 [9]

if the UE supports 3GPP PS data off except for the transfer of a PDU session from non-3GPP access to 3GPP access and except for the establishment of user plane resources on the other access for the MA PDU session the UE shall include the extended protocol configuration options IE in the PDU SESSION ESTABLISHMENT REQUEST message and include the 3GPP PS data off UE status the UE behaves as described in subclause 6.2.10

if the UE supports reliable data service the UE shall include the extended protocol configuration options IE in the PDU SESSION ESTABLISHMENT REQUEST message and include the reliable data service request indicator the UE behaves as described in subclause 6.2.15

if the UE supports DNS over (D)TLS (see 3GPP TS 33.501 [24]) the UE shall include the extended protocol configuration options IE in the PDU SESSION ESTABLISHMENT REQUEST message and include DNS server security information indicator and optionally if the UE wishes to indicate which security protocol type(s) are supported by the UE it may include the DNS server security protocol support

NOTE 9 support of DNS over (D)TLS is based on the requirements as specified in 3GPP TS 33.501 [24]

if

a) the PDU session type value of the PDU session type IE is set to "IPv4" "IPv6" or "IPv4v6";

b) the UE indicates "Control plane CIoT 5GS optimization supported" and "IP header compression for control plane CIoT 5GS optimization supported" in the 5GMM capability IE of the REGISTRATION REQUEST message; and

c) the network indicates "Control plane CIoT 5GS optimization supported" and "IP header compression for control plane CIoT 5GS optimization supported" in the 5GS network support feature IE of the REGISTRATION ACCEPT message;

the UE shall include the IP header compression configuration IE in the PDU SESSION ESTABLISHMENT REQUEST message

if

a) the PDU session type value of the PDU session type IE is set to "Ethernet";

b) the UE indicates "Control plane CIoT 5GS optimization supported" and "Ethernet header compression for control plane CIoT 5GS optimization supported" in the 5GMM capability IE of the REGISTRATION REQUEST message; and

c) the network indicates "Control plane CIoT 5GS optimization supported" and "Ethernet header compression for control plane CIoT 5GS optimization supported" in the 5GS network support feature IE of the REGISTRATION ACCEPT message;

the UE shall include the ethernet header compression configuration IE in the PDU SESSION ESTABLISHMENT REQUEST message

if the UE supports transfer of port management information containers the UE shall

a) set the TPMIC bit to "Transfer of port management information containers supported" in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message;

b) if the UE requests to establish a PDU session of "Ethernet" PDU session type include the DS-TT ethernet port MAC address IE in the PDU SESSION ESTABLISHMENT REQUEST message and set its contents to the MAC address of the DS-TT ethernet port used for the PDU session;

c) if the UE-DS-TT residence time is available at the UE include the UE-DS-TT residence time IE and set its contents to the UE-DS-TT residence time; and

d) if a port management information container is provided by the DS-TT include the port management information container IE in the PDU SESSION ESTABLISHMENT REQUEST message

NOTE 10 only SSC mode 1 is supported for a PDU session which is for time synchronization or TSC

if the UE supports secondary DN authentication and authorization over EPC the UE shall set the SDNAEPC bit to "Secondary DN authentication and authorization over EPC supported" in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message

if the UE supports (S)RTP multiplexed media information the UE shall set the RTPMMI bit to "(S)RTP multiplexed media information supported" in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message

if the UE supporting S1 mode supports receiving QoS rules with the length of two octets or QoS flow descriptions with the length of two octets via the extended protocol configuration options IE the UE shall include the QoS rules with the length of two octets support indicator or the QoS flow descriptions with the length of two octets support indicator respectively in the extended protocol configuration options IE in the PDU SESSION ESTABLISHMENT REQUEST message

if the UE supports URSP provisioning in EPS the UE shall include the URSP provisioning in EPS support indicator in the extended protocol configuration options IE of the PDU SESSION ESTABLISHMENT REQUEST message

if

- the UE is operating in single-registration mode;

- the UE supports local IP address in traffic flow aggregate description and TFT filter in S1 mode; and

- the PDU session type requested is different from "Unstructured"

the UE shall indicate the support of local address in TFT in S1 mode in the extended protocol configuration options IE in the PDU SESSION ESTABLISHMENT REQUEST message

if the W-AGF acting on behalf of the FN-RG requests to establish a PDU session of "IPv6" or "IPv4v6" PDU session type the W-AGF acting on behalf of the FN-RG may include in the PDU SESSION ESTABLISHMENT REQUEST message the suggested interface identifier IE with the PDU session type value field set to "IPv6" and containing the interface identifier for the IPv6 link local address associated with the PDU session suggested to be allocated to the FN-RG

if the UE supports provisioning of ECS configuration information to the EEC in the UE then the UE shall include the extended protocol configuration options IE in the PDU SESSION ESTABLISHMENT REQUEST message and shall include the ECS configuration information provisioning support indicator

if the UE supports receiving DNS server addresses in protocol configuration options the UE shall include the extended protocol configuration options IE in the PDU SESSION ESTABLISHMENT REQUEST message and in the extended protocol configuration options IE

a) if the UE requests to establish a PDU session of "IPv4" or "IPv4v6" PDU session type the UE shall include the DNS server IPv4 address request; and

b) if the UE requests to establish a PDU session of "IPv6" or "IPv4v6" PDU session type the UE shall include the DNS server IPv6 address request

if the UE supporting UAS services requests to establish a PDU session for C2 communication the UE shall include the Service-level-AA container IE in the PDU SESSION ESTABLISHMENT REQUEST message in the Service-level-AA container IE the UE shall include

a) the service-level device ID with the value set to the CAA-level UAV ID of the UE; and

b) if available the service-level-AA payload with the value set to the C2 authorization payload and the service-level-AA payload type with the value set to "C2 authorization payload"

NOTE 11 the C2 authorization payload in the service-level-AA payload can include one some or all of the pairing information for C2 communication an indication of the request for direct C2 communication pairing information for direct C2 communication and the UAV flight authorization information

if the UE supports the EAS rediscovery the UE shall include the extended protocol configuration options IE in the PDU SESSION ESTABLISHMENT REQUEST message and shall include the EAS rediscovery support indication in the extended protocol configuration options IE

if the UE needs to include a PDU session pair ID based on the matching URSP rule or UE local configuration the UE shall include the PDU session pair ID IE in the PDU SESSION ESTABLISHMENT REQUEST message if the UE needs to include an RSN based on the matching URSP rule or UE local configuration the UE shall include the RSN IE in the PDU SESSION ESTABLISHMENT REQUEST message

if the UE is not registered for onboarding services in SNPN and needs PVS information the UE shall include the extended protocol configuration options IE in the PDU SESSION ESTABLISHMENT REQUEST message and include the PVS information request in the extended protocol configuration options IE

if the UE supports the EDC the UE shall include the extended protocol configuration options IE in the PDU SESSION ESTABLISHMENT REQUEST message and shall include the EDC support indicator in the extended protocol configuration options IE

if the UE supports a "destination MAC address range type" packet filter component and a "source MAC address range type" packet filter component the UE shall include the extended protocol configuration options IE in the PDU SESSION ESTABLISHMENT REQUEST message and shall include the MS support of MAC address range in 5GS indicator in the extended protocol configuration options IE

if the UE supports reporting of URSP rule enforcement and is indicated to send URSP rule enforcement report to network based on the matching URSP rule which contains the URSP rule enforcement report indication set to "URSP rule enforcement report is required" the UE shall include the URSP rule enforcement reports IE in the PDU SESSION ESTABLISHMENT REQUEST message

the UE shall transport

a) the PDU SESSION ESTABLISHMENT REQUEST message;

b) the PDU session ID of the PDU session being established being handed over being transferred or been established as an MA PDU session;

c) if the request type is set to

1) "initial request" or "MA PDU request" and the UE determined to establish a new PDU session or an MA PDU session based on either a URSP rule including one or more S-NSSAIs in the URSP (see subclause 6.2.9) or UE local configuration according to subclause 4.2.2 of 3GPP TS 24.526 [19]

i) if the UE is in the HPLMN or the subscribed SNPN an S-NSSAI in the allowed NSSAI which corresponds to one of the S-NSSAI(s) in the matching URSP rule if any or else to the S-NSSAI(s) in the UE local configuration or in the default URSP rule if any according to the conditions given in subclause 4.2.2 of 3GPP TS 24.526 [19];

ii) if the UE is in a non-subscribed SNPN the UE determined according to the conditions given in subclause 4.2.2 of 3GPP TS 24.526 [19] to establish a new PDU session or an MA PDU session based on a URSP rule including one or more S-NSSAIs and the URSP rule is a part of a non-subscribed SNPN signalled URSP (see 3GPP TS 24.526 [19])

A) an S-NSSAI in the allowed NSSAI which is one of the S-NSSAI(s) in the URSP rule; and

B) a mapped S-NSSAI associated with the S-NSSAI in A); or

iii) otherwise

A) one of the mapped S-NSSAI(s) which is equal to one of the S-NSSAI(s) in the matching URSP rule if any or else to the S-NSSAI(s) in the UE local configuration or in the default URSP rule if any according to the conditions given in subclause 4.2.2 of 3GPP TS 24.526 [19]; and

B) the S-NSSAI in the allowed NSSAI associated with the S-NSSAI in A); or

1a) "initial request" and the UE determined to establish a new PDU session based on the PDU session parameters for 5G ProSe layer-3 UE-to-network relay UE including an S-NSSAI in the UE policies for 5G ProSe UE-to-network relay UE as defined in 3GPP TS 24.555 [19F]

i) in case of a non-roaming scenario an S-NSSAI in the allowed NSSAI which corresponds to the S-NSSAI in the selected PDU session parameters for 5G ProSe layer-3 UE-to-network relay UE if any; or

ii) in case of a roaming scenario

A) one of the mapped S-NSSAI(s) which corresponds to the S-NSSAI in the selected PDU session parameters for 5G ProSe layer-3 UE-to-network relay UE if any; and

B) the S-NSSAI in the allowed NSSAI associated with the S-NSSAI in A);

NOTE 12 when the UE is roaming an AMF compliant with earlier versions of the specification can omit providing to the UE a mapped S-NSSAI for one or more S-NSSAIs in the allowed NSSAI and the UE then locally sets the mapped S-NSSAI as described in subclause 4.6.2.1

1b) "initial request" and the UE has the partially allowed NSSAI and determined to establish a new PDU session based on either a URSP rule including one or more S-NSSAIs in the URSP (see subclause 6.2.9) or UE local configuration according to subclause 4.2.2 of 3GPP TS 24.526 [19]

i) if the UE is in the HPLMN or the subscribed SNPN and the current TA is in the list of TAs for which the S-NSSAI is allowed an S-NSSAI in the partially allowed NSSAI which corresponds to one of the S-NSSAI(s) in the matching URSP rule if any or else to the S-NSSAI(s) in the UE local configuration or in the default URSP rule if any according to the conditions given in subclause 4.2.2 of 3GPP TS 24.526 [19];

ii) if the UE is in the VPLMN or a non-subscribed SNPN the UE determined according to the conditions given in subclause 4.2.2 of 3GPP TS 24.526 [19] to establish a new PDU session based on a URSP rule including one or more S-NSSAIs the URSP rule is a part of a non-subscribed SNPN signalled URSP (see 3GPP TS 24.526 [19]) and the current TA is in the list of TAs for which the S-NSSAI is allowed

A) an S-NSSAI in the partially allowed NSSAI which is one of the S-NSSAI(s) in the URSP rule; and

B) a mapped S-NSSAI associated with the S-NSSAI in A); or

2) "existing PDU session" an S-NSSAI which is an S-NSSAI in the allowed NSSAI associated with the PDU session and (in roaming scenarios) a mapped S-NSSAI with exception when S-NSSAI is not provided by the network in subclause 6.1.4.2;

c1) the alternative S-NSSAI associated with the S-NSSAI to be replaced if an alternative S-NSSAI for the S-NSSAI or the mapped S-NSSAI exists;

d) if the request type is set to

1) "initial request" or "MA PDU request" and the UE determined to establish a new PDU session or an MA PDU session based on either a URSP rule including one or more DNNs in the URSP (see subclause 6.2.9) or UE local configuration according to subclause 4.2.2 of 3GPP TS 24.526 [19] a DNN which corresponds to one of the DNN(s) in the matching URSP rule if any or else to the DNN(s) in the UE local configuration or in the default URSP rule if any according to the conditions given in subclause 4.2.2 of 3GPP TS 24.526 [19];

1a) "initial request" and the UE determined to establish a new PDU session based on the PDU session parameters for 5G ProSe layer-3 UE-to-network relay UE including a DNN in the UE policies for 5G ProSe UE-to-network relay UE as defined in 3GPP TS 24.555 [19F] a DNN which corresponds to the DNN in the selected PDU session parameters for 5G ProSe layer-3 UE-to-network relay UE if any; or

2) "existing PDU session" a DNN which is a DNN associated with the PDU session;

e) the request type which is set to

1) "initial request" if the UE is not registered for emergency services and the UE requests to establish a new non-emergency PDU session;

2) "existing PDU session" if the UE is not registered for emergency services and the UE requests

i) handover of an existing non-emergency PDU session between 3GPP access and non-3GPP access;

ii) transfer of an existing PDN connection for non-emergency bearer services in the EPS to the 5GS; or

iii) transfer of an existing PDN connection for non-emergency bearer services in an untrusted non-3GPP access connected to the EPC to the 5GS;

3) "initial emergency request" if the UE requests to establish a new emergency PDU session;

4) "existing emergency PDU session" if the UE requests

i) handover of an existing emergency PDU session between 3GPP access and non-3GPP access;

ii) transfer of an existing PDN connection for emergency bearer services in the EPS to the 5GS; or

iii) transfer of an existing PDN connection for emergency bearer services in an untrusted non-3GPP access connected to the EPC to the 5GS; or

5) "MA PDU request" if

i) the UE requests to establish an MA PDU session;

ii) the UE requests to establish user plane resources over other access of an MA PDU session established over one access only; or

iii) the UE performs inter-system change from S1 mode to N1 mode according to subclause 4.8.2.3.1 and requests transfer of a PDN connection which is a user plane resource of an MA PDU session; and

f) the old PDU session ID which is the PDU session ID of the existing PDU session if the UE initiates the UE-requested PDU session establishment procedure upon receiving the PDU SESSION MODIFICATION COMMAND messages with the 5GSM cause IE set to #39 "reactivation requested";

NOTE 13 if the PDU SESSION MODIFICATION COMMAND message included alternative S-NSSAI the UE includes alternative S-NSSAI in the PDU SESSION ESTABLISHMENT REQUEST message for PDU session re-establishment

using the NAS transport procedure as specified in subclause 5.4.5 and the UE shall start timer T3580 (see example in figure 6.4.1.2.1)

for bullet c) 1) if the matching URSP rule does not have an associated S-NSSAI or if the UE does not have any matching URSP rule and there is no S-NSSAI in the UE local configuration or in the default URSP rule the UE shall not provide any S-NSSAI in a PDU session establishment procedure

for bullet c) 1a) if the selected PDU session parameters for 5G ProSe layer-3 UE-to-network relay UE do not have an associated S-NSSAI the UE shall not provide any S-NSSAI in a PDU session establishment procedure

for bullet d) 1)

- if the matching non-default URSP rule does not have an associated DNN then the UE shall not provide any DNN in a PDU session establishment procedure;

- if the UE does not have any matching non-default URSP rule the UE requests a connectivity that requires PAP/CHAP and the UE is configured with the default DNN for the S-NSSAI in the UE local configuration corresponding to the request then the UE should provide such DNN in a PDU session establishment procedure;

- if the UE does not have any matching non-default URSP rule the UE requests a connectivity that requires PAP/CHAP the UE is not configured with the default DNN for the S-NSSAI in the UE local configuration corresponding to the request and the application provides the DNN then the UE shall use such DNN in a PDU session establishment procedure;

- if the UE does not have any matching non-default URSP rule the UE requests a connectivity that does not require PAP/CHAP the UE is not configured with the DNN for the S-NSSAI in the UE local configuration corresponding to the request and the application provides the DNN then the UE shall use such DNN in a PDU session establishment procedure;

- if the UE does not have any matching non-default URSP rule the UE requests a connectivity that requires PAP/CHAP the UE is not configured with the default DNN for the S-NSSAI in the UE local configuration corresponding to the request the application does not provide the DNN and there is no DNN in the default URSP rule then the UE shall not provide any DNN in a PDU session establishment procedure; or

- if the UE does not have any matching non-default URSP rule the UE requests a connectivity that does not require PAP/CHAP the UE is not configured with the DNN for the S-NSSAI in the UE local configuration corresponding to the request the application does not provide the DNN and there is no DNN in the default URSP rule then the UE shall not provide any DNN in a PDU session establishment procedure

for bullet d) 1a) if the selected the PDU session parameters for 5G ProSe layer-3 UE-to-network relay UE do not have an associated DNN the UE shall not provide any DNN in a PDU session establishment procedure

if the request type is set to "initial emergency request" or "existing emergency PDU session" or the UE is registered for onboarding services in SNPN neither DNN nor S-NSSAI is transported by the UE using the NAS transport procedure as specified in subclause 5.4.5

figure 6.4.1.2.1 UE-requested PDU session establishment procedure

upon receipt of a PDU SESSION ESTABLISHMENT REQUEST message a PDU session ID optionally an S-NSSAI associated with (in roaming scenarios) a mapped S-NSSAI optionally a DNN determined by the AMF optionally a DNN selected by the network (if different from the DNN determined by the AMF) the request type and optionally an old PDU session ID the SMF checks whether connectivity with the requested DN can be established if the requested DNN is not included the SMF shall use the default DNN

if the PDU session being established is a non-emergency PDU session the request type is not set to "existing PDU session" and the PDU session authentication and authorization by the external DN is required due to local policy the SMF shall check whether the PDU SESSION ESTABLISHMENT REQUEST message includes the SM PDU DN request container IE or the Service-level-AA container IE

if the PDU session being established is a non-emergency PDU session the request type is not set to "existing PDU session" the SM PDU DN request container IE is included in the PDU SESSION ESTABLISHMENT REQUEST message the PDU session authentication and authorization by the external DN is required due to local policy and user's subscription data and

a) the information for the PDU session authentication and authorization by the external DN in the SM PDU DN request container IE is compliant with the local policy and user's subscription data the SMF shall proceed with the EAP authentication procedure specified in 3GPP TS 33.501 [24] and refrain from accepting or rejecting the PDU SESSION ESTABLISHMENT REQUEST message until the EAP authentication procedure finalizes; or

b) the information for the PDU session authentication and authorization by the external DN in the SM PDU DN request container IE is not compliant with the local policy and user's subscription data the SMF shall consider it as an abnormal case and proceed as specified in subclause 6.4.1.7

if the PDU session being established is a non-emergency PDU session the request type is not set to "existing PDU session" the SM PDU DN request container IE is not included in the PDU SESSION ESTABLISHMENT REQUEST message and the PDU session authentication and authorization by the external DN is required due to local policy and user's subscription data the SMF shall proceed with the EAP authentication procedure specified in 3GPP TS 33.501 [24] and refrain from accepting or rejecting the PDU SESSION ESTABLISHMENT REQUEST message until the EAP authentication procedure finalizes

if the SMF receives the old PDU session ID from the AMF and a PDU session exists for the old PDU session ID the SMF shall consider that the request for the relocation of SSC mode 3 PDU session anchor with multiple PDU sessions as specified in 3GPP TS 23.502 [9] is accepted by the UE

if the SMF receives the onboarding indication from the AMF the SMF shall consider that the PDU session is established for onboarding services in SNPN

if the UE has set the TPMIC bit to "Transfer of port management information containers supported" in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message and has included a DS-TT ethernet port MAC address IE (if the PDU session type is "Ethernet") the port management information container IE and optionally the UE-DS-TT residence time IE in the PDU SESSION ESTABLISHMENT REQUEST message the SMF shall operate as specified in 3GPP TS 23.502 [9] subclause 4.3.2.2.1

if requested by the upper layers the UE supporting UAS services shall initiate a request to establish a PDU session for UAS services where the UE

a) shall include the service-level device ID with the value set to the CAA-level UAV ID;

b) if provided by the upper layers shall include the service-level-AA server address with the value set to the USS address; and

c) if provided by the upper layers shall include

i) the service-level-AA payload type with the value set to "UUAA payload"; and

ii) the service-level-AA payload with the value set to UUAA payload

in the Service-level-AA container IE of the PDU SESSION ESTABLISHMENT REQUEST message

if the PDU session being established is a non-emergency PDU session the request type is not set to "existing PDU session" the Service-level-AA container IE is included in the PDU SESSION ESTABLISHMENT REQUEST message and

a) the service-level authentication and authorization by the external DN is required due to local policy;

b) there is a valid user's subscription information for the requested DNN or for the requested DNN and S-NSSAI; and

c) the information for the service-level authentication and authorization by the external DN in the Service-level-AA container IE includes CAA-level UAV ID

then the SMF shall proceed with the UUAA-SM procedure as specified in 3GPP TS 23.256 [6AB] and refrain from accepting or rejecting the PDU SESSION ESTABLISHMENT REQUEST message until the service-level authentication and authorization procedure is completed

the UE supporting UAS services shall not request a PDU session establishment procedure to the same DNN (or no DNN if no DNN was indicated by the UE) and the same S-NSSAI (or no S-NSSAI if no S-NSSAI was indicated by the UE) for which the UE has requested a service level authentication and authorization procedure which is ongoing

if the PDU SESSION ESTABLISHMENT REQUEST message includes the PDU session pair ID IE the RSN IE or both the SMF shall operate as specified in subclause 5.33.2 of 3GPP TS 23.501 [8]

#### 6.4.1.3 UE-requested PDU session establishment procedure accepted by the network

if the connectivity with the requested DN is accepted by the network the SMF shall create a PDU SESSION ESTABLISHMENT ACCEPT message

if the UE requests establishing an emergency PDU session the network shall not check for service area restrictions or subscription restrictions when processing the PDU SESSION ESTABLISHMENT REQUEST message

the SMF shall set the authorized QoS rules IE of the PDU SESSION ESTABLISHMENT ACCEPT message to the authorized QoS rules of the PDU session and may include the authorized QoS flow descriptions IE of the PDU SESSION ESTABLISHMENT ACCEPT message set to the authorized QoS flow descriptions of the PDU session

NOTE 1 this is applicable also if the PDU session establishment procedure was initiated to perform handover of an existing PDU session between 3GPP access and non-3GPP access and even if the authorized QoS rules and authorized QoS flow descriptions for source and target access of the handover are the same

the SMF shall ensure that the number of the packet filters used in the authorized QoS rules of the PDU session does not exceed the maximum number of packet filters supported by the UE for the PDU session if the received request type is "initial emergency request" the SMF shall set the authorized QoS flow descriptions IE according to the QoS parameters used for establishing emergency services as specified in subclause 5.16.4 of 3GPP TS 23.501 [8]

SMF shall set the authorized QoS flow descriptions IE to the authorized QoS flow descriptions of the PDU session if

a) the authorized QoS rules IE contains at least one GBR QoS flow;

b) the QFI is not the same as the 5QI of the QoS flow identified by the QFI;

c) the QoS flow can be mapped to an EPS bearer as specified in subclause 4.11.1 of 3GPP TS 23.502 [9]; or

d) the QoS flow is established for the PDU session used for relaying as specified in subclause 5.6.2.1 of 3GPP TS 23.304 [6E]

NOTE 2 in cases other than above listed cases it is up to the SMF implementation to include the authorized QoS flow description for the QoS flow in the authorized QoS flow descriptions IE of the PDU SESSION ESTABLISHMENT ACCEPT message

if interworking with EPS is supported for the PDU session the SMF shall set in the PDU SESSION ESTABLISHMENT ACCEPT message

a) the mapped EPS bearer contexts IE to the EPS bearer contexts mapped from one or more QoS flows of the PDU session; and

b) the EPS bearer identity parameter in the authorized QoS flow descriptions IE to the EPS bearer identity corresponding to the QoS flow for each QoS flow which can be transferred to EPS

if the "Create new EPS bearer" operation code in the mapped EPS bearer contexts IE was received and there is no corresponding authorized QoS flow descriptions IE in the PDU SESSION ESTABLISHMENT ACCEPT message the UE shall send a PDU SESSION MODIFICATION REQUEST message including a mapped EPS bearer contexts IE to delete the mapped EPS bearer context if the EPS bearer identity parameter in the authorized QoS flow descriptions IE was received the operation code is "Create new QoS flow description" and there is no corresponding mapped EPS bearer contexts IE in the PDU SESSION ESTABLISHMENT ACCEPT message the UE shall not diagnose an error and shall keep storing the association between the QoS flow and the corresponding EPS bearer identity

furthermore the SMF shall store the association between the QoS flow and the mapped EPS bearer context for each QoS flow which can be transferred to EPS

the SMF shall set the selected SSC mode IE of the PDU SESSION ESTABLISHMENT ACCEPT message to

a) the received SSC mode in the SSC mode IE included in the PDU SESSION ESTABLISHMENT REQUEST message based on one or more of the PDU session type the subscription and the SMF configuration;

b) either the default SSC mode for the data network listed in the subscription or the SSC mode associated with the SMF configuration if the SSC mode IE is not included in the PDU SESSION ESTABLISHMENT REQUEST message

NOTE 3 for bullet b) to avoid issues for UEs not supporting all SSC modes the network operator can in the subscription data and local configuration include at least SSC mode 1 in the allowed SSC modes and set the default SSC mode to "SSC mode 1" as per 3GPP TS 23.501 [8]

if the PDU session is an emergency PDU session the SMF shall set the selected SSC mode IE of the PDU SESSION ESTABLISHMENT ACCEPT message to "SSC mode 1" if the PDU session is a non-emergency PDU session of "Ethernet" or "Unstructured" PDU session type the SMF shall set the selected SSC mode IE to "SSC mode 1" or "SSC mode 2" if the PDU session is a non-emergency PDU session of "IPv4" "IPv6" or "IPv4v6" PDU session type the SMF shall set the selected SSC mode IE to "SSC mode 1" "SSC mode 2" or "SSC mode 3"

if the PDU session is a non-emergency PDU session and the UE is not registered for onboarding services in SNPN the SMF shall set the S-NSSAI IE of the PDU SESSION ESTABLISHMENT ACCEPT message to

a) the S-NSSAI of the PDU session; and

b) the mapped S-NSSAI (in roaming scenarios)

the S-NSSAI or the mapped S-NSSAI (in roaming scenarios) of the PDU session shall be the alternative S-NSSAI if the SMF has received an alternative S-NSSAI from the AMF

the SMF shall set the selected PDU session type IE of the PDU SESSION ESTABLISHMENT ACCEPT message to the selected PDU session type i.e the PDU session type of the PDU session

if the PDU SESSION ESTABLISHMENT REQUEST message includes a PDU session type IE set to "IPv4v6" the SMF shall select "IPv4" "IPv6" or "IPv4v6" as the selected PDU session type if the subscription the SMF configuration or both are limited to IPv4 only or IPv6 only for the DNN selected by the network the SMF shall include the 5GSM cause value #50 "PDU session type IPv4 only allowed" or #51 "PDU session type IPv6 only allowed" respectively in the 5GSM cause IE of the PDU SESSION ESTABLISHMENT ACCEPT message

if the selected PDU session type is "IPv4" the SMF shall include the PDU address IE in the PDU SESSION ESTABLISHMENT ACCEPT message and shall set the PDU address IE to an IPv4 address is allocated to the UE in the PDU session

if the selected PDU session type is "IPv6" the SMF shall include the PDU address IE in the PDU SESSION ESTABLISHMENT ACCEPT message and shall set the PDU address IE to an interface identifier for the IPv6 link local address allocated to the UE in the PDU session

if the selected PDU session type is "IPv4v6" the SMF shall include the PDU address IE in the PDU SESSION ESTABLISHMENT ACCEPT message and shall set the PDU address IE to an IPv4 address and an interface identifier for the IPv6 link local address allocated to the UE in the PDU session

if the selected PDU session type of a PDU session established by the W-AGF acting on behalf of the FN-RG is "IPv4v6" or "IPv6" the SMF shall also indicate the SMF's IPv6 link local address in the PDU address IE of the PDU SESSION ESTABLISHMENT ACCEPT message

if the PDU session is a non-emergency PDU session and the UE is not registered for onboarding services in SNPN the SMF shall set the DNN IE of the PDU SESSION ESTABLISHMENT ACCEPT message to the DNN determined by the AMF of the PDU session

the SMF shall set the Session-AMBR IE of the PDU SESSION ESTABLISHMENT ACCEPT message to the Session-AMBR of the PDU session

if the selected PDU session type is "IPv4" "IPv6" "IPv4v6" or "Ethernet" and if the PDU SESSION ESTABLISHMENT REQUEST message includes a 5GSM capability IE with the RQoS bit set to "Reflective QoS supported" the SMF shall consider that reflective QoS is supported for QoS flows belonging to this PDU session and may include the RQ timer IE set to an RQ timer value in the PDU SESSION ESTABLISHMENT ACCEPT message

if the selected PDU session type is "IPv4" "IPv6" "IPv4v6" or "Ethernet" and if the PDU SESSION ESTABLISHMENT REQUEST message includes a maximum number of supported packet filters IE the SMF shall consider this number as the maximum number of packet filters that can be supported by the UE for this PDU session otherwise the SMF considers that the UE supports 16 packet filters for this PDU session

the SMF shall consider that the maximum data rate per UE for user-plane integrity protection supported by the UE for uplink and the maximum data rate per UE for user-plane integrity protection supported by the UE for downlink are valid for the lifetime of the PDU session

if the value of the RQ timer is set to "deactivated" or has a value of zero the UE considers that RQoS is not applied for this PDU session

NOTE 4 if the 5G core network determines that reflective QoS is to be used for a QoS flow the SMF sends reflective QoS indication (RQI) to UPF to activate reflective QoS if the QoS flow is established over 3GPP access the SMF also includes reflective QoS attribute (RQA) in QoS profile of the QoS flow during QoS flow establishment

if the selected PDU session type is "IPv6" or "IPv4v6" and if the PDU SESSION ESTABLISHMENT REQUEST message includes a 5GSM capability IE with the MH6-PDU bit set to "Multi-homed IPv6 PDU session supported" the SMF shall consider that this PDU session is supported to use multiple IPv6 prefixes

if the selected PDU session type is "Ethernet" the PDU SESSION ESTABLISHMENT REQUEST message includes a 5GSM capability IE with the EPT-S1 bit set to "Ethernet PDN type in S1 mode supported" and the network supports ethernet PDN type in S1 mode the SMF shall set the EPT-S1 bit of the 5GSM network feature support IE of the PDU SESSION ESTABLISHMENT ACCEPT message to "Ethernet PDN type in S1 mode supported"

if the AMF has indicated to the SMF that the UE supports the non-3GPP access path switching and the SMF supports the non-3GPP access path switching the SMF shall set the NAPS bit of the 5GSM network feature support IE of the PDU SESSION ESTABLISHMENT ACCEPT message to "non-3GPP access path switching supported"

if the DN authentication of the UE was performed and completed successfully the SMF shall set the EAP message IE of the PDU SESSION ESTABLISHMENT ACCEPT message to an EAP-success message as specified in IETF RFC 3748 [34] provided by the DN

based on local policies or configurations in the SMF and the Always-on PDU session requested IE in the PDU SESSION ESTABLISHMENT REQUEST message (if available) if the SMF determines that either

a) the requested PDU session needs to be established as an always-on PDU session (e.g because the PDU session is for time synchronization or TSC for URLLC or for both) the SMF shall include the Always-on PDU session indication IE in the PDU SESSION ESTABLISHMENT ACCEPT message and shall set the value to "Always-on PDU session required"; or

b) the requested PDU session shall not be established as an always-on PDU session and

i) if the UE included the Always-on PDU session requested IE the SMF shall include the Always-on PDU session indication IE in the PDU SESSION ESTABLISHMENT ACCEPT message and shall set the value to "Always-on PDU session not allowed"; or

ii) if the UE did not include the Always-on PDU session requested IE the SMF shall not include the Always-on PDU session indication IE in the PDU SESSION ESTABLISHMENT ACCEPT message

if the PDU session is an MA PDU session the SMF shall include the ATSSS container IE in the PDU SESSION ESTABLISHMENT ACCEPT message the SMF shall set the content of the ATSSS container IE as specified in 3GPP TS 24.193 [13B] if the UE requests to establish user plane resources over the second access of an MA PDU session which has already been established over the first access and the parameters associated with ATSSS previously provided to the UE are not to be updated the "ATSSS container contents" shall not be included in the ATSSS container IE in the PDU SESSION ESTABLISHMENT ACCEPT message

if the PDU session is a single access PDU session containing the MA PDU session information IE with the value set to "MA PDU session network upgrade is allowed" and

a) if the SMF decides to establish a single access PDU session the SMF shall not include the ATSSS container IE in the PDU SESSION ESTABLISHMENT ACCEPT message; or

b) if the SMF decides to establish an MA PDU session the SMF shall include the ATSSS container IE in the PDU SESSION ESTABLISHMENT ACCEPT message which indicates to the UE that the requested single access PDU session was established as an MA PDU session

if the network decides that the PDU session is only for control plane CIoT 5GS optimization the SMF shall include the control plane only indication in the PDU SESSION ESTABLISHMENT ACCEPT message

if

a) the UE provided the IP header compression configuration IE in the PDU SESSION ESTABLISHMENT REQUEST message; and

b) the SMF supports IP header compression for control plane CIoT 5GS optimization;

the SMF shall include the IP header compression configuration IE in the PDU SESSION ESTABLISHMENT ACCEPT message

if

a) the UE provided the ethernet header compression configuration IE in the PDU SESSION ESTABLISHMENT REQUEST message; and

b) the SMF supports ethernet header compression for control plane CIoT 5GS optimization;

the SMF shall include the ethernet header compression configuration IE in the PDU SESSION ESTABLISHMENT ACCEPT message

if the PDU SESSION ESTABLISHMENT REQUEST included the requested MBS container IE with the MBS operation set to "Join MBS session" the SMF

a) shall include the TMGI for the multicast MBS session IDs that the UE is allowed to join if any in the received MBS container IE shall set the MBS decision to "MBS join is accepted" for each of those received MBS information may include the MBS start time to indicate the time when the multicast MBS session starts and shall include the MBS security container in each of those received MBS information if security protection is applied for that multicast MBS session and the control plane security procedure is used as specified in subclause W.4.1.2 in 3GPP TS 33.501 [24] and shall use separate QoS flows dedicated for multicast by including the authorized QoS flow descriptions IE if no separate QoS flows dedicated for multicast exist or if the SMF wants to establish new QoS flows dedicated for multicast;

NOTE 5 the network determines whether security protection applies or not for the multicast MBS session as specified in 3GPP TS 33.501 [24]

b) shall include the TMGI for multicast MBS session IDs that the UE is not allowed to join if any in the received MBS container IE shall set the MBS decision to "MBS join is rejected" for each of those received MBS information shall set the rejection cause for each of those received MBS information with the reason of rejection and if the rejection cause is set to "multicast MBS session has not started or will not start soon" may include an MBS back-off timer value; and

c) may include in the received MBS container IE the MBS service area for each multicast MBS session and include in it the MBS TAI list the NR CGI list or both that identify the service area(s) for the local MBS service

NOTE 6 for an multicast MBS session that has multiple MBS service areas the MBS service areas are indicated to the UE using MBS service announcement as described in 3GPP TS 23.247 [53] which is out of scope of this specification

in the PDU SESSION ESTABLISHMENT ACCEPT message if the UE has set the type of multicast MBS session ID to "Source specific IP multicast address" in the requested multicast MBS container IE for certain MBS session(s) in the PDU SESSION ESTABLISHMENT REQUEST message the SMF shall include the source IP address information and destination IP address information in the received MBS information together with the TMGI for each of those multicast MBS sessions

NOTE 7 including the source IP address information and destination IP address information in the received MBS information in that case is to allow the UE to perform the mapping between the requested multicast MBS session ID and the provided TMGI

NOTE 8 in SNPN TMGI is used together with NID to identify an MBS session

if the request type is "existing PDU session" the SMF shall not perform network slice admission control for the PDU session except for the following cases

a) when EPS counting is not required for the S-NSSAI of the PDU session for network slice admission control and the PDU session is established due to transfer the PDN connection from S1 mode to N1 mode in case of inter-system change; or

b) handover of an existing PDU session between 3GPP access and non-3GPP access is performed

the SMF shall send the PDU SESSION ESTABLISHMENT ACCEPT message

upon receipt of a PDU SESSION ESTABLISHMENT ACCEPT message and a PDU session ID using the NAS transport procedure as specified in subclause 5.4.5 the UE shall stop timer T3580 shall release the allocated PTI value and shall consider that the PDU session was established

if the PDU session establishment procedure was initiated to perform handover of an existing PDU session between 3GPP access and non-3GPP access then upon receipt of the PDU SESSION ESTABLISHMENT ACCEPT message the UE shall locally delete any authorized QoS rules authorized QoS flow descriptions the session-AMBR and the parameters provided in the protocol configuration options IE when in S1 mode or the extended protocol configuration options IE stored for the PDU session before processing the new received authorized QoS rules authorized QoS flow descriptions the session-AMBR and the parameters provided in the extended protocol configuration options IE if any

NOTE 9 for the case of handover from 3GPP access to non-3GPP access deletion of the QoS flow descriptions implies deletion of the associated EPS bearer identities if any and according to subclause 6.1.4.1 also deletion of the associated EPS bearer contexts regarding the reverse direction for PDU sessions via non-3GPP access the network does not allocate associated EPS bearer identities (see 3GPP TS 23.502 [9] subclause 4.11.1.4.1)

if the PDU session establishment procedure was initiated to perform handover of an existing PDU session from 3GPP access to non-3GPP access and that existing PDU session is associated with one or more multicast MBS sessions the UE shall locally leave the associated multicast MBS sessions and the SMF shall consider the UE as removed from the associated multicast MBS sessions

for an MA PDU session already established on a single access except for all those MA PDU sessions with a PDN connection established as a user-plane resource upon receipt of PDU SESSION ESTABLISHMENT ACCEPT message over the other access

a) the UE shall delete the stored authorized QoS rules and the stored session-AMBR;

b) if the authorized QoS flow descriptions IE is included in the PDU SESSION ESTABLISHMENT ACCEPT message the UE shall delete the stored authorized QoS flow descriptions; and

c) if the mapped EPS bearer contexts IE is included in the PDU SESSION ESTABLISHMENT ACCEPT message the UE shall delete the stored mapped EPS bearer contexts

if the UE supports network slice usage control and

a) a PDU session is successfully established for the on-demand S-NSSAI the UE shall stop and reset the slice deregistration inactivity timer for the on-demand S-NSSAI over corresponding access type if running; and

b) an MA PDU session is successfully established for the on-demand S-NSSAI the UE shall stop and reset the slice deregistration inactivity timer for the on-demand S-NSSAI over both 3GPP access and non-3GPP access if running

the UE shall store the authorized QoS rules and the session-AMBR received in the PDU SESSION ESTABLISHMENT ACCEPT message for the PDU session the UE shall also store the authorized QoS flow descriptions if it is included in the authorized QoS flow descriptions IE of the PDU SESSION ESTABLISHMENT ACCEPT message for the PDU session

if the number of the authorized QoS rules the number of the packet filters or the number of the authorized QoS flow descriptions associated with the PDU session have reached the maximum number supported by the UE upon receipt of a PDU SESSION ESTABLISHMENT ACCEPT message then the UE may initiate the PDU session release procedure by sending a PDU SESSION RELEASE REQUEST message with 5GSM cause #26 "insufficient resources"

for a PDU session that is being established with the request type set to "initial request" "initial emergency request" or "MA PDU request" or a PDU session that is being transferred from EPS to 5GS and established with the request type set to "existing PDU session" or "existing emergency PDU session" or a PDU session that is being handed over between non-3GPP access and 3GPP access and established with the request type set to "existing PDU session" or "existing emergency PDU session " the UE shall verify the authorized QoS rules and the authorized QoS flow descriptions provided in the PDU SESSION ESTABLISHMENT ACCEPT message for different types of errors as follows

a) semantic errors in QoS operations

1) when the rule operation is "Create new QoS rule" and the DQR bit is set to "the QoS rule is the default QoS rule" when there's already a default QoS rule

2) when the rule operation is "Create new QoS rule" and there is no rule with the DQR bit set to "the QoS rule is the default QoS rule"

3) when the rule operation is "Create new QoS rule" and two or more QoS rules associated with this PDU session would have identical precedence values

4) when the rule operation is an operation other than "Create new QoS rule"

5) when the rule operation is "Create new QoS rule" the DQR bit is set to "the QoS rule is not the default QoS rule" and the UE is in NB-N1 mode

6) when the rule operation is "Create new QoS rule" and there is already an existing QoS rule with the same QoS rule identifier

7) when the rule operation is "Create new QoS rule" the DQR bit is set to "the QoS rule is not the default QoS rule" and the PDU session type of the PDU session is "Unstructured"

8) when the flow description operation is an operation other than "Create new QoS flow description"

8a) when the flow description operation is "Create new QoS flow description" and there is already an existing QoS flow description with the same QoS flow identifier

9) when the flow description operation is "Create new QoS flow description" the QFI associated with the QoS flow description is not the same as the QFI of the default QoS rule and the UE is NB-N1 mode

10) when the flow description operation is "Create new QoS flow description" the QFI associated with the QoS flow description is not the same as the QFI of the default QoS rule and the PDU session type of the PDU session is "Unstructured"

11) when the rule operation is "Create new QoS rule" and the DQR bit is set to "the QoS rule is not the default QoS rule" and one match-all packet filter is to be associated with the QoS rule

in case 4 case 5 or case 7 if the rule operation is for a non-default QoS rule the UE shall send a PDU SESSION MODIFICATION REQUEST message to delete the QoS rule with 5GSM cause #83 "semantic error in the QoS operation"

in case 6 if the existing QoS rule is not the default QoS rule and the DQR bit of the new QoS rule is set to "the QoS rule is not the default QoS rule" the UE shall not diagnose an error further process the create request and if it was processed successfully delete the old QoS rule (i.e the QoS rule that existed when case 6 was detected) if the existing QoS rule is the default QoS rule or the DQR bit of the new QoS rule is set to "the QoS rule is the default QoS rule" the UE shall initiate a PDU session release procedure by sending a PDU SESSION RELEASE REQUEST message with 5GSM cause #83 "semantic error in the QoS operation"

in case 8 case 9 or case 10 the UE shall send a PDU SESSION MODIFICATION REQUEST message to delete the QoS flow description with 5GSM cause #83 "semantic error in the QoS operation"

in case 8a the UE shall not diagnose an error further process the create request and if it was processed successfully delete the old QoS flow description (i.e the QoS flow description that existed when case 8a was detected)

otherwise for all the cases above the UE shall initiate a PDU session release procedure by sending a PDU SESSION RELEASE REQUEST message with 5GSM cause #83 "semantic error in the QoS operation"

b) syntactical errors in QoS operations

1) when the rule operation is "Create new QoS rule" the QoS rule is a QoS rule of a PDU session of IPv4 IPv6 IPv4v6 or ethernet PDU session type and the packet filter list in the QoS rule is empty

2) when the rule operation is "Create new QoS rule" the DQR bit is set to "the QoS rule is the default QoS rule" the PDU session type of the PDU session is "Unstructured" and the packet filter list in the QoS rule is not empty

3) when there are other types of syntactical errors in the coding of the authorized QoS rules IE or the authorized QoS flow descriptions IE such as a mismatch between the number of packet filters subfield and the number of packet filters in the packet filter list when the rule operation is create new QoS rule" or the number of packet filters subfield is larger than the maximum possible number of packet filters in the packet filter list (i.e. there is no QoS rule precedence subfield included in the QoS rule IE) the QoS rule identifier is set to "no QoS rule identifier assigned" or the QoS flow identifier is set to "no QoS flow identifier assigned"

4) when the rule operation is "Create new QoS rule" there is no QoS flow description with a QFI corresponding to the QFI of the resulting QoS rule and the UE determines by using the QoS rule’s QFI as the 5QI that there is a resulting QoS rule for a GBR QoS flow (as described in 3GPP TS 23.501 [8] table 5.7.4-1)

5) when the flow description operation is "Create new QoS flow description" and the UE determines that there is a QoS flow description of a GBR QoS flow (as described in 3GPP TS 23.501 [8] table 5.7.4-1) which lacks at least one of the mandatory parameters (i.e. GFBR uplink GFBR downlink MFBR uplink and MFBR downlink) if the QoS flow description does not include a 5QI the UE determines this by using the QFI as the 5QI

in case 1 case 3 or case 4 if the QoS rule is the default QoS rule the UE shall initiate a PDU session release procedure by sending a PDU SESSION RELEASE REQUEST message with 5GSM cause #84 "syntactical error in the QoS operation" otherwise the UE shall send a PDU SESSION MODIFICATION REQUEST message including a requested QoS rule IE a requested QoS flow description IE or both to delete the QoS rule the QoS flow description or both with 5GSM cause #84 "syntactical error in the QoS operation"

in case 2 if the QoS rule is the default QoS rule the UE shall send a PDU SESSION MODIFICATION REQUEST message including a requested QoS rule IE to delete all the packet filters of the default QoS rule the UE shall include the 5GSM cause #84 "syntactical error in the QoS operation"

in case 5 if the default QoS rule is associated with the QoS flow description which lacks at least one of the mandatory parameters the UE shall initiate a PDU session release procedure by sending a PDU SESSION RELEASE REQUEST message with 5GSM cause #84 "syntactical error in the QoS operation" otherwise the UE shall send a PDU SESSION MODIFICATION REQUEST message to delete the QoS flow description which lacks at least one of the mandatory parameters and the associated QoS rule(s) if any with 5GSM cause #84 "syntactical error in the QoS operation"

NOTE 10 it is not considered an error if the UE determines that after processing all QoS operations on QoS rules and QoS flow descriptions there is a QoS flow description that is not associated with any QoS rule and the UE is not in NB-N1 mode

c) semantic errors in packet filters

1) when a packet filter consists of conflicting packet filter components which would render the packet filter ineffective i.e no IP packet will ever fit this packet filter how the UE determines a semantic error in a packet filter is outside the scope of the present document

if the QoS rule is the default QoS rule the UE shall initiate a PDU session release procedure by sending a PDU SESSION RELEASE REQUEST message with 5GSM cause #44 "semantic error in packet filter(s)" otherwise the UE shall send a PDU SESSION MODIFICATION REQUEST message to delete the QoS rule with 5GSM cause #44 "semantic error in packet filter(s)"

d) syntactical errors in packet filters

1) when the rule operation is "Create new QoS rule" and two or more packet filters in the resultant QoS rule would have identical packet filter identifiers

2) when there are other types of syntactical errors in the coding of packet filters such as the use of a reserved value for a packet filter component identifier

if the QoS rule is the default QoS rule the UE shall initiate a PDU session release procedure by sending a PDU SESSION RELEASE REQUEST message with 5GSM cause #45 "syntactical errors in packet filter(s)" otherwise the UE shall send a PDU SESSION MODIFICATION REQUEST message to delete the QoS rule with 5GSM cause #45 "syntactical errors in packet filter(s)"

if the Always-on PDU session indication IE is included in the PDU SESSION ESTABLISHMENT ACCEPT message and

a) the value of the IE is set to "Always-on PDU session required" the UE shall consider the established PDU session as an always-on PDU session; or

b) the value of the IE is set to "Always-on PDU session not allowed" the UE shall not consider the established PDU session as an always-on PDU session

the UE shall not consider the established PDU session as an always-on PDU session if the UE does not receive the Always-on PDU session indication IE in the PDU SESSION ESTABLISHMENT ACCEPT message

the UE shall store the mapped EPS bearer contexts if received in the PDU SESSION ESTABLISHMENT ACCEPT message furthermore the UE shall also store the association between the QoS flow and the mapped EPS bearer context for each QoS flow which can be transferred to EPS based on the received EPS bearer identity parameter in authorized QoS flow descriptions IE and the mapped EPS bearer contexts the UE shall check each mapped EPS bearer context for different types of errors as follows

NOTE 11 an error detected in a mapped EPS bearer context does not cause the UE to discard the authorized QoS rules IE and authorized QoS flow descriptions IE included in the PDU SESSION ESTABLISHMENT ACCEPT if any

a) semantic error in the mapped EPS bearer operation

1) when the operation code is an operation code other than "Create new EPS bearer"

2) when the operation code is "Create new EPS bearer" and there is already an existing mapped EPS bearer context with the same EPS bearer identity associated with any PDU session

3) when the operation code is "Create new EPS bearer" and the resulting mapped EPS bearer context has invalid mandatory parameters or missing mandatory parameters (e.g. mapped EPS QoS parameters or traffic flow template for a dedicated EPS bearer context)

in case 2 if the existing mapped EPS bearer context is associated with the PDU session that is being established the UE shall not diagnose an error further process the create request and if it was process successfully delete the old EPS bearer context

otherwise the UE shall initiate a PDU session modification procedure by sending a PDU SESSION MODIFICATION REQUEST message to delete the mapped EPS bearer context with 5GSM cause #85 "Invalid mapped EPS bearer identity"

b) if the mapped EPS bearer context includes a traffic flow template the UE shall check the traffic flow template for different types of TFT IE errors as follows

1) semantic errors in TFT operations

i) when the TFT operation is an operation other than "Create new TFT"

the UE shall initiate a PDU session modification procedure by sending a PDU SESSION MODIFICATION REQUEST message to delete the mapped EPS bearer context with 5GSM cause #41 "semantic error in the TFT operation"

2) syntactical errors in TFT operations

i) when the TFT operation = "Create new TFT" and the packet filter list in the TFT IE is empty

ii) when there are other types of syntactical errors in the coding of the TFT IE such as a mismatch between the number of packet filters subfield and the number of packet filters in the packet filter list

the UE shall initiate a PDU session modification procedure by sending a PDU SESSION MODIFICATION REQUEST message with to delete the mapped EPS bearer context 5GSM cause #42 "syntactical error in the TFT operation"

3) semantic errors in packet filters

i) when a packet filter consists of conflicting packet filter components which would render the packet filter ineffective i.e no IP packet will ever fit this packet filter how the UE determines a semantic error in a packet filter is outside the scope of the present document

ii) when the resulting TFT which is assigned to a dedicated EPS bearer context does not contain any packet filter which applicable for the uplink direction

the UE shall initiate a PDU session modification procedure by sending a PDU SESSION MODIFICATION REQUEST message to delete the mapped EPS bearer context with 5GSM cause #44 "semantic errors in packet filter(s)"

4) syntactical errors in packet filters

i) when the TFT operation = "Create new TFT" and two or more packet filters in the resultant TFT would have identical packet filter identifiers

ii) when the TFT operation = "Create new TFT" and two or more packet filters in all TFTs associated with this PDN connection would have identical packet filter precedence values

iii) when there are other types of syntactical errors in the coding of packet filters such as the use of a reserved value for a packet filter component identifier

in case ii if the old packet filters do not belong to the default EPS bearer context the UE shall not diagnose an error and shall delete the old packet filters which have identical filter precedence values

in case ii if one or more old packet filters belong to the default EPS bearer context the UE shall initiate a PDU session modification procedure by sending a PDU SESSION MODIFICATION REQUEST message to delete the mapped EPS bearer context with 5GSM cause #45 "syntactical errors in packet filter(s)"

in cases i and iii the UE shall initiate a PDU session modification procedure by sending a PDU SESSION MODIFICATION REQUEST message to delete the mapped EPS bearer context with 5GSM cause #45 "syntactical error in packet filter(s)"

if the UE detects different errors in the mapped EPS bearer contexts QoS rules or QoS flow descriptions the UE may send a single PDU SESSION MODIFICATION REQUEST message to delete the erroneous mapped EPS bearer contexts QoS rules or QoS flow descriptions in that case the UE shall include a single 5GSM cause in the PDU SESSION MODIFICATION REQUEST message

NOTE 12 the 5GSM cause to use cannot be different from #41 "semantic error in the TFT operation" #42 "syntactical error in the TFT operation" #44 "semantic error in packet filter(s)" #45 "syntactical errors in packet filter(s)" #83 "semantic error in the QoS operation" #84 "syntactical error in the QoS operation" and #85 "Invalid mapped EPS bearer identity" the selection of a 5GSM cause is up to the UE implementation

if there are mapped EPS bearer context(s) associated with a PDU session but none of them is associated with the default QoS rule the UE shall initiate a PDU session modification procedure by sending a PDU SESSION MODIFICATION REQUEST message to delete the mapped EPS bearer context(s) with 5GSM cause #85 "Invalid mapped EPS bearer identity" and shall locally delete the stored EPS bearer identity (EBI) in all the QoS flow descriptions of the PDU session if any

the UE shall only use the control plane CIoT 5GS optimization for this PDU session if the control plane only indication is included in the PDU SESSION ESTABLISHMENT ACCEPT message

if the UE requests the PDU session type "IPv4v6" and

a) the UE receives the selected PDU session type set to "IPv4" and does not receive the 5GSM cause value #50 "PDU session type IPv4 only allowed"; or

b) the UE receives the selected PDU session type set to "IPv6" and does not receive the 5GSM cause value #51 "PDU session type IPv6 only allowed";

the UE may subsequently request another PDU session for the other IP version using the UE-requested PDU session establishment procedure to the same DNN (or no DNN if no DNN was indicated by the UE) and the same S-NSSAI associated with (in roaming scenarios) a mapped S-NSSAI (or no S-NSSAI if no S-NSSAI was indicated by the UE) with a single address PDN type (IPv4 or IPv6) other than the one already activated

if the UE requests the PDU session type "IPv4v6" receives the selected PDU session type set to "IPv4" and the 5GSM cause value #50 "PDU session type IPv4 only allowed" the UE shall not subsequently request another PDU session using the UE-requested PDU session establishment procedure to the same DNN (or no DNN if no DNN was indicated by the UE) and the same S-NSSAI associated with (in roaming scenarios) a mapped S-NSSAI (or no S-NSSAI if no S-NSSAI was indicated by the UE) to obtain a PDU session type different from the one allowed by the network until any of the following conditions is fulfilled

a) the UE is registered to a new PLMN;

b) the UE is switched off;

c) the USIM is removed;

d) the entry in the "list of subscriber data" for the current SNPN is updated if the UE does not support access to an SNPN using credentials from a credentials holder and equivalent SNPNs; or

e) the selected entry of the "list of subscriber data" is updated or USIM is removed for the selected PLMN subscription if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both

if the UE requests the PDU session type "IPv4v6" receives the selected PDU session type set to "IPv6" and the 5GSM cause value #51 "PDU session type IPv6 only allowed" the UE shall not subsequently request another PDU session using the UE-requested PDU session establishment procedure to the same DNN (or no DNN if no DNN was indicated by the UE) and the same S-NSSAI associated with (in roaming scenarios) a mapped S-NSSAI (or no S-NSSAI if no S-NSSAI was indicated by the UE) to obtain a PDU session type different from the one allowed by the network until any of the following conditions is fulfilled

a) the UE is registered to a new PLMN;

b) the UE is switched off;

c) the USIM is removed

d) the entry in the "list of subscriber data" for the current SNPN is updated if the UE does not support access to an SNPN using credentials from a credentials holder and equivalent SNPNs; or

e) the selected entry of the "list of subscriber data" is updated or USIM is removed for the selected PLMN subscription if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both

NOTE 13 for the 5GSM cause values #50 "PDU session type IPv4 only allowed" and #51 "PDU session type IPv6 only allowed" re-attempt in S1 mode for the same DNN (or no DNN if no DNN was indicated by the UE) is only allowed using the PDU session type(s) indicated by the network

if the selected PDU session type of the PDU session is "Unstructured" or "Ethernet" the UE supports inter-system change from N1 mode to S1 mode the UE does not support establishment of a PDN connection for the PDN type set to "non-IP" in S1 mode and the parameters list field of one or more authorized QoS flow descriptions received in the authorized QoS flow descriptions IE of the PDU SESSION ESTABLISHMENT ACCEPT message contains an EPS bearer identity (EBI) then the UE shall locally remove the EPS bearer identity (EBI) from the parameters list field of such one or more authorized QoS flow descriptions additionally the UE shall also initiate a PDU session modification procedure by sending a PDU SESSION MODIFICATION REQUEST message to delete the mapped EPS bearer context with 5GSM cause #85 "Invalid mapped EPS bearer identity"

if the selected PDU session type of the PDU session is "Ethernet" the UE supports inter-system change from N1 mode to S1 mode the UE does not support establishment of a PDN connection for the PDN type set to "non-IP" in S1 mode the UE the network or both of them do not support ethernet PDN type in S1 mode and the parameters list field of one or more authorized QoS flow descriptions received in the authorized QoS flow descriptions IE of the PDU SESSION ESTABLISHMENT ACCEPT message contains an EPS bearer identity (EBI) then the UE shall locally remove the EPS bearer identity (EBI) from the parameters list field of such one or more authorized QoS flow descriptions additionally the UE shall also initiate a PDU session modification procedure by sending a PDU SESSION MODIFICATION REQUEST message to delete the mapped EPS bearer context with 5GSM cause #85 "Invalid mapped EPS bearer identity"

for a UE which is registered for disaster roaming services and for a PDU session which is not a PDU session for emergency services

a) if the parameters list field of one or more authorized QoS flow descriptions received in the authorized QoS flow descriptions IE of the PDU SESSION ESTABLISHMENT ACCEPT message contains an EPS bearer identity (EBI) then the UE shall locally remove the EPS bearer identity (EBI) from the parameters list field of such one or more authorized QoS flow descriptions; and

b) the UE shall locally delete the contents of the mapped EPS bearer contexts IE if it is received in the PDU SESSION ESTABLISHMENT ACCEPT message

if the UE receives an IPv4 link MTU parameter an ethernet frame payload MTU parameter an unstructured link MTU parameter or a Non-IP link MTU parameter in the extended protocol configuration options IE of the PDU SESSION ESTABLISHMENT ACCEPT message the UE shall pass to the upper layer the received IPv4 link MTU size the received ethernet frame payload MTU size the unstructured link MTU size or the non-IP link MTU size

NOTE 14 the IPv4 link MTU size corresponds to the maximum length of user data packet that can be sent either via the control plane or via N3 interface for a PDU session of the "IPv4" PDU session type

NOTE 15 the ethernet frame payload MTU size corresponds to the maximum length of a payload of an ethernet frame that can be sent either via the control plane or via N3 interface for a PDU session of the "Ethernet" PDU session type

NOTE 16 the unstructured link MTU size correspond to the maximum length of user data packet that can be sent either via the control plane or via N3 interface for a PDU session of the "Unstructured" PDU session type

NOTE 17 a PDU session of "Ethernet" or "Unstructured" PDU session type can be transferred to a PDN connection of "non-IP" PDN type thus the UE can request the non-IP link MTU parameter in the PDU session establishment procedure the non-IP link MTU size corresponds to the maximum length of user data that can be sent either in the user data container in the ESM DATA TRANSPORT message or via S1-U interface as specified in 3GPP TS 24.301 [15]

if the 5G-RG receives an ACS information parameter in the extended protocol configuration options IE of the PDU SESSION ESTABLISHMENT ACCEPT message the 5G-RG shall pass the ACS URL in the received ACS information parameter to the upper layer

if the UE has indicated support for CIoT 5GS optimizations and receives a small data rate control parameters container in the extended protocol configuration options IE in the PDU SESSION ESTABLISHMENT ACCEPT message the UE shall store the small data rate control parameters value and use the stored small data rate control parameters value as the maximum allowed limit of uplink user data for the PDU session in accordance with 3GPP TS 23.501 [8]

if the UE has indicated support for CIoT 5GS optimizations and receives an additional small data rate control parameters for exception data container in the extended protocol configuration options IE in the PDU SESSION ESTABLISHMENT ACCEPT message the UE shall store the additional small data rate control parameters for exception data value and use the stored additional small data rate control parameters for exception data value as the maximum allowed limit of uplink exception data for the PDU session in accordance with 3GPP TS 23.501 [8]

if the UE has indicated support for CIoT 5GS optimizations and receives an initial small data rate control parameters container or an initial additional small data rate control parameters for exception data container in the extended protocol configuration options IE in the PDU SESSION ESTABLISHMENT ACCEPT message the UE shall use these parameters for the newly established PDU session when the validity period of the initial parameters expire the parameters received in a small data rate control parameters container or an additional small data rate control parameters for exception data container shall be used

if the UE receives a serving PLMN rate control IE in the PDU SESSION ESTABLISHMENT ACCEPT message the UE shall store the serving PLMN rate control IE value and use the stored serving PLMN rate control value as the maximum allowed limit of uplink control plane user data for the corresponding PDU session in accordance with 3GPP TS 23.501 [8]

if the UE receives an APN rate control parameters container or an additional APN rate control for exception data parameters container in the extended protocol configuration options IE in the PDU SESSION ESTABLISHMENT ACCEPT message the UE shall store these parameters and use them to limit the rate at which it generates uplink user data messages for the PDN connection corresponding to the PDU session if the PDU session is transferred to EPS upon inter-system change from N1 mode to S1 mode in accordance with 3GPP TS 24.301 [15] the received APN rate control parameters and additional APN rate control for exception data parameters shall replace any previously stored APN rate control parameters and additional APN rate control for exception data parameters respectively for this PDN connection

if the UE receives an initial APN rate control parameters container or an initial additional APN rate control for exception data parameters container in the extended protocol configuration options IE in the PDU SESSION ESTABLISHMENT ACCEPT message the UE shall store these parameters in the APN rate control status and use them to limit the rate at which it generates exception data messages for the PDN connection corresponding to the PDU session if the PDU session is transferred to EPS upon inter-system change from N1 mode to S1 mode in accordance with 3GPP TS 24.301 [15] the received APN rate control status shall replace any previously stored APN rate control status for this PDN connection

NOTE 18 in the PDU SESSION ESTABLISHMENT ACCEPT message the SMF provides either APN rate control parameters container or initial APN rate control parameters container in the extended protocol configuration options IE but not both

NOTE 19 in the PDU SESSION ESTABLISHMENT ACCEPT message the SMF provides either additional APN rate control for exception data parameters container or initial additional APN rate control for exception data parameters container in the extended protocol configuration options IE but not both

if the network accepts the use of reliable data service to transfer data for the PDU session the network shall include the extended protocol configuration options IE in the PDU SESSION ESTABLISHMENT ACCEPT message and include the reliable data service accepted indicator the UE behaves as described in subclause 6.2.15

if

- the UE indicates support of DNS over (D)TLS by providing DNS server security information indicator to the network;

- optionally the UE indicates which security protocol type(s) are supported by the UE by providing the DNS server security protocol support to the network; and

- the network wants to enforce the use of DNS over (D)TLS

the network may include the extended protocol configuration options IE in the PDU SESSION ESTABLISHMENT ACCEPT message and include the DNS server security information with length of two octets upon receiving the DNS server security information the UE shall pass it to the upper layer the UE shall use this information to send the DNS over (D)TLS (See 3GPP TS 33.501 [24])

NOTE 20 support of DNS over (D)TLS is based on the requirements as specified in 3GPP TS 33.501 [24] and it is implemented based on the operator requirement

if the PDU SESSION ESTABLISHMENT REQUEST message includes the Service-level-AA container IE with the service-level device ID set to the CAA-level UAV ID and the SMF is provided by the UAS-NF the successful UUAA-SM result and the CAA-level UAV ID the SMF shall store the successful result together with the authorized CAA-level UAV ID and transmit the PDU SESSION ESTABLISHMENT ACCEPT message to the UE where the PDU SESSION ESTABLISHMENT ACCEPT message shall include the Service-level-AA container IE containing

a) the service-level-AA response with the SLAR field set to "Service level authentication and authorization was successful";

b) the service-level device ID with the value set to the CAA-level UAV ID; and

c) if a payload is received from the UAS-NF,the service-level-AA payload with the value set to the payload;

d) if a payload type associated with the payload is received from the UAS-NF the service-level-AA payload type with the values set to the associated payload type

NOTE 21 UAS security information can be included in the UUAA payload by the USS as specified in 3GPP TS 33.256 [24B]

NOTE 21A a list of USS addresses where each entry contains a USS address and a corresponding geographical area can be included in the UUAA payload by the USS as specified in 3GPP TS 23.256 [6AB]

if the network accepts the request of the PDU session establishment for C2 communication the network shall send the PDU SESSION ESTABLISHMENT ACCEPT message including the Service-level-AA container IE containing

a) the service-level-AA response with the value of C2AR field set to the "C2 authorization was successful";

b) if a payload is provided from the UAS-NF the service-level-AA payload with the value set to the payload;

c) if a payload type associated with the payload is provided from the UAS-NF the service-level-AA payload type with the value set to the payload type; and

d) if the CAA-level UAV ID is provided from the UAS-NF the service-level device ID with the value set to the CAA-level UAV ID

NOTE 22:The C2 authorization payload in the service-level-AA payload can include one or both of the C2 session security information and pairing information for direct C2 communication

upon receipt of the PDU SESSION ESTABLISHMENT ACCEPT message of the PDU session for C2 communication if the Service-level-AA container IE is included the UE shall forward the service-level-AA contents of the Service-level-AA container IE to the upper layers

the SMF may be configured with one or more PVS IP addresses or PVS names or both associated with the DNN and S-NSSAI used for onboarding services in SNPN for configuration of SNPN subscription parameters in PLMN via the user plane or for configuration of a UE via the user plane with credentials for NSSAA or PDU session authentication and authorization procedure if the PDU session was established for onboarding services in SNPN or the PVS information request is included in the extended protocol configuration options IE of the PDU SESSION ESTABLISHMENT REQUEST message establishing a PDU session providing connectivity for configuration of SNPN subscription parameters in PLMN via the user plane the network may include the extended protocol configuration options IE in the PDU SESSION ESTABLISHMENT ACCEPT message and include the PVS IP address(es) or the PVS name(s) or both associated with the DNN and S-NSSAI of the established PDU session if available if the PVS information request is included in the extended protocol configuration options IE of the PDU SESSION ESTABLISHMENT REQUEST message establishing the PDU session providing connectivity for configuration of a UE via the user plane with credentials for PDU session authentication and authorization procedure based on the subscribed DNN(s) and S-NSSAI(s) of the UE and the DNN and S-NSSAI of the established PDU session the network should include the extended protocol configuration options IE in the PDU SESSION ESTABLISHMENT ACCEPT message and include the PVS IP address(es) or the PVS name(s) or both which are associated with the established PDU session and per subscribed DNN(s) and S-NSSAI(s) of the UE if available if the PVS information request is included in the extended protocol configuration options IE of the PDU SESSION ESTABLISHMENT REQUEST message establishing the PDU session providing connectivity for configuration of a UE via the user plane with credentials for NSSAA based on the subscribed S-NSSAI(s) of the UE and the S-NSSAI of the established PDU session the network should include the extended protocol configuration options IE in the PDU SESSION ESTABLISHMENT ACCEPT message and include the PVS IP address(es) or the PVS name(s) or both which are associated with the established PDU session and per subscribed S-NSSAI(s) of the UE if available

NOTE 23 if the PVS information request is included in the extended protocol configuration options IE of the PDU SESSION ESTABLISHMENT REQUEST message establishing a PDU session providing connectivity for configuration of SNPN subscription parameters in SNPN via the user plane by a UE which is not registered for onboarding services in SNPN the SMF can include the PVS IP address(es) or the PVS name(s) or both associated with the DNN and S-NSSAI of the established PDU session if available in the extended protocol configuration options IE of the PDU SESSION ESTABLISHMENT ACCEPT message

NOTE 24 the PVS IP address(es) or the PVS name(s) or both in the SMF can either be locally configured or provided by DCS the SMF can send the PVS IP address(es) or the PVS name(s) or both that are available in the SMF as the PVS IP address(es) or the PVS name(s) or both to the UE respectively if the PDU session was established for onboarding services in SNPN not supporting localized services in SNPN the PVS IP address(es) or the PVS name(s) or both provided by DCS takes precedence over the PVS IP address(es) or the PVS name(s) or both locally configured respectively if the PDU session was established for onboarding services in SNPN supporting localized services in SNPN the SMF can include both the DCS provided PVS IP address(es) or the PVS name(s) or both associated with the DNN and S-NSSAI of the established PDU session and the locally configured PVS IP address(es) or the PVS name(s) or both associated with the DNN and S-NSSAI of the established PDU session if available

the UE upon receiving one or more PVS IP address(es) if any one or more the PVS name(s) if any or both shall pass them to the upper layers

NOTE 25 if several PVS IP addresses several PVS name(s) or one or more PVS IP addresses and one or more PVS name(s) are received how the UE uses this information is up to UE implementation

if the UE indicates support for ECS configuration information provisioning by providing the ECS configuration information provisioning support indicator in the extended protocol configuration options IE of the PDU SESSION ESTABLISHMENT REQUEST message then the SMF may include the extended protocol configuration options IE in the PDU SESSION ESTABLISHMENT ACCEPT message with

a) at least one of ECS IPv4 Address(es) ECS IPv6 Address(es) and ECS FQDN(s);

b) at least one associated ECSP identifier;

c) optionally spatial validity conditions associated with the ECS address;

d) optionally ECS authentication methods associated with the ECS address; and

e) optionally ECS supported PLMNs information list including the associated ECSP information for which the EDN configuration information can be provided by the ECS

the UE upon receiving one or more ECS IPv4 address(es) if any ECS IPv6 address(es) if any or ECS FQDN(s) if any with the associated spatial validity condition if any the associated ECS authentication methods if any ECS supported PLMNs information list if any and an ECSP identifier shall pass them to the upper layers

NOTE 26 the IP address(es) FQDN(s) or both are associated with the ECSP identifier and replace previously provided ECS configuration information associated with the same ECSP identifier if any

if the SMF needs to provide DNS server address(es) to the UE and the UE has provided the DNS server IPv4 address request the DNS server IPv6 address request or both of them in the PDU SESSION ESTABLISHMENT REQUEST message then the SMF shall include the extended protocol configuration options IE in the PDU SESSION ESTABLISHMENT ACCEPT message with one or more DNS server IPv4 address(es) one or more DNS server IPv6 address(es) or both of them if the UE supports receiving DNS server addresses in protocol configuration options and receives one or more DNS server IPv4 address(es) one or more DNS server IPv6 address(es) or both of them in the extended protocol configuration options IE of the PDU SESSION ESTABLISHMENT ACCEPT message then the UE shall pass the received DNS server IPv4 address(es) if any and the received DNS server IPv6 address(es) if any to upper layers

NOTE 27 the received DNS server address(es) replace previously provided DNS server address(es) if any

if the PDU SESSION ESTABLISHMENT ACCEPT message includes the received MBS container IE for each of the received MBS information

a) if MBS decision is set to "MBS join is accepted" the UE shall consider that it has successfully joined the multicast MBS session the UE shall store the received TMGI and shall use it for any further operation on that multicast MBS session the UE shall store the received MBS service area associated with the received TMGI if any and provide the received TMGI to lower layers the UE may provide the MBS start time if it is included in the received MBS information to upper layers; or

b) if MBS decision is set to "MBS join is rejected" the UE shall consider the requested join as rejected the UE shall store the received MBS service area associated with the received TMGI if any if the received rejection cause is set to "User is outside of local MBS service area" the UE shall not request to join the same multicast MBS session if neither current TAI nor CGI of the current cell is part of the received MBS service area if the received rejection cause is set to "multicast MBS session has not started or will not start soon" and an MBS back-off timer value is included with value that indicates neither zero nor deactivated the UE shall start a back-off timer T3587 with the value provided in the MBS back-off timer value for the received TMGI and shall not attempt to join the multicast MBS session with the same TMGI until the expiry of T3587 if the MBS back-off timer value indicates that this timer is deactivated the UE shall not attempt to join the multicast MBS session with the same TMGI the source IP address information of the TMGI or the destination IP address information of the TMGI until the UE is switched off the USIM is removed or the entry in the "list of subscriber data" for the current SNPN is updated if the MBS back-off timer value indicates zero the UE may attempt to join the multicast MBS session with the same TMGI

if the UE is switched off when the timer T3587 is running the UE may behave as follows when the UE is switched on and the USIM in the UE remains the same

let t1 be the time remaining for T3587 timeout at switch off and let t be the time elapsed between switch off and switch on if t1 is greater than t then the timer shall be restarted with the value t1 – t if t1 is equal to or less than t then the timer need not be restarted

if the PDU session is established for IMS signalling and the UE has requested P-CSCF IPv6 address or P-CSCF IPv4 address the SMF shall include P-CSCF IP address(es) in the extended protocol configuration options IE in the PDU SESSION ESTABLISHMENT ACCEPT message

NOTE 28 the P-CSCF selection functionality is specified in subclause 5.16.3.11 of 3GPP TS 23.501 [8]

upon receipt of the PDU SESSION ESTABLISHMENT ACCEPT message if the UE included the PDU session pair ID in the PDU SESSION ESTABLISHMENT REQUEST message the UE shall associate the PDU session with the PDU session pair ID if the UE included the RSN in the PDU SESSION ESTABLISHMENT REQUEST message the UE shall associate the PDU session with the RSN

if the PDU SESSION ESTABLISHMENT ACCEPT message include alternative S-NSSAI the S-NSSAI for the established PDU session shall be the S-NSSAI to be replaced and the alternative S-NSSAI on the UE side

if the UE supports EDC and the network allows the use of EDC the SMF shall include the extended protocol configuration options IE in the PDU SESSION ESTABLISHMENT ACCEPT message with the EDC usage allowed indicator if the UE supports EDC and receives the EDC usage allowed indicator in the extended protocol configuration options IE of the PDU SESSION ESTABLISHMENT ACCEPT message the UE shall indicate to upper layers that network allows the use of EDC

if the UE supports EDC and the network requires the use of EDC the SMF shall include the extended protocol configuration options IE in the PDU SESSION ESTABLISHMENT ACCEPT message with the EDC usage required indicator if the UE supports EDC and receives the EDC usage required indicator in the extended protocol configuration options IE of the PDU SESSION ESTABLISHMENT ACCEPT message the UE shall indicate to upper layers that network requires the use of EDC

if the PDU SESSION ESTABLISHMENT REQUEST message includes a MS support of MAC address range in 5GS indicator in the extended protocol configuration options IE the SMF

a) shall consider that the UE supports a "destination MAC address range type" packet filter component and a "source MAC address range type" packet filter component; and

b) if the SMF supports a "destination MAC address range type" packet filter component and a "source MAC address range type" packet filter component and enables the UE to request QoS rules with a "destination MAC address range type" packet filter component and a "source MAC address range type" packet filter component shall include the extended protocol configuration options IE in the PDU SESSION ESTABLISHMENT ACCEPT message and shall include the network support of MAC address range in 5GS indicator in the extended protocol configuration options IE

if the UE receives the 5GSM network feature support IE in the PDU SESSION ESTABLISHMENT ACCEPT message with the NAPS bit set to "non-3GPP access path switching supported" during the PDU session establishment procedure of any PDU session the UE may include the NSONR bit with value set to "non-3GPP path switching while using old non-3GPP resources requested" in the Non-3GPP path switching information IE in the REGISTRATION REQUEST message while performing the registration procedure for mobility registration update for non-3GPP access path switching

NOTE 29 if the UE is registered to different PLMNs over 3GPP and non-3GPP accesses the UE uses the capability received over non-3GPP access to determine whether to initiate the registration procedure for mobility registration update for non-3GPP path switching

NOTE 30 if the AMF selects an SMF not supporting non-3GPP access path switching the non-3GPP access path switching can still be performed with the AMF triggering release of the old user plane resources before new user plane resources are established

if the PDU SESSION ESTABLISHMENT ACCEPT message includes a network support of MAC address range in 5GS indicator in the extended protocol configuration options IE the UE shall consider that the network supports a "destination MAC address range type" packet filter component and a "source MAC address range type" packet filter component

NOTE 31 handling of indication that network allows the use of EDC or that network requires the use of EDC is specified in 3GPP TS 23.548 [182]

if the SMF includes the authorized QoS flow descriptions and the SMF determines to provide the N3QAI to the UE the SMF shall include the N3QAI IE in the PDU SESSION ESTABLISHMENT ACCEPT message

if the SMF supports URSP provisioning in EPS and the URSP provisioning in EPS support indicator is included in the extended protocol configuration options IE of the PDU SESSION ESTABLISHMENT REQUEST message the SMF shall insert the URSP provisioning in EPS support indicator in the extended protocol configuration options IE of the PDU SESSION ESTABLISHMENT ACCEPT message

if the PDU session to be established is a single access PDU session over 3GPP access with IP PDU session type and based on operator policy the SMF determines to provide the protocol description for UL PDU set handling to the UE the SMF may include the protocol description IE in the PDU SESSION ESTABLISHMENT ACCEPT message

if the PDU session was a single access PDU session established over wireline access with IP PDU session type and based on operator policy the SMF determines the ECN marking for L4S for the 5G-RG (see subclause 4.17.2 of 3GPP TS 23.316 [6D]) the SMF may include the ECN marking for L4S indication IE in the PDU SESSION ESTABLISHMENT ACCEPT message

if the UE has set the RTPMMI bit to "(S)RTP multiplexed media information supported" in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message the SMF may include the (S)RTP multiplexed media packet filter component in the packet filters of the QoS rules IE in the PDU SESSION ESTABLISHMENT ACCEPT message

if the protocol description IE is included in the PDU SESSION ESTABLISHMENT ACCEPT message the UE shall for each existing QoS rule store the associated protocol description included in the protocol description IE the UE may use the protocol description information associated with the QoS rule(s) provided by the protocol description IE to identify PDUs belonging to PDU sets for the uplink direction

NOTE 32 whether and how to use the protocol description information to identify PDU sets is up to the UE implementation

if the ECN marking for L4S indication IE is included in the PDU SESSION ESTABLISHMENT ACCEPT message the 5G-RG shall for each existing QoS rule store the associated ECN marking for L4S indication included in the ECN marking for L4S indication IE the 5G-RG may perform the ECN marking for L4S for the corresponding QoS flow based on the ECN marking for L4S indication.NOTE 33 how to perform the ECN marking for L4S for 5G-RG is out of the scope of this specification

#### 6.4.1.4 UE-requested PDU session establishment procedure not accepted by the network

##### 6.4.1.4.1 general

if the connectivity with the requested DN is rejected by the network the SMF shall create a PDU SESSION ESTABLISHMENT REJECT message

the SMF shall set the 5GSM cause IE of the PDU SESSION ESTABLISHMENT REJECT message to indicate the reason for rejecting the PDU session establishment

the 5GSM cause IE typically indicates one of the following SM cause values

#8 operator determined barring;

#26 insufficient resources;

#27 missing or unknown DNN;

#28 unknown PDU session type;

#29 user authentication or authorization failed;

#31 request rejected unspecified;

#32 service option not supported;

#33 requested service option not subscribed;

#35 PTI already in use;

#38 network failure;

#39 reactivation requested;

#46 out of LADN service area;

#50 PDU session type IPv4 only allowed;

#51 PDU session type IPv6 only allowed;

#54 PDU session does not exist;

#57 PDU session type IPv4v6 only allowed;

#58 PDU session type unstructured only allowed;

#61 PDU session type ethernet only allowed;

#67 insufficient resources for specific slice and DNN;

#68 not supported SSC mode;

#69 insufficient resources for specific slice;

#70 missing or unknown DNN in a slice;

#82 maximum data rate per UE for user-plane integrity protection is too low;

#86 UAS services not allowed; or

#95 – 111 protocol errors

if the PDU SESSION ESTABLISHMENT REQUEST message includes a PDU session type IE set to "IPv6" and the subscription the SMF configuration or both are limited to IPv4 only for the requested DNN the SMF shall include the 5GSM cause value #50 "PDU session type IPv4 only allowed" in the 5GSM cause IE of the PDU SESSION ESTABLISHMENT REJECT message

if the PDU SESSION ESTABLISHMENT REQUEST message includes a PDU session type IE set to "IPv6" and the subscription the SMF configuration or both support none of "IPv4" and "IPv6" PDU session types for the requested DNN the SMF shall include the 5GSM cause value #28 "unknown PDU session type" in the 5GSM cause IE of the PDU SESSION ESTABLISHMENT REJECT message

if the PDU SESSION ESTABLISHMENT REQUEST message includes a PDU session type IE set to "IPv4" and the subscription the SMF configuration or both are limited to IPv6 only for the requested DNN the SMF shall include the 5GSM cause value #51 "PDU session type IPv6 only allowed" in the 5GSM cause IE of the PDU SESSION ESTABLISHMENT REJECT message

if the PDU SESSION ESTABLISHMENT REQUEST message includes a PDU session type IE set to "IPv4" and the subscription the SMF configuration or both support none of "IPv4" and "IPv6" PDU session types for the requested DNN the SMF shall include the 5GSM cause value #28 "unknown PDU session type" in the 5GSM cause IE of the PDU SESSION ESTABLISHMENT REJECT message

if the PDU SESSION ESTABLISHMENT REQUEST message includes a PDU session type IE set to "IPv4v6" and the subscription the SMF configuration or both support none of "IPv4v6" "IPv4" and "IPv6" PDU session types for the requested DNN the SMF shall include the 5GSM cause value #28 "unknown PDU session type" in the 5GSM cause IE of the PDU SESSION ESTABLISHMENT REJECT message

if the PDU SESSION ESTABLISHMENT REQUEST message includes a PDU session type IE set to "Unstructured" or "Ethernet" and the subscription the SMF configuration or both do not support the PDU session type for the requested DNN the SMF shall include the 5GSM cause value #28 "unknown PDU session type" in the 5GSM cause IE of the PDU SESSION ESTABLISHMENT REJECT message

if the PDU SESSION ESTABLISHMENT REQUEST message is to establish an MA PDU session and includes a PDU session type IE set to "Unstructured" and the SMF configuration does not support the PDU session type the SMF shall include the 5GSM cause value #28 "unknown PDU session type" in the 5GSM cause IE of the PDU SESSION ESTABLISHMENT REJECT message

if the PDU SESSION ESTABLISHMENT REQUEST message contains the SSC mode IE indicating an SSC mode not supported by the subscription the SMF configuration or both of them and the SMF decides to rejects the PDU session establishment the SMF shall include the 5GSM cause value #68 "not supported SSC mode" in the 5GSM cause IE and the SSC modes allowed by SMF in the allowed SSC mode IE of the PDU SESSION ESTABLISHMENT REJECT message

if the PDU SESSION ESTABLISHMENT REQUEST message is to establish an MA PDU session and MA PDU session is not allowed due to operator policy and subscription and the SMF decides to reject the PDU session establishment the SMF shall include the 5GSM cause value #33 "requested service option not subscribed" in the 5GSM cause IE of the PDU SESSION ESTABLISHMENT REJECT message

if the PDU SESSION ESTABLISHMENT REQUEST message is identified to be for C2 communication and

a) does not include the Service-level-AA container IE with the service-level device ID set to the CAA-level UAV ID;

b) does not include the Service-level-AA container IE with the service-level-AA payload and the Service-level-AA payload type; or

c) the SMF is informed by the UAS-NF that the UAS service is not allowed

the SMF shall reject the PDU SESSION ESTABLISHMENT REQUEST message by transmitting a PDU SESSION ESTABLISHMENT REJECT message with 5GSM cause IE set to 5GSM cause value #86 "UAS services not allowed"

in 3GPP access if the operator's configuration requires user-plane integrity protection for the PDU session and the maximum data rate per UE for user-plane integrity protection supported by the UE for uplink or the maximum data rate per UE for user-plane integrity protection supported by the UE for downlink or both are lower than required by the operator's configuration the SMF shall include the 5GSM cause value #82 "maximum data rate per UE for user-plane integrity protection is too low" in the 5GSM cause IE of the PDU SESSION ESTABLISHMENT REJECT message

if the UE requests a PDU session establishment for an LADN when the UE is located outside of the LADN service area the SMF shall include the 5GSM cause value #46 "out of LADN service area" in the 5GSM cause IE of the PDU SESSION ESTABLISHMENT REJECT message

if the DN authentication of the UE was performed with the PDU session authentication and authorization procedure and completed unsuccessfully the SMF shall include the 5GSM cause value #29 "user authentication or authorization failed" in the 5GSM cause IE of the PDU SESSION ESTABLISHMENT REJECT message and shall set the EAP message IE of the PDU SESSION ESTABLISHMENT REJECT message to an EAP-failure message as specified in IETF RFC 3748 [34] provided by the DN

if the DN authentication of the UE was performed with the service-level authentication and authorization procedure and completed unsuccessfully the SMF shall include the 5GSM cause value #29 "user authentication or authorization failed" in the 5GSM cause IE of the PDU SESSION ESTABLISHMENT REJECT message and shall include the service-level-AA response provided by DN in the Service-level-AA container IE of the PDU SESSION ESTABLISHMENT REJECT message

based on the local policy and user's subscription data if a PDU session is being established with the request type set to "existing PDU session" and the SMF determines the UE has

a) moved between a tracking area in NB-N1 mode and a tracking area in WB-N1 mode;

b) moved between a tracking area in NB-S1 mode and a tracking area in WB-N1 mode; or

c) moved between a tracking area in WB-S1 mode and a tracking area in NB-N1 mode

the SMF may reject the PDU SESSION ESTABLISHMENT REQUEST message and

a) include the 5GSM cause value #39 "reactivation requested" in the 5GSM cause IE of the PDU SESSION ESTABLISHMENT REJECT message; or

b) include a 5GSM cause value other than #39 "reactivation requested" in the 5GSM cause IE of the PDU SESSION ESTABLISHMENT REJECT message

NOTE 1 the included 5GSM cause value is up to the network implementation

if the PDU session cannot be established due to resource unavailability in the UPF the SMF shall include the 5GSM cause value #26 "insufficient resources" in the 5GSM cause IE of the PDU SESSION ESTABLISHMENT REJECT message

based on the user's subscription data and the operator policy if the SMF determines that the UUAA-SM procedure needs to be performed for a UE but the SMF does not receives the service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE of the PDU SESSION ESTABLISHMENT REQUEST message from the UE the SMF shall include the 5GSM cause value #86 "UAS services not allowed" in the 5GSM cause IE of the PDU SESSION ESTABLISHMENT REJECT message

the network may include a Back-off timer value IE in the PDU SESSION ESTABLISHMENT REJECT message

if the 5GSM cause value is #26 "insufficient resources" #67 "insufficient resources for specific slice and DNN" or #69 "insufficient resources for specific slice" and the PDU SESSION ESTABLISHMENT REQUEST message was received from a UE configured for high priority access in selected PLMN or SNPN or the request type provided during the PDU session establishment is set to "initial emergency request" or "existing emergency PDU session" the network shall not include a Back-off timer value IE

if the 5GSM cause value is #29 "user authentication or authorization failed " the network should include a Back-off timer value IE

if the Back-off timer value IE is included and the 5GSM cause value is different from #26 "insufficient resources" #28 "unknown PDU session type" #46 "out of LADN service area" #50 "PDU session type IPv4 only allowed" #51 "PDU session type IPv6 only allowed" #54 "PDU session does not exist" #57 "PDU session type IPv4v6 only allowed" #58 "PDU session type unstructured only allowed" #61 "PDU session type ethernet only allowed" #67 "insufficient resources for specific slice and DNN" #68 "not supported SSC mode" and #69 "insufficient resources for specific slice" the network may include the Re-attempt indicator IE to indicate whether the UE is allowed to attempt a PDN connectivity procedure in the PLMN for the same DNN in S1 mode whether another attempt in S1 mode or in N1 mode is allowed in an equivalent PLMN or whether another attempt in N1 mode is allowed in an equivalent SNPN

if the 5GSM cause value is #50 "PDU session type IPv4 only allowed" #51 "PDU session type IPv6 only allowed" #57 "PDU session type IPv4v6 only allowed" #58 "PDU session type unstructured only allowed" or #61 "PDU session type ethernet only allowed" the network may include the Re-attempt indicator IE without Back-off timer value IE to indicate whether the UE is allowed to attempt a PDU session establishment procedure in an equivalent PLMN or equivalent SNPN in N1 mode using the same PDU session type for the same DNN (or no DNN if no DNN was indicated by the UE) and the same S-NSSAI (or no S-NSSAI if no S-NSSAI was indicated by the UE)

the SMF shall send the PDU SESSION ESTABLISHMENT REJECT message

upon receipt of a PDU SESSION ESTABLISHMENT REJECT message and a PDU session ID using the NAS transport procedure as specified in subclause 5.4.5 the UE shall stop timer T3580 shall release the allocated PTI value and shall consider that the PDU session was not established

if the PDU SESSION ESTABLISHMENT REQUEST message was sent with request type set to "initial emergency request" or "existing emergency PDU session" and the UE receives a PDU SESSION ESTABLISHMENT REJECT message then the UE may

a) inform the upper layers of the failure of the procedure; or

NOTE 2 this can result in the upper layers requesting another emergency call attempt using domain selection as specified in 3GPP TS 23.167 [6]

b) de-register locally if not de-registered already attempt initial registration for emergency services

if the PDU SESSION ESTABLISHMENT REJECT message includes 5GSM cause #39 "reactivation requested" and the PDU session is being transferred from EPS to 5GS and established with the request type set to "existing PDU session" the UE should re-initiate the UE-requested PDU session establishment procedure as specified in subclause 6.4.1 for

a) the PDU session type associated with the transferred PDU session;

b) the SSC mode associated with the transferred PDU session;

c) the DNN associated with the transferred PDU session; and

d) the S-NSSAI associated with (if available in roaming scenarios) a mapped S-NSSAI if provided in the UE-requested PDU session establishment procedure of the transferred PDU session

if the PDU SESSION ESTABLISHMENT REJECT message includes 5GSM cause #86 "UAS services not allowed" and the UE has not included the service-level device ID in the Service-level-AA container IE of the PDU SESSION ESTABLISHMENT REQUEST message and set the value to the CAA-level UAV ID

a) the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for UAS services without including the CAA-level UAV ID in the service-level device ID of the Service-level-AA container IE; and

b) upon receipt of the request from the upper layers to establish a PDU session for UAS services the UE shall initiate the UE-requested PDU session establishment procedure by including the service-level device ID in the Service-level-AA container IE of the PDU SESSION ESTABLISHMENT REQUEST message and set the value to the CAA-level UAV ID as specified in subclause 6.4.1.2

if the 5GSM cause value is different from #26 "insufficient resources" #28 "unknown PDU session type" #39 "reactivation requested" #46 "out of LADN service area" #50 "PDU session type IPv4 only allowed" #51 "PDU session type IPv6 only allowed" #54 "PDU session does not exist" #57 "PDU session type IPv4v6 only allowed" #58 "PDU session type unstructured only allowed" #61 "PDU session type ethernet only allowed" #67 "insufficient resources for specific slice and DNN" #68 "not supported SSC mode" and #69 "insufficient resources for specific slice" #86 "UAS services not allowed" and #33 "requested service option not subscribed" and the PDU SESSION ESTABLISHMENT REQUEST message was received from a UE configured for high priority access in selected PLMN the network shall not include a Back-off timer value IE

##### 6.4.1.4.2 handling of network rejection due to congestion control

if

- the 5GSM cause value #26 "insufficient resources" and the Back-off timer value IE are included in the PDU SESSION ESTABLISHMENT REJECT message; or

- an indication that the 5GSM message was not forwarded due to DNN based congestion control is received along a Back-off timer value and a PDU SESSION ESTABLISHMENT REQUEST message with the PDU session ID IE set to the PDU session ID of the PDU session;

the UE shall ignore the 5GSM congestion re-attempt indicator or the Re-attempt indicator IE provided by the network if any and the UE shall take different actions depending on the timer value received for timer T3396 in the Back-off timer value IE or depending on the Back-off timer value received from the 5GMM sublayer (if the UE is a UE configured for high priority access in selected PLMN or SNPN exceptions are specified in subclause 6.2.7)

a) if the timer value indicates neither zero nor deactivated and a DNN was provided during the PDU session establishment the UE shall stop timer T3396 associated with the corresponding DNN if it is running if the timer value indicates neither zero nor deactivated and no DNN was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop timer T3396 associated with no DNN if it is running in an SNPN the timer T3396 to be stopped includes

1) the timer T3396 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

2) the timer T3396 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE shall then start timer T3396 with the value provided in the Back-off timer value IE or with the Back-off timer value received from the 5GMM sublayer and

1) shall not send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for the same DNN that was sent by the UE until timer T3396 expires or timer T3396 is stopped; and

2) shall not send another PDU SESSION ESTABLISHMENT REQUEST message without a DNN and with request type different from "initial emergency request" and different from "existing emergency PDU session" or another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for a non-emergency PDU session established without a DNN provided by the UE if no DNN was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" until timer T3396 expires or timer T3396 is stopped

the UE shall not stop timer T3396 upon a PLMN change SNPN change or inter-system change;

b) if the timer value indicates that this timer is deactivated and a DNN was provided during the PDU session establishment the UE shall stop timer T3396 associated with the corresponding DNN if it is running if the timer value indicates that this timer is deactivated and no DNN was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop timer T3396 associated with no DNN if it is running in an SNPN the timer T3396 to be stopped includes

1) the timer T3396 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

2) the timer T3396 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE

1) shall not send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for the same DNN until the UE is switched off the USIM is removed the entry in the "list of subscriber data" for the current SNPN is updated if the UE does not support access to an SNPN using credentials from a credentials holder or the selected entry of the "list of subscriber data" is updated if the UE supports access to an SNPN using credentials from a credentials holder or the UE receives a PDU SESSION MODIFICATION COMMAND message for the same DNN from the network or a PDU SESSION AUTHENTICATION COMMAND message for the same DNN from the network or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE for the same DNN from the network; and

2) shall not send another PDU SESSION ESTABLISHMENT REQUEST message without a DNN and with request type different from "initial emergency request" and different from "existing emergency PDU session" or another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for a non-emergency PDU session established without a DNN provided by the UE if no DNN was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" until the UE is switched off the USIM is removed the entry in the "list of subscriber data" for the current SNPN is updated if the UE does not support access to an SNPN using credentials from a credentials holder or the selected entry of the "list of subscriber data" is updated if the UE supports access to an SNPN using credentials from a credentials holder or the UE receives a PDU SESSION MODIFICATION COMMAND message for a non-emergency PDU session established without a DNN provided by the UE or a PDU SESSION AUTHENTICATION COMMAND message for a non-emergency PDU session established without a DNN provided by the UE or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE for a non-emergency PDU session established without a DNN provided by the UE

the timer T3396 remains deactivated upon a PLMN change SNPN change or inter-system change; and

c) if the timer value indicates zero the UE

1) shall stop timer T3396 associated with the corresponding DNN if running in an SNPN the timer T3396 to be stopped includes

i) the timer T3396 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

ii) the timer T3396 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same DNN; and

2) if no DNN was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop timer T3396 associated with no DNN if running in an SNPN the timer T3396 to be stopped includes

i) the timer T3396 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

ii) the timer T3396 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE may send another PDU SESSION ESTABLISHMENT REQUEST message without a DNN or another PDU SESSION MODIFICATION REQUEST message without a DNN provided by the UE

in an SNPN if the UE supports equivalent SNPNs then the UE shall apply the timer T3396 for all the equivalent SNPNs otherwise the UE shall apply the timer T3396 for the registered SNPN

if the Back-off timer value IE is not included or no Back-off timer value is received from the 5GMM sublayer then the UE may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same DNN or without a DNN as specified in subclause 6.2.7

when the timer T3396 is running or the timer is deactivated the UE is allowed to initiate a PDU session establishment procedure for emergency services

if the timer T3396 is running when the UE enters state 5GMM-DEREGISTERED the UE remains switched on and the USIM in the UE (if any) remains the same and the entry in the "list of subscriber data" to which timer T3396 is associated (if any) is not updated then timer T3396 is kept running until it expires or it is stopped

if the UE is switched off when the timer T3396 is running and if the USIM in the UE (if any) remains the same and the entry in the "list of subscriber data" to which timer T3396 is associated (if any) is not updated when the UE is switched on the UE shall behave as follows

- let t1 be the time remaining for T3396 timeout at switch off and let t be the time elapsed between switch off and switch on if t1 is greater than t then the timer shall be restarted with the value t1 – t if t1 is equal to or less than t then the timer need not be restarted if the UE is not capable of determining t then the UE shall restart the timer with the value t1

if

- the 5GSM cause value #67 "insufficient resources for specific slice and DNN" and the Back-off timer value IE are included in the PDU SESSION ESTABLISHMENT REJECT message; or

- an indication that the 5GSM message was not forwarded due to S-NSSAI and DNN based congestion control is received along a Back-off timer value and a PDU SESSION ESTABLISHMENT REQUEST message with the PDU session ID IE set to the PDU session ID of the PDU session;

the UE shall ignore the Re-attempt indicator IE provided by the network if any and take different actions depending on the timer value received for timer T3584 in the Back-off timer value IE or depending on the Back-off timer value received from the 5GMM sublayer (if the UE is a UE configured for high priority access in selected PLMN or SNPN exceptions are specified in subclause 6.2.8)

a) if the timer value indicates neither zero nor deactivated the UE shall stop timer T3584 associated with the same [S-NSSAI DNN] combination as that the UE provided during the PDU session establishment if it is running if the timer value indicates neither zero nor deactivated and no DNN was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop timer T3584 associated with [S-NSSAI no DNN] combination as that the UE provided during the PDU session establishment if it is running if the timer value indicates neither zero nor deactivated and no S-NSSAI was provided during the PDU session establishment the UE shall stop timer T3584 associated with [no S-NSSAI DNN] combination as that the UE provided during the PDU session establishment if it is running if the timer value indicates neither zero nor deactivated and neither S-NSSAI nor DNN was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop timer T3584 associated with [no S-NSSAI no DNN] combination as that the UE provided during the PDU session establishment if it is running the timer T3584 to be stopped includes

1) in a PLMN

i) the timer T3584 applied for all the PLMNs if running; and

ii) the timer T3584 applied for the registered PLMN if running; or

2) in an SNPN

i) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

ii) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE shall then start timer T3584 with the value provided in the Back-off timer value IE or with the Back-off timer value received from the 5GMM sublayer and

1) shall not send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for the same [S-NSSAI DNN] combination that was sent by the UE until timer T3584 expires or timer T3584 is stopped;

2) shall not send another PDU SESSION ESTABLISHMENT REQUEST message with request type different from "initial emergency request" and different from "existing emergency PDU session" or another PDU SESSION MODIFICATION REQUEST with exception of those identified in subclause 6.4.2.1 message for the same [S-NSSAI no DNN] combination that was sent by the UE if no DNN was provided during the PDU session establishment until timer T3584 expires or timer T3584 is stopped;

3) shall not send another PDU SESSION ESTABLISHMENT REQUEST message or another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for the same [no S-NSSAI DNN] combination that was sent by the UE if no S-NSSAI was provided during the PDU session establishment until timer T3584 expires or timer T3584 is stopped; and

4) shall not send another PDU SESSION ESTABLISHMENT REQUEST message with request type different from "initial emergency request" and different from "existing emergency PDU session" or another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for the same [no S-NSSAI no DNN] combination that was sent by the UE if neither S-NSSAI nor DNN was provided during the PDU session establishment until timer T3584 expires or timer T3584 is stopped

the UE shall not stop timer T3584 upon a PLMN change SNPN change or inter-system change;

b) if the timer value indicates that this timer is deactivated the UE

1) shall stop timer T3584 associated with the same [S-NSSAI DNN] combination as that the UE provided during the PDU session establishment if running the timer T3584 to be stopped includes

i) in a PLMN

A) the timer T3584 applied for all the PLMNs if running; and

B) the timer T3584 applied for the registered PLMN if running; or

ii) in an SNPN

A) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

B) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for the same [S-NSSAI DNN] combination that was sent by the UE until the UE is switched off the USIM is removed the entry in the "list of subscriber data" for the current SNPN is updated if the UE does not support access to an SNPN using credentials from a credentials holder or the selected entry of the "list of subscriber data" is updated if the UE supports access to an SNPN using credentials from a credentials holder or the UE receives a PDU SESSION MODIFICATION COMMAND message for the same [S-NSSAI DNN] combination from the network or a PDU SESSION AUTHENTICATION COMMAND message for the same [S-NSSAI DNN] combination from the network or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE for the same [S-NSSAI DNN] combination from the network;

2) shall stop timer T3584 associated with the same [S-NSSAI no DNN] combination as that the UE provided during the PDU session establishment if running the timer T3584 to be stopped includes

i) in a PLMN

A) the timer T3584 applied for all the PLMNs if running; and

B) the timer T3584 applied for the registered PLMN if running; or

ii) in an SNPN

A) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

B) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE shall not send a PDU SESSION ESTABLISHMENT REQUEST message with request type different from "initial emergency request" and different from "existing emergency PDU session" or a PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for the same [S-NSSAI no DNN] combination that was sent by the UE if no DNN was provided during the PDU session establishment until the UE is switched off the USIM is removed the entry in the "list of subscriber data" for the current SNPN is updated if the UE does not support access to an SNPN using credentials from a credentials holder or the selected entry of the "list of subscriber data" if the UE supports access to an SNPN using credentials from a credentials holder or the UE receives an PDU SESSION MODIFICATION COMMAND message for a non-emergency PDU session established for the same [S-NSSAI no DNN] combination from the network or a PDU SESSION AUTHENTICATION COMMAND message for a non-emergency PDU session established for the same [S-NSSAI DNN] combination from the network or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE for a non-emergency PDU session established for the same [S-NSSAI no DNN] combination from the network;

3) shall stop timer T3584 associated with the same [no S-NSSAI DNN] combination as that the UE provided during the PDU session establishment if running the timer T3584 to be stopped includes

i) in a PLMN

A) the timer T3584 applied for all the PLMNs if running; and

B) the timer T3584 applied for the registered PLMN if running; or

ii) in an SNPN

A) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

B) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE shall not send a PDU SESSION ESTABLISHMENT REQUEST message or a PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for the same [no S-NSSAI DNN] combination that was sent by the UE if no S-NSSAI was provided during the PDU session establishment until the UE is switched off the USIM is removed the entry in the "list of subscriber data" for the current SNPN is updated or the UE receives a PDU SESSION MODIFICATION COMMAND message for the same [no S-NSSAI DNN] combination from the network or a PDU SESSION AUTHENTICATION COMMAND message for a non-emergency PDU session established for the same [no S-NSSAI no DNN] combination from the network or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE for the same [no S-NSSAI DNN] combination from the network; and

4) shall stop timer T3584 associated with the same [no S-NSSAI no DNN] combination as that the UE provided during the PDU session establishment if running the timer T3584 to be stopped includes

i) in a PLMN

A) the timer T3584 applied for all the PLMNs if running; and

B) the timer T3584 applied for the registered PLMN if running; or

ii) in an SNPN

A) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

B) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE shall not send a PDU SESSION ESTABLISHMENT REQUEST message with request type different from "initial emergency request" and different from "existing emergency PDU session" or a PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for the same [no S-NSSAI no DNN] combination that was sent by the UE if neither S-NSSAI nor DNN was provided during the PDU session establishment until the UE is switched off the USIM is removed the entry in the "list of subscriber data" for the current SNPN is updated if the UE does not support access to an SNPN using credentials from a credentials holder or the selected entry of the "list of subscriber data" is updated if the UE supports access to an SNPN using credentials from a credentials holder or the UE receives an PDU SESSION MODIFICATION COMMAND message for a non-emergency PDU session established for the same [no S-NSSAI no DNN] combination from the network or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE for a non-emergency PDU session established for the same [no S-NSSAI no DNN] combination from the network

the timer T3584 remains deactivated upon a PLMN change SNPN change or inter-system change; and

c) if the timer value indicates zero the UE

1) shall stop timer T3584 associated with the same [S-NSSAI DNN] combination as that the UE provided during the PDU session establishment if running the timer T3584 to be stopped includes

i) in a PLMN

A) the timer T3584 applied for all the PLMNs if running; and

B) the timer T3584 applied for the registered PLMN if running; or

ii) in an SNPN

A) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

B) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same [S-NSSAI DNN] combination;

2) shall stop timer T3584 associated with the same [S-NSSAI no DNN] combination as that the UE provided during the PDU session establishment if running the timer T3584 to be stopped includes

i) in a PLMN

A) the timer T3584 applied for all the PLMNs if running; and

B) the timer T3584 applied for the registered PLMN if running; or

ii) in an SNPN

A) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

B) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same [S-NSSAI no DNN] combination if no DNN was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session";

3) shall stop timer T3584 associated with the same [no S-NSSAI DNN] combination as that the UE provided during the PDU session establishment if running the timer T3584 to be stopped includes

i) in a PLMN

A) the timer T3584 applied for all the PLMNs if running; and

B) the timer T3584 applied for the registered PLMN if running; or

ii) in an SNPN

A) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

B) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same [no S-NSSAI DNN] combination if no NSSAI was provided during the PDU session establishment; and

4) shall stop timer T3584 associated with the same [no S-NSSAI no DNN] combination as that the UE provided during the PDU session establishment if running the timer T3584 to be stopped includes

i) in a PLMN

A) the timer T3584 applied for all the PLMNs if running; and

B) the timer T3584 applied for the registered PLMN if running; or

ii) in an SNPN

A) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

B) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same [no S-NSSAI no DNN] combination if neither S-NSSAI nor DNN was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session"

if the 5GSM congestion re-attempt indicator IE with the ABO bit set to "The back-off timer is applied in all PLMNs or all equivalent SNPNs " is included in the PDU SESSION ESTABLISHMENT REJECT message with the 5GSM cause value #67 "insufficient resources for specific slice and DNN" then the UE shall apply the timer T3584 for all the PLMNs or all the equivalent SNPNs otherwise the UE shall apply the timer T3584 for the registered PLMN

if the Back-off timer value IE is not included or no Back-off timer value is received from the 5GMM sublayer then the UE may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same [S-NSSAI DNN] combination or for the same [S-NSSAI no DNN] combination or for the same [no S-NSSAI DNN] combination or for the same [no S-NSSAI no DNN] combination as specified in subclause 6.2.8

when the timer T3584 is running or the timer is deactivated the UE is allowed to initiate a PDU session establishment procedure for emergency services

if the timer T3584 is running when the UE enters state 5GMM-DEREGISTERED the UE remains switched on and the USIM in the UE (if any) remains the same and the entry in the "list of subscriber data" to which timer T3584 is associated (if any) is not updated then timer T3584 is kept running until it expires or it is stopped

if the UE is switched off when the timer T3584 is running and if the USIM in the UE (if any) remains the same and the entry in the "list of subscriber data" to which timer T3584 is associated (if any) is not updated when the UE is switched on the UE shall behave as follows

- let t1 be the time remaining for T3584 timeout at switch off and let t be the time elapsed between switch off and switch on if t1 is greater than t then the timer shall be restarted with the value t1 – t if t1 is equal to or less than t then the timer need not be restarted if the UE is not capable of determining t then the UE shall restart the timer with the value t1

if

- the 5GSM cause value #69 "insufficient resources for specific slice" and the Back-off timer value IE are included in the PDU SESSION ESTABLISHMENT REJECT message; or

- an indication that the 5GSM message was not forwarded due to S-NSSAI only based congestion control is received along a Back-off timer value and a PDU SESSION ESTABLISHMENT REQUEST message with the PDU session ID IE set to the PDU session ID of the PDU session;

the UE shall ignore the Re-attempt indicator IE provided by the network if any and take different actions depending on the timer value received for timer T3585 in the Back-off timer value IE or depending on the Back-off timer value received from the 5GMM sublayer (if the UE is a UE configured for high priority access in selected PLMN or SNPN exceptions are specified in subclause 6.2.8)

a) if the timer value indicates neither zero nor deactivated and an S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop timer T3585 associated with the corresponding S-NSSAI if it is running if the timer value indicates neither zero nor deactivated and no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop timer T3585 associated with no S-NSSAI if it is running the timer T3585 to be stopped includes

1) in a PLMN

i)- the timer T3585 applied for all the PLMNs and for the access over which the PDU SESSION ESTABLISHMENT REJECT is received if running;

ii) the timer T3585 applied for all the PLMNs and for both 3GPP access type and non-3GPP access type if running;

iii) the timer T3585 applied for the registered PLMN and for the access over which the PDU SESSION ESTABLISHMENT REJECT is received if running; and

iv) the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type if running; or

2) in an SNPN

i) the timer T3585 applied for all the equivalent SNPNs and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

ii) the timer T3585 applied for all the equivalent SNPNs and for both 3GPP access type and non-3GPP access type associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

iii) the timer T3585 applied for the registered SNPN and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

iv) the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE shall then start timer T3585 with the value provided in the Back-off timer value IE or with the Back-off timer value received from the 5GMM sublayer and

1) shall not send another PDU SESSION ESTABLISHMENT REQUEST message with request type different from "initial emergency request" and different from "existing emergency PDU session" or another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for a non-emergency PDU session for the same S-NSSAI that was sent by the UE until timer T3585 expires or timer T3585 is stopped; and

2) shall not send another PDU SESSION ESTABLISHMENT REQUEST message without an S-NSSAI and with request type different from "initial emergency request" and different from "existing emergency PDU session" or another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for a non-emergency PDU session established without an S-NSSAI provided by the UE if no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" until timer T3585 expires or timer T3585 is stopped

the UE shall not stop timer T3585 upon a PLMN change SNPN change or inter-system change;

b) if the timer value indicates that this timer is deactivated and an S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop timer T3585 associated with the corresponding S-NSSAI if it is running if the timer value indicates that this timer is deactivated and no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop timer T3585 associated with no S-NSSAI if it is running the timer T3585 to be stopped includes

1) in a PLMN

i) the timer T3585 applied for all the PLMNs and for the access over which the PDU SESSION ESTABLISHMENT REJECT is received if running;

ii) the timer T3585 applied for all the PLMNs and for both 3GPP access type and non-3GPP access type if running;

iii) the timer T3585 applied for the registered PLMN and for the access over which the PDU SESSION ESTABLISHMENT REJECT is received if running; and

iv) the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type if running; or

2) in an SNPN

i) the timer T3585 applied for all the equivalent SNPNs and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

ii) the timer T3585 applied for all the equivalent SNPNs and for both 3GPP access type and non-3GPP access type associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

iii) the timer T3585 applied for the registered SNPN and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

iv) the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE

1) shall not send another PDU SESSION ESTABLISHMENT REQUEST message with request type different from "initial emergency request" and different from "existing emergency PDU session" or another PDU SESSION MODIFICATION REQUEST with exception of those identified in subclause 6.4.2.1 for a non-emergency PDU session for the same S-NSSAI until the UE is switched off the USIM is removed the entry in the "list of subscriber data" for the current SNPN is updated if the UE does not support access to an SNPN using credentials from a credentials holder or the selected entry of the "list of subscriber data" is updated if the UE supports access to an SNPN using credentials from a credentials holder or the UE receives a PDU SESSION MODIFICATION COMMAND message for a non-emergency PDU session for the same S-NSSAI from the network or a PDU SESSION AUTHENTICATION COMMAND message for a non-emergency PDU session for the same S-NSSAI from the network or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE for the same S-NSSAI from the network; and

2) shall not send another PDU SESSION ESTABLISHMENT REQUEST message without an S-NSSAI and with request type different from "initial emergency request" and different from "existing emergency PDU session" or another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for a non-emergency PDU session established without an S-NSSAI provided by the UE if no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" until the UE is switched off the USIM is removed the entry in the "list of subscriber data" for the current SNPN is updated if the UE does not support access to an SNPN using credentials from a credentials holder or the selected entry of the "list of subscriber data" is updated if the UE supports access to an SNPN using credentials from a credentials holder or the UE receives a PDU SESSION MODIFICATION COMMAND message for a non-emergency PDU session established without an S-NSSAI provided by the UE or a PDU SESSION AUTHENTICATION COMMAND message for a non-emergency PDU session established without an S-NSSAI provided by the UE or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE for a non-emergency PDU session established without an S-NSSAI provided by the UE

the timer T3585 remains deactivated upon a PLMN change SNPN change or inter-system change; and

c) if the timer value indicates zero the UE

1) shall stop timer T3585 associated with the corresponding S-NSSAI if running the timer T3585 to be stopped includes

i) in a PLMN

A) the timer T3585 applied for all the PLMNs and for the access over which the PDU SESSION RELEASE COMMAND is received if running;

B) the timer T3585 applied for all the PLMNs and for the access over which the PDU SESSION RELEASE COMMAND is received if running;

C) the timer T3585 applied for the registered PLMN and for current access type or both 3GPP access type and non-3GPP access type if running; and

D) the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type if running; or

ii) in an SNPN

A) the timer T3585 applied for all the equivalent SNPNs and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

B) the timer T3585 applied for all the equivalent SNPNs and for both 3GPP access type and non-3GPP access type associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

C) the timer T3585 applied for the registered SNPN and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

D) the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same S-NSSAI; and

2) if no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request " and different from "existing emergency PDU session" the UE shall stop timer T3585 associated with no S-NSSAI if running the timer T3585 to be stopped includes

i) in a PLMN

A) the timer T3585 applied for all the PLMNs and for the access over which the PDU SESSION RELEASE COMMAND is received if running;

B) the timer T3585 applied for all the PLMNs and for the access over which the PDU SESSION RELEASE COMMAND is received if running;

C) the timer T3585 applied for the registered PLMN and for current access type or both 3GPP access type and non-3GPP access type if running; and

D) the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type if running; or

ii) in an SNPN

A) the timer T3585 applied for all the equivalent SNPNs and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

B) the timer T3585 applied for all the equivalent SNPNs and for both 3GPP access type and non-3GPP access type associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

C) the timer T3585 applied for the registered SNPN and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

D) the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE may send another PDU SESSION ESTABLISHMENT REQUEST message without an S-NSSAI or another PDU SESSION MODIFICATION REQUEST message without an S-NSSAI provided by the UE

if the 5GSM congestion re-attempt indicator IE with the ABO bit set to "The back-off timer is applied in all PLMNs or equivalent SNPNs " is included in the PDU SESSION ESTABLISHMENT REJECT message with the 5GSM cause value #69 "insufficient resources for specific slice" then the UE shall apply the timer T3585 for all the PLMNs or all the equivalent SNPNs otherwise the UE shall apply the timer T3585 for the registered PLMN or the registered SNPN additionally if the 5GSM congestion re-attempt indicator IE with the CATBO bit set to "The back-off timer is applied in the current access type" is included in the PDU SESSION ESTABLISHMENT REJECT message with the 5GSM cause value #69 "insufficient resources for specific slice" then the UE shall apply the timer T3585 for the current access type otherwise the UE shall apply the timer T3585 for both 3GPP access type and non-3GPP access type and the UE shall stop any running timer T3585 for the applied PLMN or SNPN and for the access different from the access from which the PDU SESSION ESTABLISHMENT REJECT message is received

if the Back-off timer value IE is not included or no Back-off timer value is received from the 5GMM sublayer then the UE may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same S-NSSAI or without an S-NSSAI as specified in subclause 6.2.8

when the timer T3585 is running or the timer is deactivated the UE is allowed to initiate a PDU session establishment procedure for emergency services

if the timer T3585 is running when the UE enters state 5GMM-DEREGISTERED the UE remains switched on and the USIM in the UE (if any) remains the same and the entry in the "list of subscriber data" to which timer T3585 is associated (if any) is not updated then timer T3585 is kept running until it expires or it is stopped

if the UE is switched off when the timer T3585 is running and if the USIM in the UE (if any) remains the same and the entry in the "list of subscriber data" to which timer T3585 is associated (if any) is not updated when the UE is switched on the UE shall behave as follows

let t1 be the time remaining for T3585 timeout at switch off and let t be the time elapsed between switch off and switch on if t1 is greater than t then the timer shall be restarted with the value t1 – t if t1 is equal to or less than t then the timer need not be restarted if the UE is not capable of determining t then the UE shall restart the timer with the value t1

NOTE as described in this subclause upon PLMN change SNPN change or inter-system change the UE does not stop the timer T3584 or T3585 this means the timer T3584 or T3585 can still be running or be deactivated for the given 5GSM procedure the PLMN or SNPN the S-NSSAI and optionally the DNN combination when the UE returns to the PLMN or SNPN or when it performs inter-system change back from S1 mode to N1 mode thus the UE can still be prevented from sending another PDU SESSION ESTABLISHMENT REQUEST or PDU SESSION MODIFICATION REQUEST message in the PLMN or SNPN for the same S-NSSAI and optionally the same DNN

upon PLMN change or SNPN change if T3584 applied for the registered PLMN or the registered SNPN is running or is deactivated for an S-NSSAI a DNN and old PLMN or old SNPN but T3584 is not running and is not deactivated for the S-NSSAI the DNN and new PLMN or new SNPN then the UE is allowed to send a PDU SESSION ESTABLISHMENT REQUEST message for the same S-NSSAI and the same DNN in the new PLMN or new SNPN

upon PLMN change or SNPN change if T3585 applied for the registered PLMN or the registered SNPN is running or is deactivated for an S-NSSAI and old PLMN or old SNPN but T3585 is not running and is not deactivated for the S-NSSAI and new PLMN or new SNPN then the UE is allowed to send a PDU SESSION ESTABLISHMENT REQUEST message for the same S-NSSAI in the new PLMN or new SNPN

upon SNPN change if T3585 applied for all the equivalent SNPNs is running or is deactivated for an S-NSSAI and old SNPN but T3585 is not running and is not deactivated for the S-NSSAI and new non-equivalent SNPN then the UE is allowed to send a PDU SESSION ESTABLISHMENT REQUEST message for the same S-NSSAI in the new SNPN

##### 6.4.1.4.3 handling of network rejection not due to congestion control

if the 5GSM cause value is different from #26 "insufficient resources" #28 "unknown PDU session type" #39 "reactivation requested" #46 "out of LADN service area" #50 "PDU session type IPv4 only allowed" #51 "PDU session type IPv6 only allowed" #54 "PDU session does not exist" #57 "PDU session type IPv4v6 only allowed" #58 "PDU session type unstructured only allowed" #61 "PDU session type ethernet only allowed" #67 "insufficient resources for specific slice and DNN" #68 "not supported SSC mode" and #69 "insufficient resources for specific slice" #86 "UAS services not allowed" and #33 "requested service option not subscribed" upon sending PDU SESSION ESTABLISHMENT REQUEST to establish an MA PDU session and the Back-off timer value IE is included the UE shall behave as follows (if the UE is a UE configured for high priority access in selected PLMN or SNPN exceptions are specified in subclause 6.2.12)

a) if the timer value indicates neither zero nor deactivated and

1) if the UE provided a DNN and S-NSSAI to the network during the PDU session establishment and the 5GSM cause value is different from #27 "missing or unknown DNN" the UE shall start the back-off timer with the value provided in the Back-off timer value IE for the PDU session establishment procedure and

i) in a PLMN [PLMN DNN (mapped) HPLMN S-NSSAI] combination the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same DNN and (mapped) HPLMN S-NSSAI in the current PLMN until the back-off timer expires the UE is switched off or the USIM is removed; or

ii) in an SNPN [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription DNN (mapped) subscribed SNPN S-NSSAI] combination the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same DNN and (mapped) subscribed SNPN S-NSSAI in the current SNPN using the selected entry of the "list of subscriber data" or selected PLMN subscription until the back-off timer expires the UE is switched off the USIM is removed or the selected entry of the "list of subscriber data" is updated;

2) if the UE provided a DNN to the network during the PDU session establishment and the 5GSM cause value is #27 "missing or unknown DNN" the UE shall start the back-off timer with the value provided in the Back-off timer value IE for the PDU session establishment procedure and

i) in a PLMN [PLMN DNN] combination the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same DNN in the current PLMN until the back-off timer expires the UE is switched off or the USIM is removed; or

ii) in an SNPN [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription DNN] combination the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same DNN in the current SNPN using the selected entry of the "list of subscriber data" or selected PLMN subscription until the back-off timer expires the UE is switched off the USIM is removed or the selected entry of the "list of subscriber data" is updated;

3) if the UE did not provide a DNN or S-NSSAI or any of the two parameters to the network during the PDU session establishment and the 5GSM cause value is different from #27 "missing or unknown DNN" it shall start the back-off timer accordingly for the PDU session establishment procedure and

i) in a PLMN [PLMN DNN no S-NSSAI] [PLMN no DNN (mapped) HPLMN S-NSSAI] or [PLMN no DNN no S-NSSAI] combination dependent on the combination the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same [PLMN DNN no S-NSSAI] [PLMN no DNN (mapped) HPLMN S-NSSAI] or [PLMN no DNN no S-NSSAI] combination in the current PLMN until the back-off timer expires the UE is switched off or the USIM is removed; or

ii) in an SNPN [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription DNN no S-NSSAI] [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription no DNN (mapped) subscribed SNPN S-NSSAI] or [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription no DNN no S-NSSAI] combination dependent on the combination the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription DNN no S-NSSAI] [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription no DNN (mapped) subscribed SNPN S-NSSAI] or [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription no DNN no S-NSSAI] combination in the current PLMN using the selected entry of the "list of subscriber data" or selected PLMN subscription until the back-off timer expires the UE is switched off the USIM is removed or the selected entry of the "list of subscriber data" is updated; or

4) if the UE did not provide a DNN to the network during the PDU session establishment and the 5GSM cause value is #27 "missing or unknown DNN" it shall start the back-off timer accordingly for the PDU session establishment procedure and

i) in a PLMN [PLMN no DNN] combination the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same [PLMN no DNN] in the current PLMN until the back-off timer expires the UE is switched off or the USIM is removed; or

ii) in an SNPN [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription no DNN] combination the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription no DNN] in the current PLMN using the selected entry of the "list of subscriber data" or selected PLMN subscription until the back-off timer expires the UE is switched off the USIM is removed or the selected entry of the "list of subscriber data" is updated;

b) if the timer value indicates that this timer is deactivated and

1) if the UE provided a DNN and S-NSSAI to the network during the PDU session establishment and the 5GSM cause value is different from #27 "missing or unknown DNN" the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for

i) in a PLMN the same DNN and (mapped) HPLMN S-NSSAI in the current PLMN until the UE is switched off or the USIM is removed; or

ii) in an SNPN the same DNN and (mapped) subscribed SNPN S-NSSAI in the current SNPN using the selected entry of the "list of subscriber data" or selected PLMN subscription until the UE is switched off the USIM is removed or the selected entry of the "list of subscriber data" is updated;

2) if the UE provided a DNN to the network during the PDU session establishment and the 5GSM cause value is #27 "missing or unknown DNN" the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for

i) in a PLMN the same DNN in the current PLMN until the UE is switched off or the USIM is removed; or

ii) in an SNPN the same DNN in the current SNPN using the selected entry of the "list of subscriber data" or selected PLMN subscription until the UE is switched off the USIM is removed or the selected entry of the "list of subscriber data" is updated;

3) if the UE did not provide a DNN or S-NSSAI or any of the two parameters to the network during the PDU session establishment and the 5GSM cause value is different from #27 "missing or unknown DNN" the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for

i) in a PLMN the same [PLMN DNN no S-NSSAI] [PLMN no DNN (mapped) HPLMN S-NSSAI] or [PLMN no DNN no S-NSSAI] combination in the current PLMN until the UE is switched off or the USIM is removed; or

ii) in an SNPN the same [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN no S-NSSAI] [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN (mapped) subscribed SNPN S-NSSAI] or [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN no S-NSSAI] combination in the current SNPN using the selected entry of the "list of subscriber data" or selected PLMN subscription until the UE is switched off the USIM is removed or the selected entry of the "list of subscriber data" is updated; or

4) if the UE did not provide a DNN to the network during the PDU session establishment and the 5GSM cause value is #27 "missing or unknown DNN" the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for

i) in a PLMN the same [PLMN no DNN] in the current PLMN until the UE is switched off or the USIM is removed; or

ii) in an SNPN the same [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN] in the current SNPN using the selected entry of the "list of subscriber data" or selected PLMN subscription until the UE is switched off the USIM is removed or the selected entry of the "list of subscriber data" is updated; and

c) if the timer value indicates zero and the 5GSM cause value is different from #27 "missing or unknown DNN" the UE may send another PDU SESSION ESTABLISHMENT REQUEST message for

1) in a PLMN the same combination of [PLMN DNN (mapped) HPLMN S-NSSAI] [PLMN DNN no S-NSSAI] [PLMN no DNN (mapped) HPLMN S-NSSAI] or [PLMN no DNN no S-NSSAI] in the current PLMN if the timer value indicates zero and the 5GSM cause value is #27 "missing or unknown DNN" the UE may send another PDU SESSION ESTABLISHMENT REQUEST message for the same combination of [PLMN DNN] or [PLMN no DNN] in the current PLMN; or

2) in an SNPN the same combination of [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN (mapped) subscribed SNPN S-NSSAI] [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN no S-NSSAI] [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN (mapped) subscribed S-NSSAI] or [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN no S-NSSAI] in the current SNPN using the selected entry of the "list of subscriber data" or selected PLMN subscription if the timer value indicates zero and the 5GSM cause value is #27 "missing or unknown DNN" the UE may send another PDU SESSION ESTABLISHMENT REQUEST message for the same combination of [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN] or [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN] in the current SNPN using the selected entry of the "list of subscriber data" or selected PLMN subscription

if the Back-off timer value IE is not included then the UE shall ignore the Re-attempt indicator IE provided by the network in the PDU SESSION ESTABLISHMENT REJECT message if any

a) additionally if the 5GSM cause value is #8 "operator determined barring" #32 "service option not supported" #33 "requested service option not subscribed" upon sending PDU SESSION ESTABLISHMENT REQUEST not to establish an MA PDU session or #70 "missing or unknown DNN in a slice" then

1) the UE not operating in SNPN access operation mode shall proceed as follows

i) if the UE is registered in the HPLMN or in a PLMN that is within the EHPLMN list the UE shall behave as described above in the present subclause using the configured SM retry timer value as specified in 3GPP TS 24.368 [17] or in USIM file NASCONFIG as specified in 3GPP TS 31.102 [22] if available as back-off timer value; and

NOTE 1 the way to choose one of the configured SM retry timer values for back-off timer value is up to UE implementation if the UE is configured with - an SM retry timer value in ME as specified in 3GPP TS 24.368 [17]; and - an SM retry timer value in USIM file NASCONFIG as specified in 3GPP TS 31.102 [22]

ii) otherwise if the UE is not registered in its HPLMN or in a PLMN that is within the EHPLMN list or if the SM retry timer value is not configured the UE shall behave as described above in the present subclause using the default value of 12 minutes for the back-off timer; or

2) the UE operating in SNPN access operation mode shall proceed as follows

i) if

A) the SM retry timer value for the current SNPN as specified in 3GPP TS 24.368 [17] is available; or

B) the UE used the USIM for registration to the current SNPN and the SM retry timer value in USIM file NASCONFIG as specified in 3GPP TS 31.102 [22] is available;

then the UE shall behave as described above in the present subclause using the configured SM retry timer value as back-off timer value; or

NOTE 2 the way to choose one of the configured SM retry timer values for back-off timer value is up to UE implementation if both conditions in bullets A) and B) above are satisfied

ii) otherwise the UE shall behave as described above in the present subclause using the default value of 12 minutes for the back-off timer

b) for 5GSM cause value #27 "missing or unknown DNN" then

1) the UE not operating in SNPN access operation mode shall proceed as follows

i) if the UE is registered in the HPLMN or in a PLMN that is within the EHPLMN list the UE shall start the back-off timer with the configured SM retry timer value as specified in 3GPP TS 24.368 [17] or in USIM file NASCONFIG as specified in 3GPP TS 31.102 [22] if available as back-off timer value for the PDU session establishment procedure and the [PLMN DNN] or [PLMN no DNN] combination the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same DNN in the current PLMN until the back-off timer expires the UE is switched off or the USIM is removed; and

NOTE 3 the way to choose one of the configured SM retry timer values for back-off timer value is up to UE implementation if the UE is configured with - an SM retry timer value in ME as specified in 3GPP TS 24.368 [17]; and - an SM retry timer value in USIM file NASCONFIG as specified in 3GPP TS 31.102 [22]

ii) otherwise if the UE is not registered in its HPLMN or in a PLMN that is within the EHPLMN list or if the SM retry timer value is not configured the UE shall start the back-off timer with the default value of 12 minutes as back-off timer value for the PDU session establishment procedure and the [PLMN DNN] or [PLMN no DNN] combination the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same DNN in the current PLMN until the back-off timer expires the UE is switched off or the USIM is removed; or

2) the UE operating in SNPN access operation mode shall proceed as follows

i) if

A) the SM retry timer value for the current SNPN as specified in 3GPP TS 24.368 [17] is available; or

B) the UE used the USIM for registration to the current SNPN and the SM retry timer value in USIM file NASCONFIG as specified in 3GPP TS 31.102 [22] is available;

then

the UE shall start the back-off timer with the configured SM retry timer value as back-off timer value for the PDU session establishment procedure and the [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription DNN] or [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription no DNN] combination the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same DNN in the current SNPN using the selected entry in the "list of subscriber data" or selected PLMN subscription until the back-off timer expires the UE is switched off the UICC containing the USIM is removed or the selected entry of the "list of subscriber data" is updated; or

NOTE 4 the way to choose one of the configured SM retry timer values for back-off timer value is up to UE implementation if both conditions in bullets A) and B) above are satisfied

ii) otherwise

- the UE shall start the back-off timer with the default value of 12 min as back-off timer value for the PDU session establishment procedure and the [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription DNN] or [SNPN selected entry in the "list of subscriber data" or selected PLMN subscription no DNN] combination the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same DNN in the current SNPN using the selected entry of the "list of subscriber data" until the back-off timer expires the UE is switched off the UICC containing the USIM is removed or the selected entry of the "list of subscriber data" is updated; and

c) for 5GSM cause values different from #8 "operator determined barring" #27 "missing or unknown DNN" #32 "service option not supported" #33 "requested service option not subscribed" and #70 "missing or unknown DNN in a slice" the UE behaviour regarding the start of a back-off timer is specified in subclause 6.2.12

the UE shall not stop any back-off timer

a) upon a PLMN or SNPN change;

b) upon an inter-system change; or

c) upon registration over another access type

if the network indicates that a back-off timer for the PDU session establishment procedure is deactivated then it remains deactivated;

a) upon a PLMN or SNPN change;

b) upon an inter-system change; or

c) upon registration over another access type

NOTE 5 this means the back-off timer can still be running or be deactivated for the given 5GSM procedure when the UE returns to the PLMN or SNPN or when it performs inter-system change back from S1 mode to N1 mode thus the UE can still be prevented from sending another PDU SESSION ESTABLISHMENT REQUEST message for the combination of [PLMN DNN (mapped) HPLMN S-NSSAI] [PLMN DNN no S-NSSAI] [PLMN no DNN (mapped) HPLMN S-NSSAI] [PLMN no DNN no S-NSSAI] [PLMN DNN] or [PLMN no DNN] in the PLMN or for the combination of [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN (mapped) subscribed S-NSSAI] [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN no S-NSSAI] [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN (mapped) subscribed S-NSSAI] [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN no S-NSSAI] [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN] or [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN] in the SNPN

if the back-off timer is started upon receipt of a PDU SESSION ESTABLISHMENT REJECT (i.e the timer value was provided by the network a configured value is available or the default value is used as explained above) or the back-off timer is deactivated the UE behaves as follows

a) after a PLMN or SNPN change

1) the UE may send a PDU SESSION ESTABLISHMENT REQUEST message for

i) in a PLMN the combination of [new PLMN DNN (mapped) HPLMN S-NSSAI] [new PLMN DNN no S-NSSAI] [new PLMN no DNN (mapped) HPLMN S-NSSAI] or [new PLMN no DNN no S-NSSAI] in the new PLMN if the back-off timer is not running and is not deactivated for the PDU session establishment procedure and the combination of [new PLMN DNN (mapped) HPLMN S-NSSAI] [new PLMN DNN no S-NSSAI] [new PLMN no DNN (mapped) HPLMN S-NSSAI] or [new PLMN no DNN no S-NSSAI]; or

ii) in an SNPN the combination of [new SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN (mapped) subscribed SNPN S-NSSAI] [new SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN no S-NSSAI] [new PLMN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN (mapped) subscribed SNPN S-NSSAI] or [new SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN no S-NSSAI] in the new SNPN if the back-off timer is not running and is not deactivated for the PDU session establishment procedure and the combination of [new SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN (mapped) subscribed SNPN S-NSSAI] [new SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN no S-NSSAI] [new SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN (mapped) subscribed SNPN S-NSSAI] or [new SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN no S-NSSAI];

2) as an implementation option for the 5GSM cause value #8 "operator determined barring" #32 "service option not supported" #33 "requested service option not subscribed" and #70 "missing or unknown DNN in a slice" if the network does not include a Re-attempt indicator IE the UE may decide not to automatically send another PDU SESSION ESTABLISHMENT REQUEST message for

i) in a PLMN the same combination of [PLMN DNN (mapped) HPLMN S-NSSAI] [PLMN DNN no S-NSSAI] [PLMN no DNN (mapped) HPLMN S-NSSAI] or [PLMN no DNN no S-NSSAI] using the same PDU session type if the UE is registered to a new PLMN which is in the list of equivalent PLMNs; or

ii) in an SNPN if the UE supports equivalent SNPNs the same combination of [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN (mapped) subscribed SNPN S-NSSAI] [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN no S-NSSAI] [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN (mapped) subscribed SNPN S-NSSAI] or [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN no S-NSSAI] using the same PDU session type and using the selected entry of the "list of subscriber data" or selected PLMN subscription if the UE is registered to a new SNPN which is in the list of equivalent SNPNs; and

3) as an implementation option for the 5GSM cause value #27 "missing or unknown DNN" if the network does not include a Re-attempt indicator IE the UE may decide not to automatically send another PDU SESSION ESTABLISHMENT REQUEST message for

i) in a PLMN the same combination of [PLMN DNN] or [PLMN no DNN] using the same PDU session type if the UE is registered to a new PLMN which is in the list of equivalent PLMNs; or

ii) in an SNPN if the UE supports equivalent SNPNs the same combination of [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN] or [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN] using the same PDU session type if the UE is registered to a new SNPN which is in the list of equivalent SNPNs; or

b) if the network does not include the Re-attempt indicator IE to indicate whether re-attempt in S1 mode is allowed or the UE ignores the Re-attempt indicator IE e.g because the Back-off timer value IE is not included then

1) if the UE is registered in its HPLMN or in a PLMN that is within the EHPLMN list and the back-off timer is running for the combination of [PLMN DNN (mapped) HPLMN S-NSSAI] or [PLMN DNN no S-NSSAI] the UE shall apply the configured SM\_RetryAtRATChange value as specified in 3GPP TS 24.368 [17] or in USIM file NASCONFIG as specified in 3GPP TS 31.102 [22] if available to determine whether the UE may attempt a PDN connectivity procedure for the same [PLMN DNN] combination in S1 mode if the back-off timer is running for the combination of [PLMN no DNN (mapped) HPLMN S-NSSAI] or [PLMN no DNN no S-NSSAI] the same applies for the PDN connectivity procedure for the [PLMN no DNN] combination in S1 mode accordingly; and

NOTE 6 the way to choose one of the configured SM\_RetryAtRATChange values for back-off timer value is up to UE implementation if the UE is configured with - an SM\_RetryAtRATChange value in ME as specified in 3GPP TS 24.368 [17]; and - an SM\_RetryAtRATChange value in USIM file NASCONFIG as specified in 3GPP TS 31.102 [22]

2) if the UE is not registered in its HPLMN or in a PLMN that is within the EHPLMN list or if the NAS configuration MO as specified in 3GPP TS 24.368 [17] is not available and the value for inter-system change is not configured in the USIM file NASCONFIG then the UE behaviour regarding a PDN connectivity procedure for the same [PLMN DNN] or [PLMN no DNN] combination in S1 mode is unspecified; and

c) if the network includes the Re-attempt indicator IE indicating that re-attempt in an equivalent PLMN or SNPN is not allowed then depending on the timer value received in the Back-off timer value IE for

1) in a PLMN each combination of a PLMN from the equivalent PLMN list and the respective [DNN (mapped) HPLMN S-NSSAI] [DNN no S-NSSAI] [no DNN (mapped) HPLMN S-NSSAI] or [no DNN no S-NSSAI] combination the UE shall start a back-off timer for the PDU session establishment procedure with the value provided by the network or deactivate the respective back-off timer as follows

i) if the Re-attempt indicator IE additionally indicates that re-attempt in S1 mode is allowed the UE shall start or deactivate the back-off timer for N1 mode only; and

ii) otherwise the UE shall start or deactivate the back-off timer for S1 and N1 mode; or

2) in a SNPN if the UE supports equivalent SNPNs each combination of a SNPN from the equivalent SNPN list and the respective [the selected entry of the "list of subscriber data" or selected PLMN subscription DNN (mapped) subscribed SNPN S-NSSAI] [the selected entry of the "list of subscriber data" or selected PLMN subscription DNN no S-NSSAI] [the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN (mapped) subscribed SNPN S-NSSAI] or [the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN no S-NSSAI] combination the UE shall start a back-off timer for the PDU session establishment procedure with the value provided by the network or deactivate the respective back-off timer for N1 mode

if the back-off timer for a [PLMN DNN] or [PLMN no DNN] combination was started or deactivated in S1 mode upon receipt of PDN CONNECTIVITY REJECT message (see 3GPP TS 24.301 [15]) and the network indicated that re-attempt in N1 mode is allowed then this back-off timer does not prevent the UE from sending a PDU SESSION ESTABLISHMENT REQUEST message in this PLMN for the same DNN or without DNN after inter-system change to N1 mode if the network indicated that re-attempt in N1 mode is not allowed the UE shall not send any PDU SESSION ESTABLISHMENT REQUEST message in this PLMN for the same DNN in combination with any S-NSSAI or without S-NSSAI or in this PLMN without DNN in combination with any S-NSSAI or without S-NSSAI after inter-system change to N1 mode until the timer expires the UE is switched off or the USIM is removed

NOTE 7 the back-off timer is used to describe a logical model of the required UE behaviour this model does not imply any specific implementation e.g as a timer or timestamp

NOTE 8 reference to back-off timer in this section can either refer to use of timer T3396 or to use of a different packet system specific timer within the UE whether the UE uses T3396 as a back-off timer or it uses different packet system specific timers as back-off timers is left up to UE implementation

when the back-off timer is running or the timer is deactivated the UE is allowed to initiate a PDU session establishment procedure if the procedure is for emergency services

if the 5GSM cause value is #28 "unknown PDU session type" and the PDU SESSION ESTABLISHMENT REQUEST message contained a PDU session type IE indicating a PDU session type the UE shall ignore the Back-off timer value IE and Re-attempt indicator IE provided by the network if any the UE may send another PDU SESSION ESTABLISHMENT REQUEST message to establish a new PDU session with the PDU session type IE indicating another PDU session type e.g using another value which can be used for the rejected component in another route selection descriptor if any as specified in 3GPP TS 24.526 [19] the behaviour of the UE for 5GSM cause value #28 also applies if the PDU session is a MA PDU session

if the 5GSM cause value is #39 "reactivation requested" the UE shall ignore the Back-off timer value IE and Re-attempt indicator IE provided by the network if any

NOTE 9 further UE behaviour upon receipt of 5GSM cause value #39 is up to the UE implementation

if the 5GSM cause value is #46 "out of LADN service area" the UE shall ignore the Back-off timer value IE and Re-attempt indicator IE provided by the network if any if the UE is not located inside the LADN service area the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message or another PDU SESSION MODIFICATION REQUEST message except for indicating a change of 3GPP PS data off UE status for the LADN DNN provided by the UE during the PDU session establishment procedure until the LADN information for the specific LADN DNN or the extended LADN information for the specific LADN DNN and S-NSSAI is updated as described in subclause 5.4.4 and subclause 5.5.1 if the UE is not located inside the LADN service area the UE shall not indicate the PDU session(s) for the LADN DNN provided by the UE during the PDU session establishment procedure in the uplink data status IE included in the SERVICE REQUEST message until the LADN information for the specific LADN DNN or the extended LADN information for the specific LADN DNN and S-NSSAI is updated as described in subclause 5.4.4 and subclause 5.5.1

NOTE 10 based on UE implementation the UE locating inside the LADN service area can send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the LADN DNN which was rejected with the 5GSM cause value #46 "out of LADN service area"

NOTE 10A if the UE does not receive a CONFIGURATION UPDATE COMMAND message with new LADN information within an implementation dependent time the UE can request this information by initiating a registration procedure for mobility or periodic registration update (see subclause 5.5.1.3.2 item q)

if the 5GSM cause value is #50 "PDU session type IPv4 only allowed" #51 "PDU session type IPv6 only allowed" #57 "PDU session type IPv4v6 only allowed" #58 "PDU session type unstructured only allowed" or #61 "PDU session type ethernet only allowed" the UE shall ignore the Back-off timer value IE provided by the network if any the UE shall evaluate the URSP rules if available as specified in 3GPP TS 24.526 [19] the UE shall not subsequently send another PDU SESSION ESTABLISHMENT REQUEST message for

a) in a PLMN the same DNN (or no DNN if no DNN was indicated by the UE) and the same (mapped) HPLMN S-NSSAI (or no S-NSSAI if no S-NSSAI was indicated by the UE) to obtain a PDU session type different from the one allowed by the network until any of the following conditions is fulfilled

1) the UE is registered to a new PLMN which was not in the list of equivalent PLMNs at the time when the PDU SESSION ESTABLISHMENT REJECT message was received;

2) the UE is registered to a new PLMN which was in the list of equivalent PLMNs at the time when the PDU SESSION ESTABLISHMENT REJECT message was received and either the network did not include a Re-attempt indicator IE in the PDU SESSION ESTABLISHMENT REJECT message or the Re-attempt indicator IE included in the message indicated that re-attempt in an equivalent PLMN is allowed;

3) the UE is switched off; or

4) the USIM is removed; or

b) in an SNPN the same DNN (or no DNN if no DNN was indicated by the UE) and the same (mapped) subscribed SNPN S-NSSAI (or no S-NSSAI if no S-NSSAI was indicated by the UE) using the selected entry of the "list of subscriber data" or selected PLMN subscription until any of the following conditions is fulfilled

1) the UE is registered to a new SNPN which was not in the list of equivalent SNPNs at the time when the PDU SESSION ESTABLISHMENT REJECT message was received;

2) the UE is registered to a new SNPN which was in the list of equivalent SNPNs at the time when the PDU SESSION ESTABLISHMENT REJECT message was received and either the network did not include a Re-attempt indicator IE in the PDU SESSION ESTABLISHMENT REJECT message or the Re-attempt indicator IE included in the message indicated that re-attempt in an equivalent SNPN is allowed;

3) the UE is switched off;

4) the USIM is removed; or

5) the selected entry of the "list of subscriber data" is updated

for the 5GSM cause values #50 "PDU session type IPv4 only allowed" #51 "PDU session type IPv6 only allowed" #57 "PDU session type IPv4v6 only allowed" #58 "PDU session type unstructured only allowed" and #61 "PDU session type ethernet only allowed" the UE shall ignore the value of the RATC bit in the Re-attempt indicator IE provided by the network if any

NOTE 11 for the 5GSM cause values #50 "PDU session type IPv4 only allowed" #51 "PDU session type IPv6 only allowed" #57 "PDU session type IPv4v6 only allowed" #58 "PDU session type unstructured only allowed" and #61 "PDU session type ethernet only allowed" re-attempt in S1 mode for the same DNN (or no DNN if no DNN was indicated by the UE) is only allowed using the PDU session type(s) indicated by the network

if the 5GSM cause value is #54 "PDU session does not exist" the UE shall ignore the Back-off timer value IE and Re-attempt indicator IE provided by the network if any if the PDU session establishment procedure is to perform handover of an existing PDU session between 3GPP access and non-3GPP access the UE shall release locally the existing PDU session with the PDU session ID included in the PDU SESSION ESTABLISHMENT REJECT message the UE may initiate another UE-requested PDU session establishment procedure with the request type set to "initial request" in the subsequent PDU SESSION ESTABLISHMENT REQUEST message to establish a PDU session with

a) in a PLMN the same DNN (or no DNN if no DNN was indicated by the UE) and the same (mapped) HPLMN S-NSSAI (or no S-NSSAI if no S-NSSAI was indicated by the UE); or

b) in an SNPN the same DNN (or no DNN if no DNN was indicated by the UE) and the same (mapped) subscribed SNPN S-NSSAI (or no S-NSSAI if no S-NSSAI was indicated by the UE) using the selected entry of the "list of subscriber data" or selected PLMN subscription

NOTE 12 user interaction is necessary in some cases when the UE cannot re-establish the PDU session(s) automatically

if the 5GSM cause value is #68 "not supported SSC mode" the UE shall ignore the Back-off timer value IE and Re-attempt indicator IE provided by the network if any the UE shall evaluate the URSP rules if available as specified in 3GPP TS 24.526 [19] the UE shall not subsequently send another PDU SESSION ESTABLISHMENT REQUEST message for

a) in a PLMN the same DNN (or no DNN if no DNN was indicated by the UE) and the same (mapped) HPLMN S-NSSAI (or no S-NSSAI if no S-NSSAI was indicated by the UE) using the same SSC mode or an SSC mode which was not included in the allowed SSC mode IE until any of the following conditions is fulfilled

1) the UE is registered to a new PLMN which was not in the list of equivalent PLMNs at the time when the PDU SESSION ESTABLISHMENT REJECT message was received;

2) the SSC mode which is used to access to the DNN (or no DNN if no DNN was indicated by the UE) and the (mapped) HPLMN S-NSSAI (or no S-NSSAI if no S-NSSAI was indicated by the UE) is changed by the UE which subsequently requests a new SSC mode in the allowed SSC mode IE or no SSC mode;

3) the UE is switched off; or

4) the USIM is removed; or

b) in an SNPN the same DNN (or no DNN if no DNN was indicated by the UE) and the same subscribed SNPN S-NSSAI (or no S-NSSAI if no S-NSSAI was indicated by the UE) using the same SSC mode or an SSC mode which was not included in the allowed SSC mode IE using the selected entry of the "list of subscriber data" or selected PLMN subscription until any of the following conditions is fulfilled

1) the UE is registered to a new SNPN which was not in the list of equivalent SNPNs at the time when the PDU SESSION ESTABLISHMENT REJECT message was received;

2) the SSC mode which is used to access to the DNN (or no DNN if no DNN was indicated by the UE) and the (mapped) subscribed SNPN S-NSSAI (or no S-NSSAI if no S-NSSAI was indicated by the UE) is changed by the UE which subsequently requests a new SSC mode in the allowed SSC mode IE or no SSC mode;

3) the UE is switched off;

4) the USIM is removed or

5) the selected entry of the "list of subscriber data" is updated

if the UE receives the 5GSM cause value is #33 "requested service option not subscribed" upon sending PDU SESSION ESTABLISHMENT REQUEST to establish an MA PDU session the UE shall ignore the Back-off timer value IE and Re-attempt indicator IE provided by the network if any the UE shall evaluate URSP rules if available as specified in 3GPP TS 24.526 [19] and the UE may send PDU SESSION ESTABLISHMENT REQUEST after evaluating those URSP rules

if the 5GSM cause value is #86 "UAS services not allowed" the UE shall ignore the Back-off timer value IE and Re-attempt indicator IE provided by the network if any and shall behave as specified in subcluase 6.4.1.4.1

upon receipt of an indication from 5GMM sublayer that the 5GSM message was not forwarded because the DNN is not supported or not subscribed in a slice along with a PDU SESSION ESTABLISHMENT REQUEST message with the PDU session ID IE set to the PDU session ID of the PDU session the UE shall stop timer T3580 shall abort the procedure and shall behave as follows

a) if the timer value indicates neither zero nor deactivated the UE shall start the back-off timer with the value received from the 5GMM sublayer for the PDU session establishment procedure and

1) in a PLMN the [PLMN DNN S-NSSAI] combination or the [PLMN DNN no S-NSSAI] combination if no S-NSSAI was provided during the PDU session establishment the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message in the PLMN for the same DNN and the same S-NSSAI that were sent by the UE or for the same DNN and no S-NSSAI if S-NSSAI that was not sent by the UE until

i) the back-off timer expires;

ii) the UE is switched off;

iii) the USIM is removed; or

iv) the DNN is included in the LADN information or extended LADN information and the network provides the LADN information or extended LADN information during the registration procedure or the generic UE configuration update procedure; or

2) in an SNPN the [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN S-NSSAI] combination or the [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN no S-NSSAI] combination if no S-NSSAI was provided during the PDU session establishment the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message in the SNPN for the same DNN and the same S-NSSAI that were sent by the UE or for the same DNN and no S-NSSAI if S-NSSAI that was not sent by the UE using the selected entry of the "list of subscriber data" or selected PLMN subscription until

i) the back-off timer expires;

ii) the UE is switched off;

iii) the USIM is removed; or

iv) the selected entry of the "list of subscriber data" is updated; or

v) the DNN is included in the LADN information or extended LADN information and the network provides the LADN information or extended LADN information during the registration procedure or the generic UE configuration update procedure;

b) if the timer value is not received from the 5GMM sublayer or the timer value indicates that this timer is deactivated the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message

1) in the PLMN for the same DNN and the same S-NSSAI that were sent by the UE or for the same DNN and no S-NSSAI if S-NSSAI that was not sent by the UE until

i) the UE is switched off;

ii) the USIM is removed; or

iii) the DNN is included in the LADN information or extended LADN information and the network provides the LADN information or extended LADN information during the registration procedure or the generic UE configuration update procedure; and

2) in the SNPN for the same DNN and the same S-NSSAI that were sent by the UE or for the same DNN and no S-NSSAI if S-NSSAI that was not sent by the UE using the selected entry of the "list of subscriber data" or selected PLMN subscription until

i) the UE is switched off;

ii) the USIM is removed;

iii) the selected entry of the "list of subscriber data" is updated; or

iii) the DNN is included in the LADN information or extended LADN information and the network provides the LADN information or extended LADN information during the registration procedure or the generic UE configuration update procedure; and

c) if the timer value indicates zero the UE may send another PDU SESSION ESTABLISHMENT REQUEST message for

1) in a PLMN the same combination of [PLMN DNN S-NSSAI] [PLMN DNN no S-NSSAI] in the current PLMN; or

2) in an SNPN the same combination of [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN S-NSSAI] [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN no S-NSSAI] in the current SNPN

#### 6.4.1.5 handling the maximum number of established PDU sessions

the maximum number of PDU sessions which a UE can establish in a PLMN or SNPN is limited by whichever is the lowest of the maximum number of PDU session IDs allowed by the protocol (as specified in 3GPP TS 24.007 [11] subclause 11.2.3.1b) the PLMN's or SNPN's maximum number of PDU sessions and the UE's implementation-specific maximum number of PDU sessions

if during a UE-requested PDU session establishment procedure the 5GSM sublayer in the UE receives an indication that the 5GSM message was not forwarded because

a) the PLMN's maximum number of PDU sessions has been reached then the UE determines the PLMN's maximum number of PDU sessions as the number of active PDU sessions it has; or

b) the SNPN's maximum number of PDU sessions has been reached then the UE determines the SNPN's maximum number of PDU sessions as the number of active PDU sessions it has and associates the determined maximum number of PDU sessions with

1) the entry in the "list of subscriber data" for the current SNPN if the UE does not support access to an SNPN using credentials from a credentials holder and equivalent SNPNs; or

2) the selected entry of the "list of subscriber data" or the selected PLMN subscription if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both

NOTE 1 in some situations when attempting to establish multiple PDU sessions the number of active PDU sessions that the UE has when 5GMM cause #65 is received is not equal to the maximum number of PDU sessions reached in the network

NOTE 2 when the network supports emergency services it is not expected that 5GMM cause #65 is returned by the network when the UE requests an emergency PDU session

NOTE 3 the network maintains only one maximum number of PDU sessions for a PLMN regardless of which access the PDU session exists in

NOTE 3a when the UE is registered on the same PLMN for both 3GPP access and non-3GPP access the UE maintains single maximum number of PDU sessions for respective PLMN when the UE is registered on two different PLMNs over 3GPP access and non-3GPP access the UE maintains maximum number of PDU sessions for a PLMN separately for each PLMN

NOTE 4 an MA PDU session which (only) has a PDN connection established as a user-plane resource is counted as an active PDU session when determining the PLMN's maximum number of PDU sessions

the PLMN's maximum number of PDU sessions applies to the PLMN in which the 5GMM cause #65 "maximum number of PDU sessions reached" is received when the UE is switched off or when the USIM is removed the UE shall clear all previous determinations representing PLMN's maximum number of PDU sessions

the SNPN's maximum number of PDU sessions applies to the SNPN in which the 5GMM cause #65 "maximum number of PDU sessions reached" is received when the UE is switched off the UE shall clear all previous determinations representing SNPN's maximum number of PDU sessions in addition

a) if the UE does not support access to an SNPN using credentials from a credentials holder and equivalent SNPNs and the entry in the "list of subscriber data" for the current SNPN is updated then the UE shall clear all previous determinations representing SNPN's maximum number of PDU sessions associated with the entry in the "list of subscriber data" for the current SNPN; and

b) if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both and

1) the selected entry of the "list of subscriber data" is updated then UE shall clear all previous determinations representing SNPN's maximum number of PDU sessions associated with the selected entry in the "list of subscriber data"; or

2) the USIM associated with the selected PLMN subscription is removed then UE shall clear all previous determinations representing SNPN's maximum number of PDU sessions associated with the selected PLMN subscription

upon successful registration with a new PLMN or SNPN the UE may clear previous determinations representing any PLMN's or SNPN's maximum number(s) of PDU sessions if the previous PLMN or SNPN is not registered over both 3GPP access and non-3GPP access

if the maximum number of established PDU sessions is reached at the UE and the upper layers of the UE request connectivity to a DNN the UE shall not send a PDU SESSION ESTABLISHMENT REQUEST message unless an established PDU session is released if the UE needs to release an established PDU session choosing which PDU session to release is implementation specific however the UE shall not release the emergency PDU session

if the UE needs to release a PDU session in order to request an emergency PDU session it shall either perform a local release of a PDU session or release a PDU session via explicit signalling if the UE performs a local release the UE shall

a) if the PDU session is an MA PDU session

1) perform a registration procedure for mobility and periodic registration update to indicate PDU session status to the network over each access that user plane resources have been established; and

2) perform a normal and periodic tracking area updating to indicate EPS bearer context status to the network as specified in subclause 5.5.3.2.2 of 3GPP TS 24.301 [15] when a PDN connection has been established as a user plance resource; or

b) if the PDU session is a single access PDU session perform a registration procedure for mobility and periodic registration update to indicate PDU session status to the network over the access the PDU session is associated with

#### 6.4.1.5A handling the maximum number of allowed active user-plane resources for PDU sessions of UEs in NB-N1 mode

for a UE in NB-N1 mode the UE's maximum number of supported user-plane resources is two (as defined in 3GPP TS 36.300 [25B]) when the UE sets the multiple user-plane resources support bit to "Multiple user-plane resources supported" during the registration procedure for initial registration or for mobility and periodic registration update and one otherwise

for a UE operating in NB-N1 mode if

a) the UE's maximum number of supported user-plane resources is one then only one PDU session can have active user-plane resources even though that UE might have established more than one PDU session; or

b) the UE's maximum number of supported user-plane resources is two then only two PDU sessions can have active user-plane resources even though that UE might have established more than two PDU sessions

when the maximum number of active user-plane resources is reached and upper layers request for more user-plane resources for PDU sessions other than the PDU sessions with those active user-plane resources the UE can choose to release one or more of the PDU sessions with active user-plane resources to cater for the upper layer request the choice of which PDU sessions to be released is implementation specific however if there is a PDU session with an active user-plane that is used for exception data reporting (see subclause 6.2.13) that PDU session shall not be released

if the maximum number of active user-plane resources is reached and the upper layers of the UE request user-plane resources for exception data reporting (see subclause 6.2.13) the UE shall release a PDU session that has user-plane resources to cater for the request for exception data reporting the choice of which PDU session to be released is implementation specific

if the UE decides to release one or more active user-plane resources to cater for upper layer request the UE shall release the PDU session via explicit 5GSM signalling

#### 6.4.1.6 abnormal cases in the UE

the following abnormal cases can be identified

a) expiry of timer T3580

the UE shall on the first expiry of the timer T3580

- if the PDU SESSION ESTABLISHMENT REQUEST message was sent with request type set to "initial emergency request" or "existing emergency PDU session" then the UE may

a) inform the upper layers of the failure of the procedure; or

NOTE this can result in the upper layers requesting another emergency call attempt using domain selection as specified in 3GPP TS 23.167 [6]

b) de-register locally if not de-registered already attempt initial registration for emergency services

if the UE sent the PDU SESSION ESTABLISHMENT REQUEST message in order to perform a handover of an existing emergency PDU session between 3GPP access and non-3GPP access the UE shall consider that the emergency PDU session is associated with the source access type

- otherwise retransmit the PDU SESSION ESTABLISHMENT REQUEST message and the PDU session information which was transported together with the initial transmission of the PDU SESSION ESTABLISHMENT REQUEST message and shall reset and start timer T3580 if still needed this retransmission can be repeated up to four times i.e on the fifth expiry of timer T3580 the UE shall abort the procedure release the allocated PTI and enter the state PROCEDURE TRANSACTION INACTIVE if the UE sent the PDU SESSION ESTABLISHMENT REQUEST message in order to perform a handover of an existing non-emergency PDU session between 3GPP access and non-3GPP access the UE shall consider that the PDU session is associated with the source access type

b) upon receiving an indication that the 5GSM message was not forwarded due to routing failure along with a PDU SESSION ESTABLISHMENT REQUEST message with the PDU session ID IE set to the same value as the PDU session ID that was sent by the UE the UE shall stop timer T3580 and shall abort the procedure if the UE sent the PDU SESSION ESTABLISHMENT REQUEST message in order to perform a handover of an existing PDU session between 3GPP access and non-3GPP access the UE shall consider that the PDU session is associated with the source access type

b1) upon receiving an indication that the 5GSM message was not forwarded due to service area restrictions along with a PDU SESSION ESTABLISHMENT REQUEST message with the PDU session ID IE set to the same value as the PDU session ID that was sent by the UE the UE shall stop timer T3580 and shall abort the procedure if the UE sent the PDU SESSION ESTABLISHMENT REQUEST message in order to perform a handover of an existing PDU session between 3GPP access and non-3GPP access the UE shall consider that the PDU session is associated with the source access type

b2) upon receiving an indication that the 5GSM message was not forwarded because the UE is registered to a PLMN via a satellite NG-RAN cell that is not allowed to operate at the present UE location along with a PDU SESSION ESTABLISHMENT REQUEST message with the PDU session ID IE set to the same value as the PDU session ID that was sent by the UE the UE shall stop timer T3580 and shall abort the procedure

b3) upon receiving an indication that the 5GSM message was not forwarded because the UE is marked in the UE's 5GMM context that it is not allowed to request UAS services along with a PDU SESSION ESTABLISHMENT REQUEST message with the PDU session ID IE set to the same value as the PDU session ID that was sent by the UE the UE shall stop timer T3580 and shall abort the procedure the UE shall not trigger the PDU session establishment procedure until the UE is deregistered from the PLMN

b4) upon receiving an indication that the 5GSM message was not forwarded because the PLMN's maximum number of PDU sessions has been reached along with a PDU SESSION ESTABLISHMENT REQUEST message with the PDU session ID IE set to the same value as the PDU session ID that was sent by the UE the UE shall stop timer T3580 and shall abort the procedure

b5) upon receiving an indication that the 5GSM message was not forwarded due to unexpected cause along with a PDU SESSION ESTABLISHMENT REQUEST message with the PDU session ID IE set to the same value as the PDU session ID that was sent by the UE the UE shall stop timer T3580 and shall abort the procedure

c) collision of UE-requested PDU session establishment procedure and network-requested PDU session release procedure

if the UE receives a PDU SESSION RELEASE COMMAND message after sending a PDU SESSION ESTABLISHMENT REQUEST message to the network and the PDU session ID in the PDU SESSION RELEASE COMMAND message is the same as the PDU session ID in the PDU SESSION ESTABLISHMENT REQUEST message

i) if the UE-requested PDU session establishment procedure was to request the establishment of user plane resources on the second access for an MA PDU session established on a first access and the access type IE is not included in PDU SESSION RELEASE COMMAND or the access type IE included in PDU SESSION RELEASE COMMAND indicates the first access the UE shall proceed with the network-requested PDU session release procedure abort the UE-requested PDU session establishment procedure stop timer T3580 release the allocated PTI and enter the state PROCEDURE TRANSACTION INACTIVE;

ii) if the PDU SESSION ESTABLISHMENT REQUEST message was sent with request type set to "existing PDU session" or "existing emergency PDU session" in order to perform a handover of an existing PDU session between 3GPP access and non-3GPP access the UE shall abort the PDU session establishment procedure and proceed with the network-requested PDU session release procedure; or

iii) otherwise the UE shall ignore the PDU SESSION RELEASE COMMAND message and proceed with the UE-requested PDU session establishment procedure

d) void

e) for an MA PDU session established on a single access upon receipt of a PDU SESSION ESTABLISHMENT ACCEPT message over the other access if any value of the selected PDU session type selected SSC mode 5GSM cause PDU address S-NSSAI DNN IEs in the PDU SESSION ESTABLISHMENT ACCEPT message is different from the corresponding stored value the UE shall perform a local release of the MA PDU session and perform the registration procedure for mobility and periodic registration update with a REGISTRATION REQUEST message including the PDU session status IE over both accesses

f) for an MA PDU session has a PDN connection as a user-plane resource upon receipt of a PDU SESSION ESTABLISHMENT ACCEPT message over non-3GPP access if any value of the selected PDU session type selected SSC mode 5GSM cause PDU address S-NSSAI DNN IEs in the PDU SESSION ESTABLISHMENT ACCEPT message is different from the corresponding stored mapped value the UE shall perform a local release of the MA PDU session perform the registration procedure for mobility and periodic registration update with a REGISTRATION REQUEST message including the PDU session status IE over non-3GPP access and perform the tracking area updating procedure as specified in subclause 5.5.3.2.2 of 3GPP TS 24.301 [15] with a TRACKING AREA UPDATE REQUEST message including EPS bearer context status IE

g) collision of UE-requested PDU session establishment procedure initiated to perform handover of an existing PDU session from non-3GPP access to 3GPP access and a notification from the network with access type indicating non-3GPP access

if the UE receives a notification from the network with access type indicating non-3GPP access after sending a PDU SESSION ESTABLISHMENT REQUEST message to perform handover of an existing PDU session from non-3GPP access to 3GPP access the UE shall abort the PDU session establishment procedure stop timer T3580 proceed with the service request procedure to perform handover of existing PDU session(s) from non-3GPP access to 3GPP access

h) collision of UE-requested PDU session establishment procedure and N1 NAS signalling connection release

the UE may immediately retransmit the PDU SESSION ESTABLISHMENT REQUEST message and stop reset and restart timer T3580 if the following conditions apply

1) the original UE-requested PDU session establishment procedure was initiated over an existing N1 NAS signalling connection;

2) the previous transmission of the PDU SESSION ESTABLISHMENT REQUEST message was not initiated due to timer T3580 expiry; and

3) no 5GSM message related to the PDU session (e.g PDU SESSION AUTHENTICATION COMMAND message) was received after the PDU SESSION ESTABLISHMENT REQUEST message was transmitted

i) collision of UE-requested PDU session establishment procedure and network-requested PDU session modification procedure

if the UE receives a PDU SESSION MODIFICATION COMMAND message after sending a PDU SESSION ESTABLISHMENT REQUEST message to the network and the PDU session ID in the PDU SESSION MODIFICATION COMMAND message is the same as the PDU session ID in the PDU SESSION ESTABLISHMENT REQUEST message

i) if the UE-requested PDU session establishment procedure was to request the establishment of user plane resources on the second access for an MA PDU session established on a first access the UE shall proceed with both the UE-requested PDU session establishment procedure and the network-requested PDU session modification procedure; or

ii) if the PDU SESSION ESTABLISHMENT REQUEST message was sent with request type set to "existing PDU session" or "existing emergency PDU session" in order to perform a handover of an existing PDU session between 3GPP access and non-3GPP access the UE shall proceed with the UE-requested PDU session establishment procedure and abort the network-requested PDU session modification procedure

#### 6.4.1.7 abnormal cases on the network side

the following abnormal cases can be identified

a) if the received request type is "initial emergency request" and there is an existing emergency PDU session for the UE regardless whether the PDU session ID in the PDU SESSION ESTABLISHMENT REQUEST message is identical to the PDU session ID of the existing PDU session the SMF shall locally release the existing emergency PDU session and proceed the new PDU SESSION ESTABLISHMENT REQUEST message

b) the information for the PDU session authentication and authorization by the external DN in the SM PDU DN request container IE is not compliant with local policy and user's subscription data

if the PDU session being established is a non-emergency PDU session the request type is not set to "existing PDU session" the PDU session authentication and authorization by the external DN is required due to local policy and user's subscription data and the information for the PDU session authentication and authorization by the external DN in the SM PDU DN request container IE is not compliant with the local policy and user's subscription data the SMF shall reject the PDU session establishment request including the 5GSM cause #29 "user authentication or authorization failed" in the PDU SESSION ESTABLISHMENT REJECT message

c) UE-requested PDU session establishment with request type set to "initial request" for an existing PDU session

if the SMF receives a PDU SESSION ESTABLISHMENT REQUEST message with a PDU session ID identical to the PDU session ID of an existing PDU session and with request type set to "initial request" the SMF shall locally release the existing PDU session and proceed with the PDU session establishment procedure

d) UE-requested PDU session establishment with request type "existing PDU session" or "existing emergency PDU session" for a PDU session that does not exist

if the SMF receives a PDU SESSION ESTABLISHMENT REQUEST message with request type set to "existing PDU session" or "existing emergency PDU session" and the SMF does not have any information about that PDU session then the SMF shall reject the PDU session establishment procedure with the 5GSM cause set to #54 "PDU session does not exist" in the PDU SESSION ESTABLISHMENT REJECT message

e) 5G access network cannot forward the message

if the SMF determines based on content of the n2SmInfo attribute specified in 3GPP TS 29.502 [20A] that the DL NAS TRANSPORT message carrying the PDU SESSION ESTABLISHMENT ACCEPT was not forwarded to the UE by the 5G access network then the SMF shall reject the PDU session establishment procedure with the 5GSM cause set to #26 "insufficient resources" in the PDU SESSION ESTABLISHMENT REJECT message

### 6.4.2 UE-requested PDU session modification procedure

#### 6.4.2.1 general

the purpose of the UE-requested PDU session modification procedure is

a) to enable the UE to request modification of a PDU session;

b) to indicate a change of 3GPP PS data off UE status for a PDU session;

c) to revoke the previously indicated support for reflective QoS;

d) to request specific QoS handling and segregation of service data flows;

e) to indicate to the network the relevant 5GSM parameters and capabilities (e.g the UE's 5GSM capabilities whether the UE supports more than 16 packet filters the maximum data rate per UE for user-plane integrity protection supported by the UE for uplink the maximum data rate per UE for user-plane integrity protection supported by the UE for downlink and whether the UE requests the PDU session to be an always-on PDU session in the 5GS) for a PDN connection established when in S1 mode after an inter-system change from S1 mode to N1 mode if the UE is a UE operating in single-registration mode in a network supporting N26 interface and the UE has not previously successfully performed the UE-requested PDU session modification to indicate to the network the relevant 5GSM parameters and capabilities;

f) to delete one or more mapped EPS bearer contexts;

g) to convey a port management information container;

h) to re-negotiate header compression configuration associated to a PDU session using control plane CIoT 5GS optimization;

i) to enable the UE to request to join or leave one or more multicast MBS sessions associated with a PDU session; or

j) to send the URSP rule enforcement report to the network associated to

1) an established PDU session; or

2) a PDN connection after an inter-system change from S1 mode to N1 mode if the UE is a UE operating in single-registration mode in a network supporting N26 interface

NOTE 1 the case c) d) e) f) and g) do not apply to PDU sessions associated with the control plane only indication

NOTE 2 for case e) the procedure is attempted after the first inter-system change from S1 mode to N1 mode

when the UE-requested PDU session modification procedure is used to indicate a change of 3GPP PS data off UE status for a PDU session (see subclause 6.2.10) the UE shall initiate the UE-requested PDU session modification procedure even if the UE is outside the LADN service area or the timer T3396 T3584 T3585 or the back-off timer is running or is deactivated

if the UE needs to revoke the previously indicated support for reflective QoS for a PDU session and timer T3396 T3584 T3585 or the back-off timer is running or is deactivated the UE shall not initiate the UE-requested PDU session modification procedure and shall instead initiate the UE-requested PDU session release procedure

if the UE needs to initiate the UE-requested PDU session modification procedure to indicate to the network the relevant 5GSM parameters and capabilities (e.g the UE's 5GSM capabilities whether the UE supports more than 16 packet filters the maximum data rate per UE for user-plane integrity protection supported by the UE for uplink the maximum data rate per UE for user-plane integrity protection supported by the UE for downlink and whether the UE requests the PDU session to be an always-on PDU session in the 5GS) for a PDN connection established when in S1 mode after an inter-system change from S1 mode to N1 mode the UE is a UE operating in single-registration mode in the network supporting N26 interface the UE has not previously successfully performed the UE-requested PDU session modification to indicate to the network the relevant 5GSM parameters and capabilities and

a) timer T3396 T3584 T3585 or the back-off timer is running the UE shall initiate the UE-requested PDU session modification procedure after expiry of timer T3396 T3584 or T3585 or after expiry of the back-off timer; or

b) the UE is in substate 5GMM-REGISTERED.NON-ALLOWED-SERVICE and has not performed the the UE-requested PDU session modification procedure (see subclause 5.3.5) the UE shall initiate the UE-requested PDU session modification procedure after entering substate 5GMM-REGISTERED.NORMAL-SERVICE

#### 6.4.2.2 UE-requested PDU session modification procedure initiation

in order to initiate the UE-requested PDU session modification procedure the UE shall create a PDU SESSION MODIFICATION REQUEST message

the UE shall allocate a PTI value currently not used and shall set the PTI IE of the PDU SESSION MODIFICATION REQUEST message to the allocated PTI value

the UE shall not perform the UE-requested PDU session modification procedure for an emergency PDU session except for a procedure initiated according to subclause 6.4.2.1 item e) only and for the error cases described in subclause 6.4.1.3 and subclause 6.3.2.3

the UE shall not perform the UE-requested PDU session modification procedure for a PDU session for LADN when the UE is located outside the LADN service area except for indicating a change of 3GPP PS data off UE status

if the UE requests a specific QoS handling and the PDU session is not associated with the control plane only indication the UE shall include the requested QoS rules IE indicating requested QoS rules or the requested QoS flow descriptions IE indicating requested QoS flow descriptions or both for the specific QoS handling the requested QoS rules IE includes the packet filters which describe the service data flows requested by the UE the specific QoS parameters requested by the UE are specified in the requested QoS flow descriptions IE if the UE requests the network to bind specific service data flows to a dedicated QoS flow the UE shall create a new QoS rule by setting the rule operation code to "Create new QoS rule" and shall set the segregation bit to "Segregation requested" for the corresponding QoS rule in the requested QoS rules IE the UE shall set the QRI values to "no QoS rule identifier assigned" in the requested QoS rules IE if the QoS rules are newly created; otherwise the UE shall set the QRI values to those of the existing QoS rules for which the specific QoS handling applies the UE shall set the QFI values to "no QoS flow identifier assigned" in the requested QoS flow descriptions IE if the QoS flow descriptions are newly created; otherwise the UE shall set the QFI values to the QFIs of the existing QoS flow descriptions for which the specific QoS handling applies the UE shall not request to create more than one QoS flow in a UE-requested PDU session modification procedure if the SMF receives a PDU SESSION MODIFICATION REQUEST message with a requested QoS rules IE containing more than one QoS rule with the rule operation code set to "Create new QoS rule" the SMF shall assign the same QFI to all the QoS rules which are created

if the UE requests to join or leave one or more multicast MBS sessions associated with a PDU session the UE shall include the requested MBS container IE in the PDU SESSION MODIFICATION REQUEST message and shall set the MBS operation to "Join multicast MBS session" for the join case or to "Leave MBS session" for the leave case the UE shall include the multicast MBS session information(s) and shall set the type of multicast MBS session ID for each of the multicast MBS session information to either "Temporary mobile group identity (TMGI)" or "Source specific IP multicast address" depending on the type of the multicast MBS session ID available in the UE then the remaining values of each of the multicast MBS session informations shall be set as following

a) if the type of multicast MBS session ID is set to "Temporary mobile group identity (TMGI)" the UE shall set the multicast MBS session ID to the TMGI; or

b) if the type of multicast MBS session ID is set to "Source specific IP multicast address for IPv4" or " source specific IP multicast address for IPv6" the UE shall set the source IP address information and the destination IP address information to the corresponding values

the UE should not request to join a multicast MBS session for local MBS service if neither current TAI nor CGI of the current cell is part of the MBS service area(s) of the multicast MBS session if the UE has valid information of the MBS service area(s) of the multicast MBS session

NOTE 1 the UE obtains the details of the multicast MBS session ID(s) e.g,TMGI source IP address information and destination IP address information as a pre-configuration in the UE or during the MBS service announcement which is out of scope of this specification Pre-configuration can be provided in one or more of the following ways

a) in a UE implementation-specific way (e.g factory configuration);

b) in the USIM (see EF5MBSUECONFIG file in 3GPP TS 31.102 [22]); or

c) in the UE pre-configuration MO for MBS (see 3GPP TS 24.575 [65])

for a PDN connection established when in S1 mode after an inter-system change from S1 mode to N1 mode if the UE is a UE operating in single-registration mode in a network supporting N26 interface the PDU session is of "IPv4" "IPv6" "IPv4v6" or "Ethernet" PDU session type the PDU session is not associated with the control plane only indication

a) the UE is performing the PDU session modification procedure to indicate the support of reflective QoS and the UE has not previously successfully performed the UE-requested PDU session modification to provide this indication the UE shall set the RQoS bit to "Reflective QoS supported" in the 5GSM capability IE of the PDU SESSION MODIFICATION REQUEST message; or

b) the UE is performing the PDU session modification procedure to indicate that reflective QoS is not supported and the UE has not previously successfully performed the UE-requested PDU session modification to provide this indication the UE shall set the RQoS bit to "Reflective QoS not supported" in the 5GSM capability IE of the PDU SESSION MODIFICATION REQUEST message

if the UE is performing the PDU session modification procedure to revoke the previously indicated support of reflective QoS and the PDU session is not associated with the control plane only indication the UE shall set the RQoS bit to "Reflective QoS not supported" in the 5GSM capability IE of the PDU SESSION MODIFICATION REQUEST message the UE shall not indicate support for reflective QoS for this PDU session for the remaining lifetime of the PDU session

NOTE 2 the determination to revoke the usage of reflective QoS by the UE for a PDU session is implementation dependent

for a PDN connection established when in S1 mode after an inter-system change from S1 mode to N1 mode if the UE is a UE operating in single-registration mode in a network supporting N26 interface the PDU session is of "IPv6" or "IPv4v6" PDU session type the PDU session is not associated with the control plane only indication

a) the UE is performing the PDU session modification procedure to indicate the support of Multi-homed IPv6 PDU session and the UE has not previously successfully performed the UE-requested PDU session modification to provide this indication the UE shall set the MH6-PDU bit to "Multi-homed IPv6 PDU session supported" in the 5GSM capability IE of the PDU SESSION MODIFICATION REQUEST message; or

b) the UE is performing the PDU session modification procedure to indicate that Multi-homed IPv6 PDU session is not supported and the UE has not previously successfully performed the UE-requested PDU session modification to provide this indication the UE shall set the MH6-PDU bit to "Multi-homed IPv6 PDU session not supported" in the 5GSM capability IE of the PDU SESSION MODIFICATION REQUEST message

for a PDN connection established when in S1 mode after an inter-system change from S1 mode to N1 mode if the UE is a UE operating in single-registration mode in a network supporting N26 interface the PDU session is of "IPv4" "IPv6" "IPv4v6" or "Ethernet" PDU session type the PDU session is not associated with the control plane only indication the UE supports more than 16 packet filters for this PDU session and the UE has not previously successfully performed the UE-requested PDU session modification to provide this indication the UE shall indicate the maximum number of packet filters supported for the PDU session in the maximum number of supported packet filters IE of the PDU SESSION MODIFICATION REQUEST message

for a PDN connection established when in S1 mode after an inter-system change from S1 mode to N1 mode if the UE is a UE operating in single-registration mode in a network supporting N26 interface the PDU session is not associated with the control plane only indication and the UE has not previously successfully performed the UE-requested PDU session modification to include the integrity protection maximum data rate IE in the PDU SESSION MODIFICATION REQUEST message the UE shall include the integrity protection maximum data rate IE in the PDU SESSION MODIFICATION REQUEST message

if the UE is performing the PDU session modification procedure

a) to request the deletion of a non-default QoS rule due to errors in QoS operations or packet filters;

b) to request the deletion of a QoS flow description due to errors in QoS operations; or

c) to request the deletion of a mapped EPS bearer context due to errors in mapped EPS bearer operation TFT operation or packet filters

the UE shall include the 5GSM cause IE in the PDU SESSION MODIFICATION REQUEST message as described in subclauses 6.3.2.3 6.3.2.4 and 6.4.1.3

when the UE-requested PDU session modification procedure is used to indicate a change of 3GPP PS data off UE status for a PDU session the UE shall include the extended protocol configuration options IE in the PDU SESSION MODIFICATION REQUEST message and setting the 3GPP PS data off UE status

for a PDN connection established when in S1 mode after an inter-system change from S1 mode to N1 mode if the UE is a UE operating in single-registration mode in a network supporting N26 interface the PDU session is not associated with the control plane only indication the UE requests the PDU session to be an always-on PDU session in the 5GS and the UE has not previously successfully performed the UE-requested PDU session modification to request this the UE shall include the Always-on PDU session requested IE and set the value of the IE to "Always-on PDU session requested" in the PDU SESSION MODIFICATION REQUEST message

if the UE supports transfer of port management information containers the UE may set the TPMIC bit to "Transfer of port management information containers supported" in the 5GSM capability IE of the PDU SESSION MODIFICATION REQUEST message

if a port management information container needs to be delivered (see 3GPP TS 23.501 [8] and 3GPP TS 23.502 [9]) the UE shall include a port management information container IE in the PDU SESSION MODIFICATION REQUEST message

to request re-negotiation of IP header compression configuration the UE shall include the IP header compression configuration IE in the PDU SESSION MODIFICATION REQUEST message if the network indicated "Control plane CIoT 5GS optimization supported" and "IP header compression for control plane CIoT 5GS optimization supported" in the 5GS network support feature support IE

to request re-negotiation of ethernet header compression configuration the UE shall include the ethernet header compression configuration IE in the PDU SESSION MODIFICATION REQUEST message if the network indicated "Control plane CIoT 5GS optimization supported" and "Ethernet header compression for control plane CIoT 5GS optimization supported" in the 5GS network support feature support IE

after an inter-system change from S1 mode to N1 mode if

a) the UE is operating in single-registration mode in the network supporting N26 interface;

b) the PDU session type value of the PDU session type IE is set to "IPv4" "IPv6" or "IPv4v6";

c) the UE indicates "Control plane CIoT 5GS optimization supported" and "IP header compression for control plane CIoT 5GS optimization supported" in the 5GMM capability IE of the REGISTRATION REQUEST message; and

d) the network indicates "Control plane CIoT 5GS optimization supported" and "IP header compression for control plane CIoT 5GS optimization supported" in the 5GS network support feature IE of the REGISTRATION ACCEPT message;

the UE shall initiate the PDU session modification procedure to negotiate the IP header compression configuration and include the IP header compression configuration IE in the PDU SESSION MODIFICATION REQUEST message

the UE shall include the Service-level-AA container IE in the PDU SESSION MODIFICATION REQUEST message when requesting to modify an established PDU session for C2 communication in the Service-level-AA container IE the UE shall include

a) the service-level device ID with the value set to the CAA-level UAV ID of the UE; and

b) if available the service-level-AA payload with the value set to the C2 authorization payload and the service-level-AA payload type with the value set to "C2 authorization payload"

NOTE 3 the C2 authorization payload in the service-level-AA payload can include one some or all of the pairing information for C2 communication an indication of the request for direct C2 communication pairing information for direct C2 communication and the UAV flight authorization information

the UE may include the Non-3GPP delay budget IE in the PDU SESSION MODIFICATION REQUEST message when requesting to modify an established PDU session for PIN-DN communication or PIN indirect commmunication

NOTE 3A the Non-3GPP delay budget IE can assist the network in providing specific QoS handling for a set of packet filter(s) for the PDU session as specified in subclause 5.44.3.4 of 3GPP TS 23.501 [8]

after an inter-system change from S1 mode to N1 mode if

a) the UE is operating in single-registration mode in a network that supports N26 interface;

b) the PDU session type value of the PDU session type IE is set to "Ethernet";

c) the UE indicates "Control plane CIoT 5GS optimization supported" and "Ethernet header compression for control plane CIoT 5GS optimization supported" in the 5GMM capability IE of the REGISTRATION REQUEST message; and

d) the network indicates "Control plane CIoT 5GS optimization supported" and "Ethernet header compression for control plane CIoT 5GS optimization supported" in the 5GS network support feature IE of the REGISTRATION ACCEPT message;

the UE shall initiate the PDU session modification procedure to negotiate the ethernet header compression configuration and include the ethernet header compression configuration IE in the PDU SESSION MODIFICATION REQUEST message

for a PDN connection established when in S1 mode after an inter-system change from S1 mode to N1 mode and if the UE is a UE operating in single-registration mode in a network supporting N26 interface and the UE supports receiving DNS server addresses in protocol configuration options and the UE has not previously successfully performed the UE-requested PDU session modification to indicate this support the UE shall include the extended protocol configuration options IE in the PDU SESSION MODIFICATION REQUEST message and

a) if the PDU session is of "IPv4" or "IPv4v6" PDU session type the UE shall include the DNS server IPv4 address request; and

b) if the PDU session is of "IPv6" or "IPv4v6" PDU session type the UE shall include the DNS server IPv6 address request

for a PDN connection established when in S1 mode after an inter-system change from S1 mode to N1 mode and if the UE is a UE operating in single-registration mode in a network supporting N26 interface and the UE supports the EAS rediscovery and the UE has not previously successfully performed the UE-requested PDU session modification to indicate this support the UE shall include the extended protocol configuration options IE in the PDU SESSION MODIFICATION REQUEST message and shall include the EAS rediscovery support indication in the extended protocol configuration options IE

for a PDN connection established when in S1 mode after an inter-system change from S1 mode to N1 mode and if the UE is a UE operating in single-registration mode in a network supporting N26 interface and the UE supports the EDC and the UE has not previously successfully performed the UE-requested PDU session modification to indicate this support then the UE shall include the extended protocol configuration options IE in the PDU SESSION MODIFICATION REQUEST message and shall include the EDC support indicator in the extended protocol configuration options IE

if the UE supports reporting of URSP rule enforcement and is indicated to send URSP rule enforcement report to network based on the matching URSP rule which contains the URSP rule enforcement report indication set to "URSP rule enforcement report is required" the URSP rule enforcement report is associated to

a) an established PDU session; or

b) a PDN connection after an inter-system change from S1 mode to N1 mode and if the UE is a UE operating in single-registration mode in a network supporting N26 interface the matching URSP rule is newly enforced while the UE was in S1 mode

then the UE shall include the URSP rule enforcement reports IE in the PDU SESSION MODIFICATION REQUEST message

the UE shall transport

a) the PDU SESSION MODIFICATION REQUEST message;

b) the PDU session ID; and

c) if the UE-requested PDU session modification

1) is not initiated to indicate a change of 3GPP PS data off UE status associated to a PDU session then the request type set to "modification request"; and

2) is initiated to indicate a change of 3GPP PS data off UE status associated to a PDU session then without transporting the request type;

using the NAS transport procedure as specified in subclause 5.4.5 and the UE shall start timer T3581 (see example in figure 6.4.2.2.1)

for a PDN connection established when in S1 mode and not associated with the control plane only indication after inter-system change from S1 mode to N1 mode if the UE is registered in a network supporting the ATSSS

a) the UE may request to modify a PDU session to an MA PDU session; or

b) the UE may allow the network to upgrade the PDU session to an MA PDU session in order for the UE to allow the network to upgrade the PDU session to an MA PDU session the UE shall set "MA PDU session network upgrade is allowed" in the MA PDU session information IE and set the request type to "modification request" in the UL NAS TRANSPORT message

NOTE 4 if the DNN corresponds to an LADN DNN the AMF does not forward the MA PDU session information IE to the SMF but sends the message back to the UE to inform of the unhandled request (see subclause 5.4.5.2.5)

in case the UE executes case a) or b)

1) if the UE supports ATSSS Low-Layer functionality with any steering mode (i.e. any steering mode allowed for ATSSS Low-Layer functionality) as specified in subclause 5.32.6 of 3GPP TS 23.501 [8] the UE shall set the ATSSS-ST bits to "ATSSS Low-Layer functionality with any steering mode allowed for ATSSS-LL supported" in the 5GSM capability IE of the PDU SESSION MODIFICATION REQUEST message;

NOTE 5 the ATSSS Low-Layer functionality cannot be used together with the redundant steering mode when the UE indicates that it is capable of supporting the ATSSS Low-Layer functionality with any steering mode it implies that the UE supports the ATSSS Low-Layer functionality with any steering mode except the redundant steering mode

2) if the UE supports MPTCP functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode as specified in subclause 5.32.6 of 3GPP TS 23.501 [8] the UE shall set the ATSSS-ST bits to "MPTCP functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode supported" in the 5GSM capability IE of the PDU SESSION MODIFICATION REQUEST message;

3) if the UE supports MPTCP functionality with any steering mode and ATSSS-LL functionality with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality)as specified in subclause 5.32.6 of 3GPP TS 23.501 [8] the UE shall set the ATSSS-ST bits to "MPTCP functionality with any steering mode and ATSSS-LL functionality with any steering mode allowed for ATSSS-LL supported" in the 5GSM capability IE of the PDU SESSION MODIFICATION REQUEST message;

4) if a performance measurement function in the UE can perform access performance measurements using the QoS flow of the non-default QoS rule as specified in subclause 5.32.5 of 3GPP TS 23.501 [8] the UE shall set the APMQF bit to "Access performance measurements per QoS flow supported" in the 5GSM capability IE of the PDU SESSION MODIFICATION REQUEST message;

5) if the UE supports MPQUIC functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode as specified in subclause 5.32.6 of 3GPP TS 23.501 [8] the UE shall set the ATSSS-ST bits to "MPQUIC functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode supported" in the 5GSM capability IE of the PDU SESSION MODIFICATION REQUEST message;

6) if the UE supports MPQUIC functionality with any steering mode and ATSSS-LL functionality with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) as specified in subclause 5.32.6 of 3GPP TS 23.501 [8] the UE shall set the ATSSS-ST bits to "MPQUIC functionality with any steering mode and ATSSS-LL functionality with any steering mode allowed for ATSSS-LL supported" in the 5GSM capability IE of the PDU SESSION MODIFICATION REQUEST message;

7) if the UE supports MPTCP functionality with any steering mode MPQUIC functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode as specified in subclause 5.32.6 of 3GPP TS 23.501 [8] the UE shall set the ATSSS-ST bits to "MPTCP functionality with any steering mode MPQUIC functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode supported" in the 5GSM capability IE of the PDU SESSION MODIFICATION REQUEST message; and

8) if the UE supports MPTCP functionality with any steering mode MPQUIC functionality with any steering mode and ATSSS-LL functionality with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) as specified in subclause 5.32.6 of 3GPP TS 23.501 [8] the UE shall set the ATSSS-ST bits to "MPTCP functionality with any steering mode MPQUIC functionality with any steering mode and ATSSS-LL functionality with any steering mode allowed for ATSSS-LL supported" in the 5GSM capability IE of the PDU SESSION MODIFICATION REQUEST message

upon receipt of a PDU SESSION MODIFICATION REQUEST message for MA PDU session modification the SMF shall check if the 5GSM capability IE in the PDU SESSION MODIFICATION REQUEST message includes

a) the ATSSS-ST bits set to "MPTCP functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode supported" and

i) if the DNN configuration allows for the MPTCP functionality with any steering mode and ATSSS-LL functionality with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) but does not allow RTT measurement without using PMF protocol the SMF shall ensure that the modified PDU session has the capability of MPTCP with any steering mode and ATSSS-LL with only active-standby steering mode load balancing steering mode or priority based steering mode in the downlink and MPTCP with any steering mode and ATSSS-LL with only active-standby steering mode in the uplink;

ii) if the DNN configuration allows for the MPTCP functionality with any steering mode and ATSSS-LL functionality with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) and allows RTT measurement without using PMF protocol the SMF shall ensure that the modified PDU session has the capability of MPTCP with any steering mode and ATSSS-LL with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) in the downlink and MPTCP with any steering mode and ATSSS-LL with only active-standby steering mode in the uplink; or

iii) if the DNN configuration allows for the MPTCP functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode the SMF shall ensure that the modified PDU session has the capability of MPTCP with any steering mode and ATSSS-LL with only active-standby steering mode in the downlink and the uplink;

b) the ATSSS-ST bits set to "MPQUIC functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode supported" and

i) if the DNN configuration allows for the MPQUIC functionality with any steering mode and ATSSS-LL functionality with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) but does not allow RTT measurement without using PMF protocol the SMF shall ensure that the modified PDU session has the capability of MPQUIC with any steering mode and ATSSS-LL with only active-standby steering mode load balancing steering mode or priority based steering mode in the downlink and MPQUIC with any steering mode and ATSSS-LL with only active-standby steering mode in the uplink;

ii) if the DNN configuration allows for the MPQUIC functionality with any steering mode and ATSSS-LL functionality with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) and allows RTT measurement without using PMF protocol the SMF shall ensure that the modified PDU session has the capability of MPQUIC with any steering mode and ATSSS-LL with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) in the downlink and MPQUIC with any steering mode and ATSSS-LL with only active-standby steering mode in the uplink; or

iii) if the DNN configuration allows for the MPQUIC functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode the SMF shall ensure that the modified PDU session has the capability of MPQUIC with any steering mode and ATSSS-LL with only active-standby steering mode in the downlink and the uplink;

c) the ATSSS-ST bits set to "MPQUIC functionality with any steering mode and ATSSS-LL functionality with any steering mode allowed for ATSSS-LL supported" and if the DNN configuration allows for the MPQUIC functionality with any steering mode and ATSSS-LL functionality with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) the SMF shall ensure that the modified PDU session has the capability of MPQUIC with any steering mode and ATSSS-LL with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) in the downlink and the uplink;

d) the ATSSS-ST bits set to "ATSSS Low-Layer functionality with any steering mode allowed for ATSSS-LL supported" and if the DNN configuration allows for the ATSSS-LL functionality with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) the SMF shall ensure that the modified PDU session has the capability of ATSSS-LL with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) in the downlink and the uplink;

e) the ATSSS-ST bits set to "MPTCP functionality with any steering mode and ATSSS-LL functionality with any steering mode allowed for ATSSS-LL supported" and if the DNN configuration allows for the MPTCP functionality with any steering mode and ATSSS-LL functionality with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) the SMF shall ensure that the modified PDU session has the capability of MPTCP with any steering mode and ATSSS-LL with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) in the downlink and the uplink;

f) the ATSSS-ST bits set to "MPTCP functionality with any steering mode MPQUIC functionality with any steering mode and ATSSS-LL functionality with any steering mode allowed for ATSSS-LL supported" and if the DNN configuration allows for the MPTCP functionality with any steering mode the MPQUIC functionality with any steering mode and ATSSS-LL functionality with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) the SMF shall ensure that the modified PDU session has the capability of MPTCP with any steering mode the MPQUIC with any steering mode and ATSSS-LL with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) in the downlink and the uplink; or

g) the ATSSS-ST bits set to "MPTCP functionality with any steering mode MPQUIC functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode supported" and

i) if the DNN configuration allows for the MPTCP functionality with any steering mode the MPQUIC functionality with any steering mode and ATSSS-LL functionality with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) but does not allow RTT measurement without using PMF protocol the SMF shall ensure that the modified PDU session has the capability of MPTCP with any steering mode MPQUIC with any steering mode and ATSSS-LL with only active-standby steering mode load balancing steering mode or priority based steering mode in the downlink and MPTCP with any steering mode MPQUIC with steering mode and ATSSS-LL with only active-standby steering mode in the uplink;

ii) if the DNN configuration allows for the MPTCP functionality with any steering mode the MPQUIC functionality with any steering mode and ATSSS-LL functionality with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) and allows RTT measurement without using PMF protocol the SMF shall ensure that the modified PDU session has the capability of MPTCP with any steering mode MPQUIC with any steering mode and ATSSS-LL with any steering mode (i.e. any steering mode allowed for ATSSS-LL functionality) in the downlink and MPTCP with any steering mode MPQUIC with steering mode and ATSSS-LL with only active-standby steering mode in the uplink; or

iii) if the DNN configuration allows for the MPTCP functionality with any steering mode the MPQUIC functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode the SMF shall ensure that the modified PDU session has the capability of MPTCP with any steering mode MPQUIC with any steering mode and ATSSS-LL with only active-standby steering mode in the downlink and the uplink

figure 6.4.2.2.1 UE-requested PDU session modification procedure

#### 6.4.2.3 UE-requested PDU session modification procedure accepted by the network

upon receipt of a PDU SESSION MODIFICATION REQUEST message if the SMF accepts the request to modify the PDU session the SMF shall perform the network-requested PDU session modification procedure as specified in subclause 6.3.2

if the PDU SESSION MODIFICATION REQUEST message contains a port management information container IE the SMF shall handle the contents of the port management information container IE as specified in 3GPP TS 23.501 [8] and 3GPP TS 23.502 [9]

#### 6.4.2.4 UE-requested PDU session modification procedure not accepted by the network

##### 6.4.2.4.1 general

upon receipt of a PDU SESSION MODIFICATION REQUEST message if the SMF does not accepts the request to modify the PDU session the SMF shall create a PDU SESSION MODIFICATION REJECT message

the SMF shall set the 5GSM cause IE of the PDU SESSION MODIFICATION REJECT message to indicate the reason for rejecting the PDU session modification

the 5GSM cause IE typically indicates one of the following SM cause values

#26 insufficient resources;

#29 user authentication or authorization failed;

#31 request rejected unspecified;

#32 service option not supported;

#33 requested service option not subscribed;

#35 PTI already in use;

#37 5GS QoS not accepted;

#43 invalid PDU session identity;

#44 semantic errors in packet filter(s);

#45 syntactical error in packet filter(s);

#46 out of LADN service area;

#59 unsupported 5QI value;

#67 insufficient resources for specific slice and DNN;

#69 insufficient resources for specific slice;

#83 semantic error in the QoS operation;

#84 syntactical error in the QoS operation; or

#95 – 111 protocol errors

if the UE requests a PDU session modification for an LADN when the UE is located outside of the LADN service area the SMF shall include the 5GSM cause value #46 "out of LADN service area" in the 5GSM cause IE of the PDU SESSION MODIFICATION REJECT message

if the extended protocol configuration options IE of the PDU SESSION MODIFICATION REQUEST message indicates 3GPP PS data off UE status and the SMF detects the change of the 3GPP PS data off UE status the SMF shall not include the 5GSM cause value #26 "insufficient resources" the 5GSM cause value #67 "insufficient resources for specific slice and DNN" the 5GSM cause value #69 "insufficient resources for specific slice" and the 5GSM cause value #46 "out of LADN service area" in the 5GSM cause IE of the PDU SESSION MODIFICATION REJECT message

if the UE initiates UE-requested PDU session modification procedure to modify the PDU session transferred from EPS to an MA PDU session with the request type IE set to "MA PDU request" in the UL NAS TRANSPORT message as specified in 3GPP TS 24.193 [13B] and the SMF determines based on operator policy and subscription information that the PDU SESSION MODIFICATION REQUEST message is to be rejected the SMF shall include the 5GSM cause value #33 "requested service option not subscribed" in the 5GSM cause IE of the PDU SESSION MODIFICATION REJECT message

NOTE if the SMF determines based on operator policy and subscription information that the PDU SESSION MODIFICATION REQUEST message is to be accepted as single access PDU session the ATSSS container IE cannot be included in the PDU SESSION MODIFICATION COMMAND message

the network may include a Back-off timer value IE in the PDU SESSION MODIFICATION REJECT message

if the 5GSM cause value is #26"insufficient resources" #67 "insufficient resources for specific slice and DNN" or #69 "insufficient resources for specific slice" and the PDU SESSION MODIFICATION REQUEST message was received from a UE configured for high priority access in selected PLMN or SNPN or the request type provided during the PDU session establishment is set to "initial emergency request" or "existing emergency PDU session" the network shall not include a Back-off timer value IE

the SMF shall send the PDU SESSION MODIFICATION REJECT message

upon receipt of a PDU SESSION MODIFICATION REJECT message and a PDU session ID using the NAS transport procedure as specified in subclause 5.4.5 the UE shall stop timer T3581 release the allocated PTI value and enter the state PROCEDURE TRANSACTION INACTIVE

if the PDU SESSION MODIFICATION REQUEST message was sent with the requested MBS container IE included and the MBS operation set to "Join MBS session" and the UE receives a PDU SESSION MODIFICATION REJECT message then the UE shall consider the requested MBS join as rejected

if the PDU SESSION MODIFICATION REQUEST message was sent with the requested MBS container IE included and the MBS operation set to "Leave MBS session" and the UE receives a PDU SESSION MODIFICATION REJECT message then the UE shall locally leave the multicast MBS session(s) corresponding to the TMGI(s) in the requested MBS container IE of the PDU SESSION MODIFICATION REQUEST message

##### 6.4.2.4.2 handling of network rejection due to congestion control

if

- the 5GSM cause value #26 "insufficient resources" and the Back-off timer value IE are included in the PDU SESSION MODIFICATION REJECT message; or

- an indication that the 5GSM message was not forwarded due to DNN based congestion control is received along a Back-off timer value and a PDU SESSION MODIFICATION REQUEST message with the PDU session ID IE set to the PDU session ID of the PDU session;

the UE shall ignore the Re-attempt indicator IE or the 5GSM congestion re-attempt indicator IE provided by the network if any and the UE shall take different actions depending on the timer value received for timer T3396 in the Back-off timer value IE or depending on the Back-off timer value received from the 5GMM sublayer (if the UE is a UE configured for high priority access in selected PLMN or SNPN exceptions are specified in subclause 6.2.7)

a) if the timer value indicates neither zero nor deactivated and a DNN was provided during the PDU session establishment the UE shall stop timer T3396 associated with the corresponding DNN if it is running if the timer value indicates neither zero nor deactivated and no DNN was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop timer T3396 associated with no DNN if it is running in an SNPN the timer T3396 to be stopped includes

1) the timer T3396 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

2) the timer T3396 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE shall then start timer T3396 with the value provided in the Back-off timer value IE or with the Back-off timer value received from the 5GMM sublayer and

1) shall not send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for the same DNN that was sent by the UE until timer T3396 expires or timer T3396 is stopped; and

2) shall not send another PDU SESSION ESTABLISHMENT REQUEST message without a DNN and with request type different from "initial emergency request" and different from "existing emergency PDU session" or another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for a non-emergency PDU session established without a DNN provided by the UE if no DNN was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" until timer T3396 expires or timer T3396 is stopped

the UE shall not stop timer T3396 upon a PLMN change SNPN change or inter-system change

b) if the timer value indicates that this timer is deactivated and a DNN was provided during the PDU session establishment the UE shall stop timer T3396 associated with the corresponding DNN if it is running if the timer value indicates that this timer is deactivated and no DNN was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop timer T3396 associated with no DNN if it is running in an SNPN the timer T3396 to be stopped includes

1) the timer T3396 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

2) the timer T3396 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE

1) shall not send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST with exception of those identified in subclause 6.4.2.1 for the same DNN until the UE is switched off the USIM is removed the entry in the "list of subscriber data" for the current SNPN is updated or the UE receives a PDU SESSION MODIFICATION COMMAND message for the same DNN from the network or a PDU SESSION AUTHENTICATION COMMAND message for the same DNN from the network or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE for the same DNN from the network; and

2) shall not send another PDU SESSION ESTABLISHMENT REQUEST message without a DNN and with request type different from "initial emergency request" and different from "existing emergency PDU session" or another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for a non-emergency PDU session established without a DNN provided by the UE if no DNN was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" until the UE is switched off the USIM is removed the entry in the "list of subscriber data" for the current SNPN is updated or the UE receives a PDU SESSION MODIFICATION COMMAND message for a non-emergency PDU session established without a DNN provided by the UE a PDU SESSION AUTHENTICATION COMMAND message for a non-emergency PDU session established without a DNN provided by the UE or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE for a non-emergency PDU session established without a DNN provided by the UE

the timer T3396 remains deactivated upon a PLMN change SNPN change or inter-system change

c) if the timer value indicates zero the UE

1) shall stop timer T3396 associated with the corresponding DNN if running in an SNPN the timer T3396 to be stopped includes

i) the timer T3396 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

ii) the timer T3396 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same DNN; and

2) if no DNN was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop timer T3396 associated with no DNN if running in an SNPN the timer T3396 to be stopped includes

i) the timer T3396 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

ii) the timer T3396 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE may send another PDU SESSION ESTABLISHMENT REQUEST message without a DNN or another PDU SESSION MODIFICATION REQUEST message without a DNN provided by the UE

in an SNPN if the UE supports equivalent SNPNs then the UE shall apply the timer T3396 for all the equivalent SNPNs otherwise the UE shall apply the timer T3396 for the registered SNPN

if the Back-off timer value IE is not included or no Back-off timer value is received from the 5GMM sublayer then the UE may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same DNN or without a DNN as specified in subclause 6.2.7

if the timer T3396 is running when the UE enters state 5GMM-DEREGISTERED the UE remains switched on and the USIM in the UE (if any) remains the same and the entry in the "list of subscriber data" for the SNPN to which timer T3396 is associated (if any) is not updated then timer T3396 is kept running until it expires or it is stopped

when the timer T3396 is running or the timer is deactivated the UE is allowed to initiate a PDU session establishment procedure for emergency services

if the UE is switched off when the timer T3396 is running and if the USIM in the UE (if any) remains the same and the entry in the "list of subscriber data" for the SNPN to which timer T3396 is associated (if any) is not updated when the UE is switched on the UE shall behave as follows

- let t1 be the time remaining for T3396 timeout at switch off and let t be the time elapsed between switch off and switch on if t1 is greater than t then the timer shall be restarted with the value t1 – t if t1 is equal to or less than t then the timer need not be restarted if the UE is not capable of determining t then the UE shall restart the timer with the value t1

if the UE is a UE operating in single-registration mode in a network supporting N26 interface and the PDU SESSION MODIFICATION REQUEST message was sent for a PDN connection established when in S1 mode after an inter-system change from S1 mode to N1 mode and timer T3396 associated with the corresponding DNN (or no DNN) is running then the UE shall re-initiate the UE-requested PDU session modification procedure after expiry of timer T3396

if

- the 5GSM cause value #67 "insufficient resources for specific slice and DNN" and the Back-off timer value IE are included in the PDU SESSION MODIFICATION REJECT message; or

- an indication that the 5GSM message was not forwarded due to S-NSSAI and DNN based congestion control is received along a Back-off timer value and a PDU SESSION MODIFICATION REQUEST message with the PDU session ID IE set to the PDU session ID of the PDU session;

the UE shall ignore the Re-attempt indicator IE provided by the network if any and take different actions depending on the timer value received for timer T3584 in the Back-off timer value IE or depending on the Back-off timer value received from the 5GMM sublayer (if the UE is a UE configured for high priority access in selected PLMN or SNPN exceptions are specified in subclause 6.2.8)

a) if the timer value indicates neither zero nor deactivated and both an S-NSSAI and a DNN were provided by the UE during the PDU session establishment the UE shall stop timer T3584 associated with the [S-NSSAI of the PDU session DNN] combination if it is running if the timer value indicates neither zero nor deactivated an S-NSSAI and no DNN was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop timer T3584 associated with [S-NSSAI of the PDU session no DNN] combination if it is running if the timer value indicates neither zero nor deactivated no S-NSSAI and a DNN was provided during the PDU session establishment the UE shall stop timer T3584 associated with the [no S-NSSAI DNN] combination if it is running if the timer value indicates neither zero nor deactivated and neither S-NSSAI nor DNN was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop timer T3584 associated with the [no S-NSSAI no DNN] combination if it is running the timer T3584 to be stopped includes

1) in a PLMN

i) the timer T3584 applied for all the PLMNs if running; and

ii) the timer T3584 applied for the registered PLMN if running; or

2) in an SNPN

i) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

ii) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE shall then start timer T3584 with the value provided in the Back-off timer value IE or with the Back-off timer value received from the 5GMM sublayer and

1) shall not send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message with the exception of those identified in subclause 6.4.2.1 for the [S-NSSAI DNN] combination until timer T3584 expires or timer T3584 is stopped;

2) shall not send another PDU SESSION ESTABLISHMENT REQUEST message with request type different from "initial emergency request" and different from "existing emergency PDU session" or another PDU SESSION MODIFICATION REQUEST message with the exception of those identified in subclause 6.4.2.1 for the [S-NSSAI of the PDU session no DNN] combination if no DNN was provided during the PDU session establishment until timer T3584 expires or timer T3584 is stopped;

3) shall not send another PDU SESSION ESTABLISHMENT REQUEST message or another PDU SESSION MODIFICATION REQUEST message with the exception of those identified in subclause 6.4.2.1 for the [no S-NSSAI DNN] combination if no S-NSSAI was provided during the PDU session establishment until timer T3584 expires or timer T3584 is stopped; and

4) shall not send another PDU SESSION ESTABLISHMENT REQUEST message with request type different from "initial emergency request" and different from "existing emergency PDU session" or another PDU SESSION MODIFICATION REQUEST message with the exception of those identified in subclause 6.4.2.1 for the [no S-NSSAI no DNN] combination if neither S-NSSAI nor DNN was provided during the PDU session establishment until timer T3584 expires or timer T3584 is stopped

the UE shall not stop timer T3584 upon a PLMN change SNPN change or inter-system change;

b) if the timer value indicates that this timer is deactivated

1) if both S-NSSAI and DNN were provided by the UE during the PDU session establishment the UE shall stop timer T3584 associated with the [S-NSSAI of the PDU session DNN] combination if running the timer T3584 to be stopped includes

i) in a PLMN

A) the timer T3584 applied for all the PLMNs if running; and

B) the timer T3584 applied for the registered PLMN if running; or

ii) in an SNPN

A) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

B) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for the [S-NSSAI of the PDU session DNN] combination that was sent by the UE until the UE is switched off the USIM is removed the entry in the "list of subscriber data" for the current SNPN is updated or the UE receives a PDU SESSION MODIFICATION COMMAND message for the [S-NSSAI of the PDU session DNN] combination from the network or a PDU SESSION AUTHENTICATION COMMAND message for the [S-NSSAI of the PDU session DNN] combination from the network or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE for the [S-NSSAI of the PDU session DNN] combination from the network;

2) if an S-NSSAI was provided but a DNN was not provided by the UE during the PDU session establishment the UE shall stop timer T3584 associated with the [S-NSSAI of the PDU session no DNN] combination if running the timer T3584 to be stopped includes

i) in a PLMN

A) the timer T3584 applied for all the PLMNs if running; and

B) the timer T3584 applied for the registered PLMN if running; or

ii) in an SNPN

A) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

B) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE shall not send a PDU SESSION ESTABLISHMENT REQUEST message with request type different from "initial emergency request" and different from "existing emergency PDU session" or a PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for the [S-NSSAI of the PDU session no DNN] combination if no DNN was provided during the PDU session establishment until the UE is switched off the USIM is removed the entry in the "list of subscriber data" for the current SNPN is updated or the UE receives a PDU SESSION MODIFICATION COMMAND message for a non-emergency PDU session established for the [S-NSSAI of the PDU session no DNN] combination from the network or a PDU SESSION AUTHENTICATION COMMAND message for a non-emergency PDU session established for the [S-NSSAI of the PDU session no DNN] combination from the network or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE for a non-emergency PDU session established for the [S-NSSAI of the PDU session no DNN] combination from the network;

3) if an S-NSSAI was not provided but a DNN was provided by the UE during the PDU session establishment the UE shall stop timer T3584 associated with the [no S-NSSAI DNN] combination if running the timer T3584 to be stopped includes

i) in a PLMN

A) the timer T3584 applied for all the PLMNs if running; and

B) the timer T3584 applied for the registered PLMN if running; or

ii) in an SNPN

A) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

B) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE shall not send a PDU SESSION ESTABLISHMENT REQUEST message or a PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for the [no S-NSSAI DNN] combination if no S-NSSAI was provided during the PDU session establishment until the UE is switched off the USIM is removed the entry in the "list of subscriber data" for the current SNPN is updated or the UE receives a PDU SESSION MODIFICATION COMMAND message for the [no S-NSSAI DNN] combination from the network or a PDU SESSION AUTHENTICATION COMMAND message for the [no S-NSSAI DNN] combination from the network or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE for the [no S-NSSAI DNN] combination from the network; and

4) if neither S-NSSAI nor DNN were provided by the UE during the PDU session establishment the UE shall stop timer T3584 associated with the [no S-NSSAI no DNN] combination if running the timer T3584 to be stopped includes

i) in a PLMN

A) the timer T3584 applied for all the PLMNs if running; and

B) the timer T3584 applied for the registered PLMN if running; or

ii) in an SNPN

A) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

B) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE shall not send a PDU SESSION ESTABLISHMENT REQUEST message with request type different from "initial emergency request" and different from "existing emergency PDU session" or a PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for the [no S-NSSAI no DNN] combination if neither S-NSSAI nor DNN was provided during the PDU session establishment until the UE is switched off the USIM is removed the entry in the "list of subscriber data" for the current SNPN is updated or the UE receives a PDU SESSION MODIFICATION COMMAND message for a non-emergency PDU session established for the [no S-NSSAI no DNN] combination from the network or a PDU SESSION AUTHENTICATION COMMAND message for a non-emergency PDU session established for the [no S-NSSAI no DNN] combination from the network or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE for a non-emergency PDU session established for the [no S-NSSAI no DNN] combination from the network

the timer T3584 remains deactivated upon a PLMN change SNPN change or inter-system change; and

c) if the timer value indicates zero

1) if both S-NSSAI and DNN were provided by the UE during the PDU session establishment the UE shall stop timer T3584 associated with the [S-NSSAI of the PDU session DNN] combination if running the timer T3584 to be stopped includes

i) in a PLMN

A) the timer T3584 applied for all the PLMNs if running; and

B) the timer T3584 applied for the registered PLMN if running; or

ii) in an SNPN

A) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

B) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the [S-NSSAI of the PDU session DNN] combination;

2) if an S-NSSAI was provided but a DNN was not provided by the UE during the PDU session establishment the UE shall stop timer T3584 associated with the [S-NSSAI of the PDU session no DNN] combination if running the timer T3584 to be stopped includes

i) in a PLMN

A) the timer T3584 applied for all the PLMNs if running; and

B) the timer T3584 applied for the registered PLMN if running; or

ii) in an SNPN

A) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

B) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the [S-NSSAI of the PDU session no DNN] combination if the request type was different from "initial emergency request" and different from "existing emergency PDU session";

3) if an S-NSSAI was not provided but a DNN was provided by the UE during the PDU session establishment the UE shall stop timer T3584 associated with the [no S-NSSAI DNN] combination if running the timer T3584 to be stopped includes

i) in a PLMN

A) the timer T3584 applied for all the PLMNs if running; and

B) the timer T3584 applied for the registered PLMN if running; or

ii) in an SNPN

A) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

B) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the [no S-NSSAI DNN] combination; and

4) if neither S-NSSAI nor DNN were provided by the UE during the PDU session establishment the UE shall stop timer T3584 associated with the [no S-NSSAI no DNN] combination if running the timer T3584 to be stopped includes

i) in a PLMN

A) the timer T3584 applied for all the PLMNs if running; and

B) the timer T3584 applied for the registered PLMN if running; or

ii) in an SNPN

A) the timer T3584 applied for all the equivalent SNPNs and associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

B) the timer T3584 applied for the registered SNPN associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the [no S-NSSAI no DNN] combination and the request type was different from "initial emergency request" and different from "existing emergency PDU session"

if the 5GSM congestion re-attempt indicator IE with the ABO bit set to "The back-off timer is applied in all PLMNs or all equivalent SNPNs" is included in the PDU SESSION MODIFICATION REJECT message with the 5GSM cause value #67 "insufficient resources for specific slice and DNN" then the UE shall apply the timer T3584 for all the PLMNs or all the equivalent SNPNs otherwise the UE shall apply the timer T3584 for the registered PLMN or the registered SNPN

if the Back-off timer value IE is not included or no Back-off timer value is received from the 5GMM sublayer then the UE may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same [S-NSSAI DNN] combination or for the same [S-NSSAI no DNN] combination or for the same [no S-NSSAI DNN] combination or for the same [no S-NSSAI no DNN] combination as specified in subclause 6.2.8

when the timer T3584 is running or the timer is deactivated the UE is allowed to initiate a PDU session establishment procedure for emergency services

if the timer T3584 is running when the UE enters state 5GMM-DEREGISTERED the UE remains switched on and the USIM in the UE (if any) remains the same and the entry in the "list of subscriber data" for the SNPN to which timer T3584 is associated (if any) is not updated then timer T3584 is kept running until it expires or it is stopped

if the UE is switched off when the timer T3584 is running and if the USIM in the UE (if any) remains the same and the entry in the "list of subscriber data" for the SNPN to which timer T3584 is associated (if any) is not updated when the UE is switched on the UE shall behave as follows

- let t1 be the time remaining for T3584 timeout at switch off and let t be the time elapsed between switch off and switch on if t1 is greater than t then the timer shall be restarted with the value t1 – t if t1 is equal to or less than t then the timer need not be restarted if the UE is not capable of determining t then the UE shall restart the timer with the value t1

if the UE is a UE operating in single-registration mode in a network supporting N26 interface and the PDU SESSION MODIFICATION REQUEST message was sent for a PDN connection established when in S1 mode after an inter-system change from S1 mode to N1 mode and timer T3584 associated with the corresponding [no S-NSSAI DNN] combination or [no S-NSSAI no DNN] combination is running then the UE shall re-initiate the UE-requested PDU session modification procedure after expiry of timer T3584

if

- the 5GSM cause value #69 "insufficient resources for specific slice" and the Back-off timer value IE are included in the PDU SESSION MODIFICATION REJECT message; or

- an indication that the 5GSM message was not forwarded due to S-NSSAI only based congestion control is received along a Back-off timer value and a PDU SESSION MODIFICATION REQUEST message with the PDU session ID IE set to the PDU session ID of the PDU session;

the UE shall ignore the bit "RATC" and the bit "EPLMNC" in the Re-attempt indicator IE provided by the network if any and take different actions depending on the timer value received for timer T3585 in the Back-off timer value IE or depending on the Back-off timer value received from the 5GMM sublayer (if the UE is a UE configured for high priority access in selected PLMN or SNPN exceptions are specified in subclause 6.2.8)

a) if the timer value indicates neither zero nor deactivated and an S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop timer T3585 associated with the S-NSSAI of the PDU session if it is running if the timer value indicates neither zero nor deactivated and no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop timer T3585 associated with no S-NSSAI if it is running the timer T3585 to be stopped includes

1) in a PLMN

i) the timer T3585 applied for all the PLMNs and for the access over which the PDU SESSION MODIFICATION REJECT is received if running;

ii) the timer T3585 applied for all the PLMNs and for both 3GPP access type and non-3GPP access type if running;

iii) the timer T3585 applied for the registered PLMN and for the access over which the PDU SESSION MODIFICATION REJECT is received if running; and

iv)- the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type if running; or

2) in an SNPN

i) the timer T3585 applied for all the equivalent SNPNs and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

ii) the timer T3585 applied for all the equivalent SNPNs and for both 3GPP access type and non-3GPP access type associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

iii) the timer T3585 applied for the registered SNPN and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

iv) the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE shall then start timer T3585 with the value provided in the Back-off timer value IE or with the Back-off timer value received from the 5GMM sublayer and

1) if an S-NSSAI was provided by the UE during the PDU session establishment the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message with request type different from "initial emergency request" and different from "existing emergency PDU session" or another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for a non-emergency PDU session for the S-NSSAI of the PDU session until timer T3585 expires or timer T3585 is stopped; and

2) if the request type was different from "initial emergency request" and from "existing emergency PDU session" and an S-NSSAI was not provided by the UE during the PDU session establishment the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message without an S-NSSAI and with request type different from "initial emergency request" and different from "existing emergency PDU session" or another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for a non-emergency PDU session established without an S-NSSAI provided by the UE until timer T3585 expires or timer T3585 is stopped

the UE shall not stop timer T3585 upon a PLMN change SNPN change or inter-system change;

b) if the timer value indicates that this timer is deactivated and an S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop timer T3585 associated with the S-NSSAI of the PDU session if it is running if the timer value indicates that this timer is deactivated and no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session" the UE shall stop timer T3585 associated with no S-NSSAI if it is running the timer T3585 to be stopped includes

1) in a PLMN

i) the timer T3585 applied for all the PLMNs and for the access over which the PDU SESSION MODIFICATION REJECT is received if running;

ii) the timer T3585 applied for all the PLMNs and for both 3GPP access type and non-3GPP access type if running;

iii) the timer T3585 applied for the registered PLMN and for the access over which the PDU SESSION MODIFICATION REJECT is received if running; and

iv) the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type if running; or

2) in an SNPN

i) the timer T3585 applied for all the equivalent SNPNs and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

ii) the timer T3585 applied for all the equivalent SNPNs and for both 3GPP access type and non-3GPP access type associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

iii) the timer T3585 applied for the registered SNPN and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

iv) the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

in addition

1) if an S-NSSAI was provided by the UE during the PDU session establishment the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message with request type different from "initial emergency request" and different from "existing emergency PDU session" or another PDU SESSION MODIFICATION REQUEST with exception of those identified in subclause 6.4.2.1 for a non-emergency PDU session for the S-NSSAI of the PDU session until the UE is switched off the USIM is removed the entry in the "list of subscriber data" for the current SNPN is updated or the UE receives a PDU SESSION MODIFICATION COMMAND message for a non-emergency PDU session for the S-NSSAI of the PDU session from the network or a PDU SESSION AUTHENTICATION COMMAND message for a non-emergency PDU session for the S-NSSAI of the PDU session from the network or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE for the S-NSSAI of the PDU session from the network; and

2) if the request type was different from "initial emergency request" and from "existing emergency PDU session" and an S-NSSAI was not provided by the UE during the PDU session establishment the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message without an S-NSSAI and with request type different from "initial emergency request" and different from "existing emergency PDU session" or another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for a non-emergency PDU session established without an S-NSSAI provided by the UE until the UE is switched off the USIM is removed the entry in the "list of subscriber data" for the current SNPN is updated or the UE receives a PDU SESSION MODIFICATION COMMAND message for a non-emergency PDU session established without an S-NSSAI provided by the UE or a PDU SESSION AUTHENTICATION COMMAND message for a non-emergency PDU session established without an S-NSSAI provided by the UE or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE for a non-emergency PDU session established without an S-NSSAI provided by the UE

the timer T3585 remains deactivated upon a PLMN change SNPN change or inter-system change; and

c) if the timer value indicates zero

1) if an S-NSSAI was provided by the UE during the PDU session establishment the UE shall stop timer T3585 associated with the S-NSSAI of the PDU session if running the timer T3585 to be stopped includes

i) in a PLMN

A) including the timer T3585 applied for all the PLMNs and for the access over which the PDU SESSION RELEASE COMMAND is received if running;

B) the timer T3585 applied for all the PLMNs and for the access over which the PDU SESSION RELEASE COMMAND is received if running;

C) the timer T3585 applied for the registered PLMN and for current access type or both 3GPP access type and non-3GPP access type if running; and

D) the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type if running; or

ii) in an SNPN

A) the timer T3585 applied for all the equivalent SNPNs and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

B) the timer T3585 applied for all the equivalent SNPNs and for both 3GPP access type and non-3GPP access type associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

C) the timer T3585 applied for the registered SNPN and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

D) the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the S-NSSAI of the PDU session; and

2) if no S-NSSAI was provided during the PDU session establishment and the request type was different from “initial emergency request “ and different from “existing emergency PDU session” the UE shall stop timer T3585 associated with no S-NSSAI the timer T3585 to be stopped includes

i) in a PLMN

A) the timer T3585 applied for all the PLMNs and for the access over which the PDU SESSION RELEASE COMMAND is received if running;

B) the timer T3585 applied for all the PLMNs and for the access over which the PDU SESSION RELEASE COMMAND is received if running;

C) the timer T3585 applied for the registered PLMN and for current access type or both 3GPP access type and non-3GPP access type if running; and

D) the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type if running; or

ii) in an SNPN

A) the timer T3585 applied for all the equivalent SNPNs and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

B) the timer T3585 applied for all the equivalent SNPNs and for both 3GPP access type and non-3GPP access type associated with the RSNPN or an equivalent SNPN and with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running;

C) the timer T3585 applied for the registered SNPN and for the access over which the PDU SESSION AUTHENTICATION COMMAND message is received associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running; and

D) the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type associated with the RSNPN and if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription if running

the UE may send another PDU SESSION ESTABLISHMENT REQUEST message without an S-NSSAI or another PDU SESSION MODIFICATION REQUEST message without an S-NSSAI provided by the UE

if the 5GSM congestion re-attempt indicator IE with the ABO bit set to "The back-off timer is applied in all PLMNs or all SNPNs " is included in the PDU SESSION MODIFICATION REJECT message with the 5GSM cause value #69 "insufficient resources for specific slice" then the UE shall apply the timer T3585 for all the PLMNs or all the equivalent SNPNs otherwise the UE shall apply the timer T3585 for the registered PLMN or the registered SNPN

if the Back-off timer value IE is not included or no Back-off timer value is received from the 5GMM sublayer then the UE may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same S-NSSAI or without an S-NSSAI as specified in subclause 6.2.8

when the timer T3585 is running or the timer is deactivated the UE is allowed to initiate a PDU session establishment procedure for emergency services

if the timer T3585 is running when the UE enters state 5GMM-DEREGISTERED the UE remains switched on and the USIM in the UE (if any) remains the same and the entry in the "list of subscriber data" for the SNPN to which timer T3585 is associated (if any) is not updated then timer T3585 is kept running until it expires or it is stopped

if the UE is switched off when the timer T3585 is running and if the USIM in the UE (if any) remains the same and the entry in the "list of subscriber data" for the SNPN to which timer T3585 is associated (if any) is not updated when the UE is switched on the UE shall behave as follows

- let t1 be the time remaining for T3585 timeout at switch off and let t be the time elapsed between switch off and switch on if t1 is greater than t then the timer shall be restarted with the value t1 – t if t1 is equal to or less than t then the timer need not be restarted if the UE is not capable of determining t then the UE shall restart the timer with the value t1

if the UE is a UE operating in single-registration mode in a network supporting N26 interface and the PDU SESSION MODIFICATION REQUEST message was sent for a PDN connection established when in S1 mode after an inter-system change from S1 mode to N1 mode and timer T3585 associated with no S-NSSAI is running then the UE shall re-initiate the UE-requested PDU session modification procedure after expiry of timer T3585

NOTE 3 as described in this subclause upon PLMN change SNPN change or inter-system change the UE does not stop the timer T3584 or T3585 this means the timer T3584 or T3585 can still be running or be deactivated for the given 5GSM procedure the PLMN the S-NSSAI and optionally the DNN combination when the UE returns to the PLMN or when it performs inter-system change back from S1 mode to N1 mode thus the UE can still be prevented from sending another PDU SESSION ESTABLISHMENT REQUEST or PDU SESSION MODIFICATION REQUEST message in the PLMN for the same S-NSSAI and optionally the same DNN

upon PLMN change or SNPN change if T3584 applied for the registered PLMN or the registered SNPN is running or is deactivated for an S-NSSAI a DNN and old PLMN or old SNPN but T3584 is not running and is not deactivated for the S-NSSAI the DNN and new PLMN or new SNPN then the UE is allowed to send a PDU SESSION ESTABLISHMENT REQUEST message for the same S-NSSAI and the same DNN in the new PLMN or new SNPN

upon PLMN change or SNPN change if T3585 applied for the registered PLMN or the registered SNPN is running or is deactivated for an S-NSSAI and old PLMN or old SNPN but T3585 is not running and is not deactivated for the S-NSSAI and new PLMN or new SNPN then the UE is allowed to send a PDU SESSION ESTABLISHMENT REQUEST message for the same S-NSSAI in the new PLMN or new SNPN

upon SNPN change if T3585 applied for all the equivalent SNPNs is running or is deactivated for an S-NSSAI and old SNPN but T3585 is not running and is not deactivated for the S-NSSAI and new non-equivalent SNPN then the UE is allowed to send a PDU SESSION ESTABLISHMENT REQUEST message for the same S-NSSAI in the new SNPN

##### 6.4.2.4.3 handling of network rejection not due to congestion control

if the 5GSM cause value is different from #26 "insufficient resources" #37 "5GS QoS not accepted" #44 "Semantic errors in packet filter(s)" #45 "Syntactical error in packet filter(s)" #46 "out of LADN service area" #59 "unsupported 5QI value" #67 "insufficient resources for specific slice and DNN" #69 "insufficient resources for specific slice" #83 "Semantic error in the QoS operation" and #84 "Syntactical error in the QoS operation" and the Back-off timer value IE is included the UE shall behave as follows (if the UE is a UE configured for high priority access in selected PLMN or SNPN exceptions are specified in subclause 6.2.12)

a) if the timer value indicates neither zero nor deactivated and

1) if the UE provided DNN and S-NSSAI to the network during the PDU session establishment the UE shall start the back-off timer with the value provided in the Back-off timer value IE for the PDU session modification procedure and

i) in a PLMN [PLMN DNN (mapped) HPLMN S-NSSAI of the PDU session] combination the UE shall not send another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for the same DNN and the (mapped) HPLMN S-NSSAI of the PDU session in the current PLMN until the back-off timer expires the UE is switched off or the USIM is removed; or

ii) in an SNPN [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription DNN (mapped) subscribed SNPN S-NSSAI] combination the UE shall not send another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for the same DNN and (mapped) subscribed SNPN S-NSSAI of the PDU session in the current SNPN using the selected entry of the "list of subscriber data" or selected PLMN subscription until the back-off timer expires the UE is switched off the USIM is removed or the selected entry of the "list of subscriber data" is updated;

2) if the UE did not provide a DNN or S-NSSAI or any of the two parameters to the network during the PDU session establishment it shall start the back-off timer accordingly for the PDU session modification procedure and

i) in a PLMN [PLMN DNN no S-NSSAI] [PLMN no DNN (mapped) HPLMN S-NSSAI of the PDU session] or [PLMN no DNN no S-NSSAI] combination dependent on the combination the UE shall not send another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for the same [PLMN DNN no S-NSSAI] [PLMN no DNN (mapped) HPLMN S-NSSAI of the PDU session] or [PLMN no DNN no S-NSSAI] combination in the current PLMN until the back-off timer expires the UE is switched off or the USIM is removed; or

ii) in an SNPN [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription DNN no S-NSSAI] [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription no DNN (mapped) subscribed SNPN S-NSSAI of the PDU session] or [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription no DNN no S-NSSAI] combination dependent on the combination the UE shall not send another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for the same [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription DNN no S-NSSAI] [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription no DNN (mapped) subscribed SNPN S-NSSAI of the PDU session] or [SNPN selected entry of the "list of subscriber data" or selected PLMN subscription no DNN no S-NSSAI] combination in the current SNPN until the back-off timer expires the UE is switched off the USIM is removed or the selected entry in the "list of subscriber data" is updated;

b) if the timer value indicates that this timer is deactivated and

1) if the UE provided DNN and S-NSSAI to the network during the PDU session establishment the UE shall not send another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for

i) in a PLMN the same DNN and the (mapped) HPLMN S-NSSAI of the PDU session in the current PLMN until the UE is switched off or the USIM is removed; or

ii) in an SNPN the same DNN and the (mapped) subscribed SNPN S-NSSAI of the PDU session in the current SNPN using the selected entry of the "list of subscriber data" or selected PLMN subscription until the UE is switched off or the USIM is removed or the selected entry in the "list of subscriber data";

2) if the UE did not provide a DNN or S-NSSAI or any of the two parameters to the network during the PDU session establishment the UE shall not send another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 for

i) in a PLMN; the same [PLMN DNN no S-NSSAI] [PLMN no DNN (mapped) HPLMN S-NSSAI of the PDU session] or [PLMN no DNN no S-NSSAI] combination in the current PLMN until the UE is switched off or the USIM is removed; or

ii) in an SNPN the same [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN no S-NSSAI] [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN (mapped) subscribed SNPN S-NSSAI of the PDU session] or [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN no S-NSSAI] combination in the current SNPN using the selected entry of the "list of subscriber data" or selected PLMN subscription until the UE is switched off the USIM is removed or the selected entry in the "list of subscriber data" is updated; and

c) if the timer value indicates zero the UE may send another PDU SESSION MODIFICATION REQUEST message for

1) in a PLMN the same combination of [PLMN DNN (mapped) HPLMN S-NSSAI of the PDU session] [PLMN DNN no S-NSSAI] [PLMN no DNN (mapped) HPLMN S-NSSAI of the PDU session] or [PLMN no DNN no S-NSSAI] in the current PLMN; or

2) in an SNPN the same combination of [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN (mapped) subscribed SNPN S-NSSAI of the PDU session] [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN no S-NSSAI] [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN (mapped) subscribed SNPN S-NSSAI of the PDU session] or [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN no S-NSSAI] in the current SNPN

if the Back-off timer value IE is not included then the UE shall ignore the Re-attempt indicator IE provided by the network in the PDU SESSION MODIFICATION REJECT message if any

a) additionally if the 5GSM cause value is #32 "service option not supported" or #33 "requested service option not subscribed" then

1) the UE not operating in SNPN access operation mode shall proceed as follows

i) if the UE is registered in the HPLMN or in a PLMN that is within the EHPLMN list the UE shall behave as described above in the present subclause using the configured SM retry timer value as specified in 3GPP TS 24.368 [17] or in USIM file NASCONFIG as specified in 3GPP TS 31.102 [22] if available as back-off timer value; and

NOTE 1 the way to choose one of the configured SM retry timer values for back-off timer value is up to UE implementation if the UE is configured with - an SM retry timer value in the ME as specified in 3GPP TS 24.368 [17]; and - an SM retry timer value in USIM file NASCONFIG as specified in 3GPP TS 31.102 [22]

ii) otherwise if the UE is not registered in its HPLMN or in a PLMN that is within the EHPLMN list or if the SM retry timer value is not configured the UE shall behave as described above in the present subclause using the default value of 12 minutes for the back-off timer; or

2) the UE operating in SNPN access operation mode shall proceed as follows

i) if

A) the SM retry timer value for the current SNPN as specified in 3GPP TS 24.368 [17] is available; or

B) the SM retry timer value in USIM file NASCONFIG as specified in 3GPP TS 31.102 [22] is available and the UE used the USIM for registration to the current SNPN;

then the UE shall behave as described above in the present subclause using the configured SM retry timer value as back-off timer value; or

NOTE 2 the way to choose one of the configured SM retry timer values for back-off timer value is up to UE implementation if both conditions in bullets A) and B) above are satisfied

ii) otherwise the UE shall behave as described above in the present subclause using the default value of 12 minutes for the back-off timer

b) for 5GSM cause values different from #32 "service option not supported" or #33 "requested service option not subscribed" the UE behaviour regarding the start of a back-off timer is specified in subclause 6.2.12

the UE shall not stop any back-off timer

a) upon a PLMN or SNPN change;

b) upon an inter-system change; or

c) upon registration over another access type

if the network indicates that a back-off timer for the PDU session modification procedure is deactivated then it remains deactivated

a) upon a PLMN or SNPN change;

b) upon an inter-system change; or

c) upon registration over another access type

NOTE 3 this means the back-off timer can still be running or be deactivated for the given 5GSM procedure when the UE returns to the PLMN or SNPN or when it performs inter-system change back from S1 mode to N1 mode thus the UE can still be prevented from sending another PDU SESSION MODIFICATION REQUEST message for the combination of [PLMN DNN (mapped) HPLMN S-NSSAI of the PDU session] [PLMN DNN no S-NSSAI] [PLMN no DNN (mapped) HPLMN S-NSSAI of the PDU session] or [PLMN no DNN no S-NSSAI] in the PLMN or for the combination of [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN (mapped) subscribed S-NSSAI] [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN no S-NSSAI] [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN (mapped) subscribed S-NSSAI] or [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN no S-NSSAI] in the SNPN

if the back-off timer is started upon receipt of a PDU SESSION MODIFICATION REJECT (i.e the timer value was provided by the network a configured value is available or the default value is used as explained above) or the back-off timer is deactivated the UE behaves as follows

a) after a PLMN or SNPN change the UE may send a PDU SESSION MODIFICATION REQUEST message for

1) in a PLMN the combination of [new PLMN DNN (mapped) HPLMN S-NSSAI of the PDU session] [new PLMN DNN no S-NSSAI] [new PLMN no DNN (mapped) HPLMN S-NSSAI of the PDU session] or [new PLMN no DNN no S-NSSAI] in the new PLMN if the back-off timer is not running and is not deactivated for the PDU session modification procedure and the combination of [new PLMN DNN (mapped) HPLMN S-NSSAI of the PDU session] [new PLMN DNN no S-NSSAI] [new PLMN no DNN (mapped) HPLMN S-NSSAI of the PDU session] or [new PLMN no DNN no S-NSSAI]; or

2) in an SNPN the combination of [new SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN (mapped) subscribed SNPN S-NSSAI of the PDU session] [new SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN no S-NSSAI] [new SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN (mapped) subscribed SNPN S-NSSAI of the PDU session] or [new SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN no S-NSSAI] in the new SNPN if the back-off timer is not running and is not deactivated for the PDU session modification procedure and the combination of [new SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN (mapped) subscribed SNPN S-NSSAI of the PDU session] [new SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN no S-NSSAI] [new SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN (mapped) subscribed SNPN S-NSSAI of the PDU session] or [new SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN no S-NSSAI];

furthermore as an implementation option for the 5GSM cause value #32 "service option not supported" or #33 "requested service option not subscribed" if the network does not include a Re-attempt indicator IE the UE may decide not to automatically send another PDU SESSION MODIFICATION REQUEST message

1) in a PLMN the same combination of [PLMN DNN (mapped) HPLMN S-NSSAI of the PDU session] [PLMN DNN no S-NSSAI] [PLMN no DNN (mapped) HPLMN S-NSSAI of the PDU session] or [PLMN no DNN no S-NSSAI] if the UE is registered to a new PLMN which is in the list of equivalent PLMNs; or

2) in an SNPN if the UE supports equivalent SNPNs the same combination of [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN (mapped) subscribed SNPN S-NSSAI of the PDU session] [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription DNN no S-NSSAI] [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN (mapped) subscribed SNPN S-NSSAI of the PDU session] or [SNPN the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN no S-NSSAI] if the UE is registered to a new SNPN which is in the list of equivalent SNPNs

b) if the network does not include the Re-attempt indicator IE to indicate whether re-attempt in S1 mode is allowed or the UE ignores the Re-attempt indicator IE e.g because the Back-off timer value IE is not included then

1) if the UE is registered in its HPLMN or in a PLMN that is within the EHPLMN list and the back-off timer is running for the combination of [PLMN DNN (mapped) HPLMN S-NSSAI of the PDU session] or [PLMN DNN no S-NSSAI] the UE shall apply the configured SM\_RetryAtRATChange value as specified in 3GPP TS 24.368 [17] or in USIM file NASCONFIG as specified in 3GPP TS 31.102 [22] if available to determine whether the UE may attempt an EPS bearer resource allocation procedure or an EPS bearer resource modification procedure for the same [PLMN DNN] combination in S1 mode; and

NOTE 4 the way to choose one of the configured SM\_RetryAtRATChange values for back-off timer value is up to UE implementation if the UE is configured with - an SM\_RetryAtRATChange value in ME as specified in 3GPP TS 24.368 [17]; and - an SM\_RetryAtRATChange value in USIM file NASCONFIG as specified in 3GPP TS 31.102 [22]

2) if the UE is not registered in its HPLMN or in a PLMN that is within the EHPLMN list or if the NAS configuration MO as specified in 3GPP TS 24.368 [17] is not available and the value for inter-system change is not configured in the USIM file NASCONFIG then the UE behaviour regarding an EPS bearer resource allocation procedure or an EPS bearer resource modification procedure for the same [PLMN DNN] combination in S1 mode is unspecified; and

c) if the network includes the Re-attempt indicator IE indicating that re-attempt in an equivalent PLMN or equivalent SNPN is not allowed then depending on the timer value received in the Back-off timer value IE for

1) in a PLMN each combination of a PLMN from the equivalent PLMN list and the respective [DNN (mapped) HPLMN S-NSSAI of the PDU session] [DNN no S-NSSAI] [no DNN (mapped) HPLMN S-NSSAI of the PDU session] or [no DNN no S-NSSAI] combination the UE shall start a back-off timer for the PDU session modification procedure with the value provided by the network or deactivate the respective back-off timer as follows

i) if the Re-attempt indicator IE additionally indicates that re-attempt in S1 mode is allowed the UE shall start or deactivate the back-off timer for N1 mode only; and

ii) otherwise the UE shall start or deactivate the back-off timer for S1 and N1 mode

2) in a SNPN if the UE supports equivalent SNPNs each combination of a SNPN from the equivalent SNPN list and the respective [the selected entry of the "list of subscriber data" or selected PLMN subscription DNN (mapped) subscribed SNPN S-NSSAI of the PDU session] [the selected entry of the "list of subscriber data" or selected PLMN subscription DNN no S-NSSAI] [the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN (mapped) subscribed SNPN S-NSSAI of the PDU session] or [the selected entry of the "list of subscriber data" or selected PLMN subscription no DNN no S-NSSAI] combination the UE shall start a back-off timer for the PDU session modification procedure with the value provided by the network or deactivate the respective back-off timer for N1 mode in an SNPN

if the back-off timer for a [PLMN DNN] or [PLMN no DNN] combination was started or deactivated in S1 mode upon receipt of BEARER RESOURCE ALLOCATION REJECT message or BEARER RESOURCE MODIFICATION REJECT message (see 3GPP TS 24.301 [15]) and the network indicated that re-attempt in N1 mode is allowed then this back-off timer does not prevent the UE from sending a PDU SESSION MODIFICATION REQUEST message in this PLMN for the same DNN after inter-system change to N1 mode if the network indicated that re-attempt in N1 mode is not allowed the UE shall not send any PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1 in this PLMN for the same DNN in combination with any S-NSSAI or without S-NSSAI after inter-system change to N1 mode until the timer expires the UE is switched off or the USIM is removed

NOTE 5 the back-off timer is used to describe a logical model of the required UE behaviour this model does not imply any specific implementation e.g as a timer or timestamp

NOTE 6 reference to back-off timer in this section can either refer to use of timer T3396 or to use of a different packet system specific timer within the UE whether the UE uses T3396 as a back-off timer or it uses different packet system specific timers as back-off timers is left up to UE implementation

if the 5GSM cause value is #46 "out of LADN service area" the UE shall ignore the Back-off timer value IE and Re-attempt indicator IE provided by the network if any if the UE is not located inside the LADN service area the UE shall not send another PDU SESSION MODIFICATION REQUEST message except for indicating a change of 3GPP PS data off UE status or another PDU SESSION ESTABLISHMENT REQUEST message for the LADN DNN provided by the UE during the PDU session establishment procedure until the LADN information for the specific LADN DNN or the extended LADN information for the specific LADN DNN and S-NSSAI is updated as described in subclause 5.4.4 and subclause 5.5.1 if the UE is not located inside the LADN service area the UE shall not indicate the PDU session(s) for the LADN DNN provided by the UE during the PDU session establishment procedure in the uplink data status IE included in the SERVICE REQUEST message until the LADN information for the specific LADN DNN or the extended LADN information for the specific LADN DNN and S-NSSAI is provided by network as described in subclause 5.4.4 and subclause 5.5.1

NOTE 7 based on UE implementation the UE locating inside the LADN service area can send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the LADN DNN which was rejected with the 5GSM cause value #46 "out of LADN service area"

NOTE 7A if the UE does not receive a CONFIGURATION UPDATE COMMAND message with new LADN information within an implementation dependent time the UE can request this information by initiating a registration procedure for mobility or periodic registration update (see subclause 5.5.1.3.2 item q)

if the 5GSM cause value is #37 "5GS QoS not accepted" #44 "Semantic errors in packet filter(s)" #45 "Syntactical error in packet filter(s)" #59 "unsupported 5QI value" #83 "Semantic error in the QoS operation" or #84 "Syntactical error in the QoS operation" the UE shall ignore the Back-off timer value IE and Re-attempt indicator IE provided by the network if any the UE should pass the corresponding error cause to the upper layers

NOTE 8 how to solve the issues of not accepted 5GS QoS and unsupported 5QI value in the upper layers is UE implementation specific

#### 6.4.2.5 abnormal cases in the UE

the following abnormal cases can be identified

a) expiry of timer T3581

the UE shall on the first expiry of the timer T3581 retransmit the PDU SESSION MODIFICATION REQUEST message and the PDU session information which was transported together with the initial transmission of the PDU SESSION MODIFICATION REQUEST message and shall reset and start timer T3581 this retransmission is repeated four times i.e on the fifth expiry of timer T3581 the UE shall abort the procedure and shall release the allocated PTI

b) invalid PDU session identity

upon receipt of the PDU SESSION MODIFICATION REJECT message including 5GSM cause #43 "invalid PDU session identity" the UE shall perform a local release of the existing PDU session and shall stop the timer T3581

c) collision of network-requested PDU session release procedure and UE-requested PDU session modification procedure

if the UE receives a PDU SESSION RELEASE COMMAND message during the UE-requested PDU session modification procedure and the PDU session indicated in the PDU SESSION RELEASE COMMAND message is the PDU session that the UE had requested to modify the UE shall abort the PDU session modification procedure and proceed with the network-requested PDU session release procedure

d) handling DL user data packets marked with RQI when UE has already revoked the usage of reflective QoS

if the UE receives a DL user data packet marked with a RQI and the DL user data packet belongs to a PDU session of IPv4 IPv6 IPv4v6 or ethernet PDU session type for which the UE has already revoked the usage of reflective QoS then the UE shall ignore the RQI and shall handle the received DL user data packet

e) collision of network-requested PDU session modification procedure and UE-requested PDU session modification procedure

the handling of the same abnormal case as described in subclause 6.3.2.6 applies

f) upon receiving an indication that the 5GSM message was not forwarded due to service area restrictions along with a PDU SESSION MODIFICATION REQUEST message with the PDU session ID IE set to the same value as the PDU session ID that was sent by the UE the UE shall abort the procedure and shall stop the timer T3581

g) upon receiving an indication that the 5GSM message was not forwarded due to routing failure along with a PDU SESSION MODIFICATION REQUEST message with the PDU session ID IE set to the same value as the PDU session ID that was sent by the UE the UE shall stop timer T3581 and shall abort the procedure

ga) upon receiving an indication that the 5GSM message was not forwarded because the UE accessing via a satellite NG-RAN cell is informed that the PLMN is not allowed to operate at the present UE location along with a PDU SESSION MODIFICATION REQUEST message with the PDU session ID IE set to the same value as the PDU session ID that was sent by the UE the UE shall stop timer T3581 and shall abort the procedure

gb) upon receiving an indication that the 5GSM message was not forwarded due to unexpected cause along with a PDU SESSION MODIFICATION REQUEST message with the PDU session ID IE set to the same value as the PDU session ID that was sent by the UE the UE shall stop timer T3581 and shall abort the procedure

h) collision of UE-requested PDU session modification procedure and N1 NAS signalling connection release

the UE may immediately retransmit the PDU SESSION MODIFICATION REQUEST message and stop reset and restart timer T3581 if the following conditions apply

1) the original UE-requested PDU session modification procedure was initiated over an existing N1 NAS signalling connection; and

2) the previous transmission of the PDU SESSION MODIFICATION REQUEST message was not initiated due to timer T3581 expiry

i) rejection of a UE-requested PDU session modification procedure when the UE has initiated the procedure to delete one or more non-default QoS rules for the PDU session

upon receipt of a PDU SESSION MODIFICATION REJECT message with 5GSM cause value #31 "request rejected unspecified" if the UE had initiated deletion of one or more non-default QoS rules for the PDU session as an implementation option

1) it may perform a local release of the PDU session and shall stop the timer T3581 in order to synchronize the PDU session context with the AMF the UE shall perform the registration procedure for mobility and periodic registration update with a REGISTRATION REQUEST message including the PDU session status IE; or

2) it shall stop the timer T3581 and initiate the UE-requested PDU session release procedure

NOTE the UE can delay the release of the PDU session until there is no pending data transferred through the other QoS flows of the PDU session

#### 6.4.2.6 abnormal cases on the network side

the following abnormal cases can be identified

a) if the PDU session is an emergency PDU session and the 5GSM cause IE is not included in the PDU SESSION MODIFICATION REQUEST message which is not triggered according to subclause 6.4.2.1 item e) or is set to a 5GSM cause other than the 5GSM causes #41 #42 #44 #45 #83 #84 and #85 the SMF shall reject the PDU SESSION MODIFICATION REQUEST message with 5GSM cause #31 "request rejected unspecified"

b) PDU session inactive for the received PDU session identity

if the PDU session ID in the PDU SESSION MODIFICATION REQUEST message belongs to any PDU session in state PDU SESSION INACTIVE in the SMF the SMF shall set the 5GSM cause IE to #43 "Invalid PDU session identity" in the PDU SESSION MODIFICATION REJECT message

c) collision of network-requested PDU session modification procedure and UE-requested PDU session modification procedure

the handling of the same abnormal case as described in subclause 6.3.2.5 applies

d) AMF provides a "message was exempted from the DNN based congestion activated in the AMF" but the UE-requested PDU session modification procedure is not exempt from DNN based congestion control

if the SMF receives an exemptionind attribute indicating "message was exempted from the DNN based congestion activated in the AMF" as specified in 3GPP TS 29.502 [20A] and the extended protocol configuration options IE of the PDU SESSION MODIFICATION REQUEST message does not indicate 3GPP PS data off UE status then the SMF shall set the 5GSM cause #26 "insufficient resources" in the PDU SESSION MODIFICATION REJECT message

e) AMF provides a "message was exempted from the S-NSSAI and DNN based congestion activated in the AMF" but the UE-requested PDU session modification procedure is not exempt from S-NSSAI only based congestion control

if the SMF receives an exemptionind attribute indicating "message was exempted from the S-NSSAI and DNN based congestion activated in the AMF" as specified in 3GPP TS 29.502 [20A] and the extended protocol configuration options IE of the PDU SESSION MODIFICATION REQUEST message does not indicate 3GPP PS data off UE status then the SMF shall set the 5GSM cause #67 "insufficient resources for specific slice and DNN" in the PDU SESSION MODIFICATION REJECT message

f) AMF provides a "message was exempted from the S-NSSAI only based congestion activated in the AMF" but the UE-requested PDU session modification procedure is not exempt from S-NSSAI only based congestion control

if the SMF receives an exemptionind attribute indicating "message was exempted from the S-NSSAI only based congestion activated in the AMF" as specified in 3GPP TS 29.502 [20A] and the extended protocol configuration options IE of the PDU SESSION MODIFICATION REQUEST message does not indicate 3GPP PS data off UE status then the SMF shall set the 5GSM cause #69 "insufficient resources for specific slice" in the PDU SESSION MODIFICATION REJECT message

g) 5G access network cannot forward the message

if the SMF determines based on content of the n2SmInfo attribute specified in 3GPP TS 29.502 [20A] that the DL NAS TRANSPORT message carrying the PDU SESSION MODIFICATION COMMAND message was not forwarded to the UE by the 5G access network due to a cause other than handover procedure in progress then the SMF shall reject the UE-requested PDU session modification procedure with an appropriate 5GSM cause value in the PDU SESSION MODIFICATION REJECT message

NOTE the use of an appropriate 5GSM cause value is implementation specific

### 6.4.3 UE-requested PDU session release procedure

#### 6.4.3.1 general

the purpose of the UE-requested PDU session release procedure is to enable by the UE to request a release of a PDU session

the UE is allowed to initiate the PDU session release procedure even if the timer T3396 is running

the UE is allowed to initiate the PDU session release procedure even if the timer T3584 is running

the UE is allowed to initiate the PDU session release procedure even if the timer T3585 is running

the UE is allowed to initiate the PDU session release procedure even if the UE is outside the LADN service area

#### 6.4.3.2 UE-requested PDU session release procedure initiation

in order to initiate the UE-requested PDU session release procedure the UE shall create a PDU SESSION RELEASE REQUEST message

the UE may set the 5GSM cause IE of the PDU SESSION RELEASE REQUEST message to indicate the reason for releasing the PDU session

the 5GSM cause IE typically indicates one of the following 5GSM cause values

#26 insufficient resources;

#36 regular deactivation;

#44 semantic errors in packet filter(s);

#45 syntactical error in packet filter(s);

#83 semantic error in the QoS operation;

#84 syntactical error in the QoS operation;

#96 invalid mandatory information

the UE shall allocate a PTI value currently not used and shall set the PTI IE of the PDU SESSION RELEASE REQUEST message to the allocated PTI value

the UE shall transport the PDU SESSION RELEASE REQUEST message and the PDU session ID using the NAS transport procedure as specified in subclause 5.4.5 and the UE shall start timer T3582 (see example in figure 6.4.3.2.1)

if the UE is releasing the PDU session due to

a) errors in QoS operations or packet filters; or

b) the number of the authorized QoS rules the number of the packet filters or the number of the authorized QoS flow descriptions associated with the PDU session have reached the maximum number supported by the UE

the UE shall include the 5GSM cause IE in the PDU SESSION RELEASE REQUEST message as described in subclauses 6.3.2.4 and 6.4.1.3

figure 6.4.3.2.1 UE-requested PDU session release procedure

#### 6.4.3.3 UE-requested PDU session release procedure accepted by the network

upon receipt of a PDU SESSION RELEASE REQUEST message and a PDU session ID if the SMF accepts the request to release the PDU session and shall perform the network-requested PDU session release procedure as specified in subclause 6.3.3

#### 6.4.3.4 UE-requested PDU session release procedure not accepted by the network

upon receipt of a PDU SESSION RELEASE REQUEST message if the SMF does not accept the request to release the PDU session the SMF shall create a PDU SESSION RELEASE REJECT message

the SMF shall set the 5GSM cause IE of the PDU SESSION RELEASE REJECT message to indicate the reason for rejecting the PDU session release

the 5GSM cause IE typically indicates one of the following SM cause values

#35 PTI already in use; or

#43 invalid PDU session identity; or

#95 – 111 protocol errors

the SMF shall send the PDU SESSION RELEASE REJECT message

upon receipt of a PDU SESSION RELEASE REJECT message and a PDU session ID using the NAS transport procedure as specified in subclause 5.4.5 the UE shall stop timer T3582 release the allocated PTI value and locally release the PDU session if there is one or more multicast MBS sessions associated with the PDU session the UE shall locally leave the associated multicast MBS sessions

#### 6.4.3.5 abnormal cases in the UE

the following abnormal cases can be identified

a) expiry of timer T3582

the UE shall on the first expiry of the timer T3582 retransmit the PDU SESSION RELEASE REQUEST message and the PDU session information which was transported together with the initial transmission of the PDU SESSION RELEASE REQUEST message and shall reset and start timer T3582 this retransmission is repeated four times i.e on the fifth expiry of timer T3582 the UE shall abort the procedure release the allocated PTI perform a local release of the PDU session and perform the registration procedure for mobility and periodic registration update by sending a REGISTRATION REQUEST message including the PDU session status IE over each access that user plane resources have been established if the PDU session is an MA PDU session or over the access the PDU session is associated with if the PDU session is a single access PDU session if there is one or more multicast MBS sessions associated with the PDU session the UE shall locally leave the associated multicast MBS sessions

b) collision of UE-requested PDU session release procedure and network-requested PDU session modification procedure

when the UE receives a PDU SESSION MODIFICATION COMMAND message during the UE-requested PDU session release procedure and the PDU session indicated in PDU SESSION MODIFICATION COMMAND message is the PDU session that the UE had requested to release the UE shall ignore the PDU SESSION MODIFICATION COMMAND message and proceed with the PDU session release procedure

c) collision of UE-requested PDU session release procedure and network-requested PDU session release procedure

when the UE receives a PDU SESSION RELEASE COMMAND message with the PTI IE set to "No procedure transaction identity assigned" during the UE-requested PDU session release procedure the PDU session indicated in the PDU SESSION RELEASE COMMAND message is the same as the PDU session that the UE requests to release

- if the access type IE is included in the PDU SESSION RELEASE COMMAND message and the PDU session is an MA PDU session and having user-plane resources established on the access different from the access indicated in the access type IE in the PDU SESSION RELEASE COMMAND message the UE shall proceed both the UE-requested PDU session release procedure and network-requested PDU session release procedure; or

- otherwise the UE shall abort the UE-requested PDU session release procedure and shall stop the timer T3582 and proceed with the network-requested PDU session release procedure

NOTE 1 whether the UE ignores the 5GSM cause #39 "reactivation requested" if received in the PDU SESSION RELEASE COMMAND is up to the UE implementation

d) receipt of an indication that the 5GSM message was not forwarded due to routing failure

upon receiving an indication that the 5GSM message was not forwarded due to routing failure along with a PDU SESSION RELEASE REQUEST message with the PDU session ID IE set to the same value as the PDU session ID that was sent by the UE the UE shall stop timer T3582 abort the procedure release the allocated PTI perform a local release of the PDU session and perform the registration procedure for mobility and periodic registration update by sending a REGISTRATION REQUEST message including the PDU session status IE over each access that user plane resources have been established if the PDU session is an MA PDU session or over the access the PDU session is associated with if the PDU session is a single access PDU session if there is one or more multicast MBS sessions associated with the released PDU session the UE shall locally leave the associated multicast MBS sessions

e) PDU session release signalling restricted due to service area restrictions

the UE may delay the release of the PDU session until the UE is not restricted by service area restrictions or it may release the allocated PTI perform a local release of the PDU session and include the PDU session status IE over each access that user plane resources have been established if the PDU session is an MA PDU session or over the access the PDU session is associated with if the PDU session is a single access PDU when performing the next registration procedure if the UE performs the local release of the PDU session and there is one or more multicast MBS sessions associated with the released PDU session the UE shall locally leave the associated multicast MBS sessions

f) collision of UE-requested PDU session release procedure and N1 NAS signalling connection release

the UE may immediately retransmit the PDU SESSION RELEASE REQUEST message and stop reset and restart timer T3582 if the following conditions apply

1) the original UE-requested PDU session release procedure was initiated over an existing N1 NAS signalling connection; and

2) the previous transmission of the PDU SESSION RELEASE REQUEST message was not initiated due to timer T3582 expiry

g) receipt of an indication that the 5GSM message was not forwarded due to the PLMN is not allowed to operate at the present UE location

upon receiving an indication that the 5GSM message was not forwarded because the UE accessing via a satellite NG-RAN cell is informed that the PLMN is not allowed to operate at the present UE location along with a PDU SESSION RELEASE REQUEST message with the PDU session ID IE set to the same value as the PDU session ID that was sent by the UE the UE shall stop timer T3582 abort the procedure and locally release the PDU session

ga) upon receiving an indication that the 5GSM message was not forwarded due to unexpected cause along with a PDU SESSION RELEASE REQUEST message with the PDU session ID IE set to the same value as the PDU session ID that was sent by the UE the UE shall stop timer T3582 abort the procedure and locally release the PDU session

#### 6.4.3.6 abnormal cases on the network side

the following abnormal cases can be identified

a) PDU session inactive for the received PDU session identity

if the PDU session ID in the PDU SESSION RELEASE REQUEST message belongs to any PDU session in state PDU SESSION INACTIVE in the SMF the SMF shall send the PDU SESSION RELEASE REJECT message to the UE with the 5GSM cause #43 "Invalid PDU session identity"

## 6.5 5GSM status procedure

### 6.5.1 general

the purpose of the sending of the 5GSM STATUS message is to report at any time certain error conditions detected upon receipt of 5GSM protocol data the 5GSM STATUS message can be sent by both the network and the UE (see example in figure 6.5.1.1)

figure 6.5.1.1 5GSM status procedure

### 6.5.2 5GSM status received in the UE

if the 5GSM entity of the UE receives a 5GSM STATUS message the UE shall take different actions depending on the received 5GSM cause value

#47 PTI mismatch

the UE shall abort any ongoing 5GSM procedure related to the received PTI value and stop any related timer

#81 invalid PTI value

the UE shall abort any ongoing 5GSM procedure related to the received PTI value and stop any related timer

#97 message type non-existent or not implemented

the UE shall abort any ongoing 5GSM procedure related to the PTI or PDU session ID and stop any related timer

on receipt of a 5GSM STATUS message with any other 5GSM cause value no state transition and no specific action shall be taken as seen from the radio interface i.e local actions are possible

### 6.5.3 5GSM status received in the SMF

if the SMF receives a 5GSM STATUS message the SMF shall take different actions depending on the received 5GSM cause value

#43 invalid PDU session identity

the SMF shall abort any ongoing 5GSM procedure related to the PTI or PDU session ID stop any related timer and locally release the PDU session indicated in the 5GSM STATUS message

#47 PTI mismatch

the SMF shall abort any ongoing 5GSM procedure related to the received PTI value and stop any related timer

if the PTI indicated in the 5GSM STATUS message is related to a PDU SESSION ESTABLISHMENT ACCEPT message the SMF shall perform a local release of the PDU session indicated in the PDU SESSION ESTABLISHMENT ACCEPT message

#81 invalid PTI value

the SMF shall abort any ongoing 5GSM procedure related to the received PTI value and stop any related timer

#96 invalid mandatory information

the SMF shall abort any ongoing 5GSM procedure related to the PTI or PDU session ID and stop any related timer

#97 message type non-existent or not implemented

the SMF shall abort any ongoing 5GSM procedure related to the PTI or PDU session ID and stop any related timer

the local actions to be taken by the SMF on receipt of a 5GSM STATUS message with any other 5GSM cause value are implementation dependent

## 6.6 miscellaneous procedures

### 6.6.1 exchange of extended protocol configuration options

the UE and the SMF can exchange protocol configuration options via 5GSM procedures

the protocol configuration options shall be exchanged via the extended protocol configuration options IE

### 6.6.2 remote UE report procedure

#### 6.6.2.1 general

the purpose of the 5G ProSe remote UE report procedure is for a UE acting as a 5G ProSe layer-3 UE-to-network relay UE to notify the network that one or more 5G ProSe remote UEs are connected to the 5G ProSe layer-3 UE-to-network relay UE or disconnected from the 5G ProSe layer-3 UE-to-network relay UE as specified in 3GPP TS 23.304 [6E]

the UE does not initiate the remote UE report procedure if the timer T3396 is running

the UE does not initiate the remote UE report procedure if the timer T3584 is running

the UE does not initiate the remote UE report procedure if the timer T3585 is running

#### 6.6.2.2 remote UE report procedure initiation

in order to initiate the 5G ProSe remote UE report procedure the UE shall create a REMOTE UE REPORT message

the UE shall include information of newly connected or disconnected 5G ProSe remote UEs to the network in the REMOTE UE REPORT message by setting the values of the remote UE context connected IE or the remote UE context disconnected IE to the 5G ProSe remote UE identities that are being connected or disconnected respectively

the UE shall set the remote UE ID with

a) the UP-PRUK ID of the 5G ProSe remote UE if the security for 5G ProSe communication via 5G ProSe UE-to-network relay is performed over user plane as specified in 3GPP TS 33.503 [56];

b) the CP-PRUK ID of the 5G ProSe remote UE if the security for 5G ProSe communication via 5G ProSe UE-to-network relay is performed over control plane as specified in 3GPP TS 33.503 [56]; or

c) the PEI of the 5G ProSe remote UE if the RSC is specific for emergency services as specified in 3GPP TS 24.554 [19E] and the 5G ProSe remote UE is identified by a PEI

if the UE sets the remote UE ID with the PRUK ID of the 5G ProSe remote UE and the UP-PRUK ID is in 64-bit string format the UE shall include the HPLMN ID of the 5G ProSe remote UE

if the UE allocated an IPv4 address to a 5G ProSe remote UE and enabled UDP usage to the 5G ProSe remote UE the UE shall include in the REMOTE UE REPORT message the UDP port range assigned to the 5G ProSe remote UE in the NAT function of 5G ProSe layer-3 UE-to-network relay if the UE allocated an IPv4 address to a 5G ProSe remote UE and enabled TCP usage to the 5G ProSe remote UE the UE shall include in the REMOTE UE REPORT message the TCP port range assigned to the 5G ProSe remote UE in the NAT function of 5G ProSe layer-3 UE-to-network relay

the UE shall set the PDU session ID IE to the value of the PDU session associated with the 5G ProSe remote UE connected to the 5G ProSe layer-3 UE-to-network relay UE or disconnected from the 5G ProSe layer-3 UE-to-network relay UE

the UE shall allocate a PTI value currently not used and shall set the PTI IE of the REMOTE UE REPORT message to the allocated PTI value

the UE shall transport the REMOTE UE REPORT message and the PDU session ID using the NAS transport procedure as specified in subclause 5.4.5 and the UE shall start timer T3586 (see example in figure 6.6.2.2.1)

figure 6.6.2.2.1 remote UE report procedure

#### 6.6.2.3 remote UE report procedure accepted by the network

upon receipt of the REMOTE UE REPORT message the SMF shall send a REMOTE UE REPORT RESPONSE message to the UE the SMF shall include the PTI from the REMOTE UE REPORT message

the SMF shall set the EAP message IE to an EAP-success message or an EAP-failure message to be sent to the 5G ProSe layer-3 remote UE if the EAP-success message or the EAP-failure message is received from the DN

upon receipt of the REMOTE UE REPORT RESPONSE message the UE shall stop timer T3586 and enter the state PROCEDURE TRANSACTION INACTIVE

#### 6.6.2.4 abnormal cases in the UE

the following abnormal cases can be identified

a) expiry of timer T3586

on the first expiry of the timer T3586 the UE shall resend the REMOTE UE REPORT message and shall reset and restart timer T3586 this retransmission is repeated two times i.e on the third expiry of timer T3586 the UE shall abort the procedure and release any resources for this procedure

NOTE after the abortion of the remote UE report procedure the remote UE report procedure for the remote UE(s) can be restarted and how to restart the procedure is left to UE implementation

b) collision of network-requested PDU session release procedure and remote UE report procedure

if the UE receives a PDU SESSION RELEASE COMMAND message during the remote UE report procedure and the PDU session indicated in the PDU SESSION RELEASE COMMAND message is the PDU session ID that the UE had indicated in the REMOTE UE REPORT message the UE shall abort the remote UE report procedure and proceed with the network-requested PDU session release procedure

c) collision of remote UE report procedure and N1 NAS signalling connection release

the UE may immediately retransmit the REMOTE UE REPORT message and stop reset and restart timer T3586 if following conditions apply

1) the original REMOTE UE REPORT was initiated over an existing N1 NAS signalling connection; and

2) the previous transmission of the REMOTE UE REPORT message was not initiated due to timer T3586 expiry

#### 6.6.2.5 abnormal cases on the network side

the following abnormal cases have been identified

a) collision of network-requested PDU session release procedure and remote UE report procedure

if the SMF receives a REMOTE UE REPORT message during a network-requested PDU session release procedure and the PDU session indicated in the PDU SESSION RELEASE COMMAND message is the PDU session ID that is in the REMOTE UE REPORT message the SMF shall abort the remote UE report procedure and proceed with the network-requested PDU session release procedure

b) PDU session inactive for the received PDU session identity

if the PDU session ID in the REMOTE UE REPORT message belongs to any PDU session in state PDU SESSION INACTIVE in the SMF the SMF shall send the 5GSM STATUS message to the UE with the 5GSM cause #43 "Invalid PDU session identity"

# 7 handling of unknown unforeseen and erroneous protocol data

## 7.1 general

the procedures specified in the present document apply to those messages which pass the checks described in this subclause

this subclause also specifies procedures for the handling of unknown unforeseen and erroneous protocol data by the receiving entity these procedures are called "error handling procedures" but in addition to providing recovery mechanisms for error situations they define a compatibility mechanism for future extensions of the protocols

subclauses 7.1 to 7.8 shall be applied in order of precedence

detailed error handling procedures in the network are implementation dependent and may vary from PLMN to PLMN however when extensions of this protocol are developed networks are assumed to have the error handling which is indicated in this subclause as mandatory ("shall") and that is indicated as strongly recommended ("should")

also the error handling of the network is only considered as mandatory or strongly recommended when certain thresholds for errors are not reached during a dedicated connection

for definition of semantical and syntactical errors see 3GPP TS 24.007 [11] subclause 11.4.2

## 7.2 message too short or too long

### 7.2.1 message too short

when a message is received that is too short to contain a complete message type information element that message shall be ignored cf 3GPP TS 24.007 [11]

### 7.2.2 message too long

the maximum size of a NAS message for NR connected to 5GCN is specified in 3GPP TS 38.323 [29]

the maximum size of a NAS message for E-UTRA connected to 5GCN is specified 3GPP TS 36.323 [25]

the maximum size of a NAS message for non-3GPP access connected to 5GCN is specified in 3GPP TS 24.502 [18]

## 7.3 unknown or unforeseen procedure transaction identity or PDU session identity

### 7.3.1 procedure transaction identity

the following network procedures shall apply for handling an unknown erroneous or unforeseen PTI received in a 5GSM message

a) in case the network receives a PDU SESSION MODIFICATION COMPLETE a PDU SESSION RELEASE COMPLETE message or a PDU SESSION MODIFICATION COMMAND REJECT message in which the PTI value is an assigned or unassigned value that does not match any PTI in use the network shall respond with a 5GSM STATUS message including 5GSM cause #47 "PTI mismatch"

b) in case the network receives a PDU SESSION AUTHENTICATION COMPLETE message or a SERVICE-LEVEL AUTHENTICATION COMPLETE message in which the PTI value is an assigned value the network shall respond with a 5GSM STATUS message including 5GSM cause #81 "invalid PTI value"

c) in case the network receives a PDU SESSION ESTABLISHMENT REQUEST message a PDU SESSION MODIFICATION REQUEST message or a PDU SESSION RELEASE REQUEST message in which the PTI value is an unassigned value the network shall respond with a 5GSM STATUS message including 5GSM cause #81 "invalid PTI value"

d) in case the network receives a 5GSM message in which the PTI value is a reserved value the network shall ignore the message

the following UE procedures shall apply for handling an unknown erroneous or unforeseen PTI received in a 5GSM message

a) in case the UE receives a PDU SESSION MODIFICATION COMMAND message or a PDU SESSION MODIFICATION REJECT message in which the PTI value is an assigned value that does not match any PTI in use

1) if the UE detects that this PDU SESSION MODIFICATION COMMAND message is a network retransmission of an already accepted request (see subclause 6.3.2.3) the UE shall respond with a PDU SESSION MODIFICATION COMPLETE message;

2) if the UE detects that this PDU SESSION MODIFICATION COMMAND message is a network retransmission of an already rejected request (see subclause 6.3.2.4) the UE shall respond with a PDU SESSION MODIFICATION COMAND REJECT message; or

3) otherwise the UE shall respond with a 5GSM STATUS message including 5GSM cause #47 "PTI mismatch"

b) in case the UE receives a PDU SESSION RELEASE COMMAND message or a PDU SESSION RELEASE REJECT message in which the PTI value is an assigned value that does not match any PTI in use

1) if the UE detects that this PDU SESSION RELEASE COMMAND message is a network retransmission of an already accepted request (see subclause 6.3.3.3) the UE shall respond with a PDU SESSION RELEASE COMPLETE message; or

2) otherwise the UE shall respond with a 5GSM STATUS message including 5GSM cause #47 "PTI mismatch"

c) in case the UE receives a PDU SESSION ESTABLISHMENT ACCEPT message or a PDU SESSION ESTABLISHMENT REJECT message in which the PTI value is an assigned value that does not match any PTI in use

1) the UE shall respond with a 5GSM STATUS message including 5GSM cause #47 "PTI mismatch"

d) in case the UE receives a PDU SESSION AUTHENTICATION COMMAND message a PDU SESSION AUTHENTICATION RESULT message or a SERVICE-LEVEL AUTHENTICATION COMMAND message in which the PTI value is an assigned value the UE shall respond with a 5GSM STATUS message including 5GSM cause #81 "invalid PTI value"

e) in case the UE receives a PDU SESSION ESTABLISHMENT ACCEPT message a PDU SESSION ESTABLISHMENT REJECT message a PDU SESSION MODIFICATION REJECT message or a PDU SESSION RELEASE REJECT message in which the PTI value is an unassigned value the UE shall ignore the message

f) in case the UE receives a 5GSM message in which the PTI value is a reserved value the UE shall ignore the message

### 7.3.2 PDU session identity

the following network procedures shall apply for handling an unknown erroneous or unforeseen PDU session identity received in the header of a 5GSM message (specified as the header of a standard L3 message see 3GPP TS 24.007 [11])

a) if the network receives a PDU SESSION MODIFICATION REQUEST message which includes an unassigned or reserved PDU session identity value the network shall respond with a PDU SESSION MODIFICATION REJECT message including 5GSM cause #43 "invalid PDU session identity"

b) if the network receives PDU SESSION RELEASE REQUEST message which includes an unassigned or reserved PDU session identity value the network shall respond with a PDU SESSION RELEASE REJECT message including 5GSM cause #43 "invalid PDU session identity"

c) upon receipt of an UL NAS TRANSPORT message the network takes the following actions

1) if the request type IE is set to "initial request" or "initial emergency request" and the message includes a reserved PDU session identity value the network shall respond with a DL NAS TRANSPORT message with 5GMM cause #90 "payload was not forwarded";

2) otherwise if the message includes an unassigned or reserved PDU session identity value the network shall respond with a DL NAS TRANSPORT message with 5GMM cause #90 "payload was not forwarded"

d) if the network receives a 5GSM message other than those listed in items a) through c) above in which the message includes a reserved PDU session identity value or an assigned value that does not match an existing PDU session the network shall ignore the message

the following UE procedures shall apply for handling an unknown erroneous or unforeseen PDU session identity received in the header of a 5GSM message

a) if the UE receives a 5GSM message which includes an unassigned or reserved PDU session identity value the UE shall ignore the message

b) if the UE receives a 5GSM message which includes a PDU session identity belonging to any PDU session in state PDU SESSION INACTIVE in the UE the UE shall respond with a 5GSM STATUS message including 5GSM cause #43 "invalid PDU session identity"

## 7.4 unknown or unforeseen message type

if UE receives a 5GMM message or 5GSM message with message type not defined for the extended protocol discriminator (EPD) or not implemented by the receiver it shall return a status message (5GMM STATUS or 5GSM STATUS depending on the EPD) with cause #97 "message type non-existent or not implemented"

if the network receives a 5GMM or 5GSM message with message type not defined for the EPD or not implemented by the receiver in a protocol state where reception of an unsolicited message with the given EPD from the UE is not foreseen in the protocol the network actions are implementation dependent otherwise if the network receives a message with message type not defined for the EPD or not implemented by the receiver it shall ignore the message except that it should return a status message (5GMM STATUS or 5GSM STATUS depending on the EPD) with cause #97 "message type non-existent or not implemented"

NOTE a message type not defined for the EPD in the given direction is regarded by the receiver as a message type not defined for the EPD see 3GPP TS 24.007 [11]

if the UE receives a message not compatible with the protocol state the UE shall return a status message (5GMM STATUS or 5GSM STATUS depending on the EPD) with cause #98 "message type not compatible with protocol state"

if the network receives a message not compatible with the protocol state the network actions are implementation dependent

## 7.5 Non-semantical mandatory information element errors

### 7.5.1 common procedures

when on receipt of a message

a) an "imperative message part" error; or

b) a "missing mandatory IE" error

is diagnosed or when a message containing

a) a syntactically incorrect mandatory IE;

b) an IE with an IEI unknown in the message but encoded as "comprehension required" (see 3GPP TS 24.007 [11]); or

c) an out of sequence IE encoded as "comprehension required" (see 3GPP TS 24.007 [11]) is received

the UE shall proceed as follows

if the message is not one of the messages listed in the UE procedures in subclause 7.5.3 item a) b) or c) the UE shall return a status message (5GMM STATUS or 5GSM STATUS depending on the EPD) with cause #96 "invalid mandatory information";

the network shall proceed as follows

if the message is not one of the messages listed in the network procedures in subclause 7.5.3 item a) b) or c) the network shall either

1) try to treat the message (the exact further actions are implementation dependent); or

2) ignore the message except that it should return a status message (5GMM STATUS or 5GSM STATUS depending on the EPD) with cause #96 "invalid mandatory information"

### 7.5.2 5GS mobility management

no exceptional cases are described for 5GS mobility management messages

no semantical or syntactical diagnosis other than presence and length shall be performed on the EPS NAS message container information element in the REGISTRATION REQUEST message

### 7.5.3 5GS session management

the following UE procedures shall apply for handling an error encountered with a mandatory information element in a 5GSM message

a) if the message is a PDU SESSION ESTABLISHMENT ACCEPT the UE shall initiate PDU session release procedure by sending a PDU SESSION RELEASE REQUEST message with 5GSM cause #96 "invalid mandatory information"

b) void

c) if the message is a PDU SESSION RELEASE COMMAND a PDU SESSION RELEASE COMPLETE message with 5GSM cause #96 "invalid mandatory information" shall be returned

the following network procedures shall apply for handling an error encountered with a mandatory information element in a 5GSM message

a) if the message is a PDU SESSION ESTABLISHMENT REQUEST a PDU SESSION ESTABLISHMENT REJECT message with 5GSM cause #96 "invalid mandatory information" shall be returned

b) if the message is a PDU SESSION MODIFICATION REQUEST a PDU SESSION MODIFICATION REJECT message with 5GSM cause #96 "invalid mandatory information" shall be returned

c) if the message is a PDU SESSION RELEASE REQUEST a PDU SESSION RELEASE REJECT message with 5GSM cause #96 "invalid mandatory information" shall be returned

## 7.6 unknown and unforeseen IEs in the non-imperative message part

### 7.6.1 IEIs unknown in the message

the UE shall ignore all IEs with an IEI unknown in a message which are not encoded as "comprehension required" (see 3GPP TS 24.007 [11])

the network shall take the same approach

### 7.6.2 out of sequence IEs

the UE shall ignore all out of sequence IEs in a message which are not encoded as "comprehension required" (see 3GPP TS 24.007 [11])

the network should take the same approach

### 7.6.3 repeated IEs

if an information element with format t TV TLV or TLV-E is repeated in a message in which repetition of the information element is not specified in clause 8 and clause 9 of the present document the UE shall handle only the contents of the information element appearing first and shall ignore all subsequent repetitions of the information element when repetition of information elements is specified the UE shall handle only the contents of specified repeated information elements if the limit on repetition of information elements is exceeded the UE shall handle the contents of information elements appearing first up to the limit of repetitions and shall ignore all subsequent repetitions of the information element

the network should follow the same procedures

### 7.6.4 unknown and unforeseen IEs in a type 6 IE container information element

#### 7.6.4.1 IEIs unknown in the type 6 IE container information element

the UE shall ignore all IEs with an IEI unknown in a type 6 IE container information element which are not encoded as "comprehension required" (see 3GPP TS 24.007 [11])

the network shall take the same approach

NOTE the set of IEIs defined for a type 6 IE container information element is independent of the set of IEIs defined for other parts of the message therefore an IE can be unknown in a type 6 IE container information element even if an IE with the same IEI is known in other parts of the message and vice versa

#### 7.6.4.2 out of sequence IEs

the UE shall ignore all out of sequence IEs in a type 6 IE container information element which are not encoded as "comprehension required" (see 3GPP TS 24.007 [11])

the network should take the same approach

#### 7.6.4.3 repeated IEs

if an information element with format TLV-E is repeated in a type 6 IE container information element in which repetition of the information element is not specified in clause 8 and clause 9 of the present document the UE shall handle only the contents of the information element appearing first and shall ignore all subsequent repetitions of the information element when repetition of information elements in the type 6 IE container information element is specified the UE shall handle only the contents of specified repeated information elements if the limit on repetition of information elements is exceeded the UE shall handle the contents of information elements appearing first up to the limit of repetitions and shall ignore all subsequent repetitions of the information element

the network should follow the same procedures

## 7.7 Non-imperative message part errors

this category includes

a) syntactically incorrect optional IEs; and

b) conditional IE errors

### 7.7.1 syntactically incorrect optional IEs

the UE shall treat all optional IEs that are syntactically incorrect in a message as not present in the message

the network shall take the same approach

### 7.7.2 conditional IE errors

when upon receipt of a 5GMM or 5GSM message the UE diagnoses a "missing conditional IE" error or an "unexpected conditional IE" error or when it receives a 5GMM or 5GSM message containing at least one syntactically incorrect conditional IE the UE shall ignore the message and shall return a status message (5GMM STATUS or 5GSM STATUS depending on the EPD) with cause #100 "conditional IE error"

when the network receives a message and diagnoses a "missing conditional IE" error or an "unexpected conditional IE" error or when it receives a message containing at least one syntactically incorrect conditional IE the network shall either

a) try to treat the message (the exact further actions are implementation dependent); or

b) ignore the message except that it should return a status message (5GMM STATUS or 5GSM STATUS depending on the EPD) with cause #100 "conditional IE error"

### 7.7.3 errors in a type 6 IE container information element

#### 7.7.3.1 syntactically incorrect optional IEs

the UE shall treat all optional IEs that are syntactically incorrect in a type 6 IE container information element as not present in the type 6 IE container information element

the network shall take the same approach

EXAMPLE 1 if the type 6 IE container information element includes 2 type 6 information elements and the first one is syntactically incorrect the receiver ignores the first information element and continues with the processing of the second one

EXAMPLE 2 if the remaining value part of a type 6 IE container information element is too short to contain a complete type 6 information element the receiver ignores these octets and continues with the processing of the octets following the type 6 IE container information element if there are any

#### 7.7.3.2 conditional IE errors

when upon receipt of a 5GMM or 5GSM message the UE diagnoses a "missing conditional IE" error or an "unexpected conditional IE" error for the contents of a type 6 IE container information element or when it receives a 5GMM or 5GSM message with a type 6 IE container information element containing at least one syntactically incorrect conditional IE the UE shall ignore the message and shall return a status message (5GMM STATUS or 5GSM STATUS depending on the EPD) with cause #100 "conditional IE error"

when the network receives a message and diagnoses a "missing conditional IE" error or an "unexpected conditional IE" error for the contents of a type 6 IE container information element or when it receives a message with a type 6 IE container information element containing at least one syntactically incorrect conditional IE the network shall either

a) try to treat the message (the exact further actions are implementation dependent); or

b) ignore the message except that it should return a status message (5GMM STATUS or 5GSM STATUS depending on the EPD) with cause #100 "conditional IE error"

## 7.8 messages with semantically incorrect contents

when a message with semantically incorrect contents is received the UE shall perform the foreseen reactions of the procedural part of the present document (i.e of clauses 5 6) if however no such reactions are specified the UE shall ignore the message except that it shall return a status message (5GMM STATUS or 5GSM STATUS depending on the EPD) with cause #95 "semantically incorrect message"

the network should follow the same procedure except that a status message is not normally transmitted

# 8 message functional definitions and contents

## 8.1 overview

this clause defines the structure of the messages of the layer 3 (L3) protocols defined in the present document these are standard L3 messages as defined in 3GPP TS 24.007 [12]

each definition given in the present clause includes

a) a brief description of the message direction and use including whether the message has

1 local significance i.e relevant only on the originating or terminating access;

2 access significance i.e relevant in the originating and terminating access but not in the network;

3 dual significance i.e relevant in either the originating or terminating access and in the network; or

4 global significance i.e relevant in the originating and terminating access and in the network

b) a table listing the information elements (IE) known in the message and the order of their appearance in the message all IEs that may be repeated are explicitly indicated (The v LV and LV-E formatted IEs which compose the imperative part of the message occur before the t TV TLV and TLV-E formatted IEs which compose the non-imperative part of the message see 3GPP TS 24.007 [12]) in a (maximal) sequence of consecutive IEs with half octet length the first IE with half octet length occupies bits 1 to 4 of octet n the second IE bits 5 to 8 of octet n the third IE bits 1 to 4 of octet N+1 etc such a sequence always has an even number of elements

for each information element the table indicates

1 the information element identifier (IEI) in hexadecimal notation if the IE has format t TV TLV or TLV-E if the IEI has half octet length it is specified by a notation representing the IEI as a hexadecimal digit followed by a "-" (example B-)

NOTE 1 the same IEI can be used for different information element types in different messages of the same protocol

NOTE 2 if a message includes a type 6 IE container information element then the same IEI can be used for different information element types in the type 6 IE container information element and in other parts of the same message

2 the name of the information element (which may give an idea of the semantics of the element) the name of the information element followed by "IE" or "information element" is used in this technical report as reference to the information element within a message

3 the name of the type of the information element (which indicates the coding of the value part of the IE) and generally the referenced subclause of clause 9 of the present document describing the value part of the information element

4 the presence requirement indication (M c or O) for the IE as defined in 3GPP TS 24.007 [12]

5 the format of the information element (T v TV LV TLV LV-E or TLV-E) as defined in 3GPP TS 24.007 [12]

6 the length of the information element (or permissible range of lengths) in octets in the message where "?" means that the maximum length of the IE is only constrained by link layer protocol this indication is non-normative

c) subclauses specifying where appropriate conditions for IEs with presence requirement c or o in the relevant message which together with other conditions specified in the present document define when the information elements shall be included or not what non-presence of such IEs means and – for IEs with presence requirement c – the static conditions for presence or non-presence of the IEs or for both cases (see 3GPP TS 24.007 [12])

## 8.2 5GS mobility management messages

### 8.2.1 authentication request

#### 8.2.1.1 message definition

the AUTHENTICATION REQUEST message is sent by the AMF to the UE to initiate authentication of the UE identity see table 8.2.1.1.1

message type AUTHENTICATION REQUEST

significance dual

direction network to UE

table 8.2.1.1.1 AUTHENTICATION REQUEST message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Authentication request message identity | Message type  9.7 | M | V | 1 |
|  | ngKSI | NAS key set identifier  9.11.3.32 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | ABBA | ABBA  9.11.3.10 | M | LV | 3-n |
| 21 | Authentication parameter RAND (5G authentication challenge) | Authentication parameter RAND  9.11.3.16 | O | TV | 17 |
| 20 | Authentication parameter AUTN (5G authentication challenge) | Authentication parameter AUTN  9.11.3.15 | O | TLV | 18 |
| 78 | EAP message | EAP message  9.11.2.2 | O | TLV-E | 7-1503 |

#### 8.2.1.2 authentication parameter RAND

authentication parameter RAND IE is included if the AUTHENTICATION REQUEST message is used in a 5G AKA authentication procedure

#### 8.2.1.3 authentication parameter AUTN

authentication parameter AUTN IE is included if the AUTHENTICATION REQUEST message is used in a 5G AKA authentication procedure

#### 8.2.1.4 void

#### 8.2.1.5 EAP message

EAP message IE is included if the AUTHENTICATION REQUEST message is used in an EAP based primary authentication and key agreement procedure

### 8.2.2 authentication response

#### 8.2.2.1 message definition

the AUTHENTICATION RESPONSE message is sent by the UE to the AMF to deliver a calculated authentication response to the network see table 8.2.2.1.1

message type AUTHENTICATION RESPONSE

significance dual

direction UE to network

table 8.2.2.1.1 AUTHENTICATION RESPONSE message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Authentication response message identity | Message type  9.7 | M | V | 1 |
| 2D | Authentication response parameter | Authentication response parameter  9.11.3.17 | O | TLV | 18 |
| 78 | EAP message | EAP message  9.11.2.2 | O | TLV-E | 7-1503 |

#### 8.2.2.2 authentication response parameter

this IE is included if the message is sent in a 5G AKA based primary authentication and key agreement procedure

#### 8.2.2.3 EAP message

EAP message IE is included if the EAP message received in a related AUTHENTICATION REQUEST message was an EAP-request

### 8.2.3 authentication result

#### 8.2.3.1 message definition

the AUTHENTICATION RESULT message is sent by the AMF to the UE to provide result of EAP authentication of the UE identity see table 8.2.3.1.1

message type AUTHENTICATION RESULT

significance dual

direction network to UE

table 8.2.3.1.1 AUTHENTICATION RESULT message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Authentication result message identity | Message type  9.7 | M | V | 1 |
|  | ngKSI | NAS key set identifier  9.11.3.32 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | EAP message | EAP message  9.11.2.2 | M | LV-E | 6-1502 |
| 38 | ABBA | ABBA  9.11.3.10 | O | TLV | 4-n |
| 55 | AUN3 device security key | AUN3 device security key  9.11.3.107 | O | TLV | 36-n |

NOTE it is possible for AMFs compliant with version 18.3.0 or 18.3.1 of this specification to send the AUN3 device security key IE with a fixed length of 66 octets

#### 8.2.3.2 ABBA

this IE shall be included if the message contains an EAP message IE with an EAP-success message

#### 8.2.3.3 AUN3 device security key

this IE shall be included when the AUTHENTICATION RESULT message is provided to a 5G-RG that is acting on behalf of an AUN3 device if the EAP message IE is set to an EAP-success message

### 8.2.4 authentication failure

#### 8.2.4.1 message definition

the AUTHENTICATION FAILURE message is sent by the UE to the AMF to indicate that authentication of the network has failed see table 8.2.4.1.1

message type AUTHENTICATION FAILURE

significance dual

direction UE to network

table 8.2.4.1.1 AUTHENTICATION FAILURE message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Authentication failure message identity | Message type  9.7 | M | V | 1 |
|  | 5GMM cause | 5GMM cause  9.11.3.2 | M | V | 1 |
| 30 | Authentication failure parameter | Authentication failure parameter  9.11.3.14 | O | TLV | 16 |

#### 8.2.4.2 authentication failure parameter

this IE shall be included in a 5G AKA based primary authentication and key agreement procedure if and only if the 5GMM cause was #21 "synch failure" it shall include the response to the authentication challenge from the USIM which is made up of the AUTS parameter (see 3GPP TS 33.501 [24])

### 8.2.5 authentication reject

#### 8.2.5.1 message definition

the AUTHENTICATION REJECT message is sent by the AMF to the UE to indicate that the authentication procedure has failed and that the UE shall abort all activities see table 8.2.5.1.1

message type AUTHENTICATION REJECT

significance dual

direction network to UE

table 8.2.5.1.1 AUTHENTICATION REJECT message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Authentication reject message identity | Message type  9.7 | M | V | 1 |
| 78 | EAP message | EAP message  9.11.2.2 | O | TLV-E | 7-1503 |

#### 8.2.5.2 EAP message

EAP message IE is included if the AUTHENTICATION REJECT message is used to convey EAP-failure message

### 8.2.6 registration request

#### 8.2.6.1 message definition

the REGISTRATION REQUEST message is sent by the UE to the AMF see table 8.2.6.1.1

message type REGISTRATION REQUEST

significance dual

direction UE to network

table 8.2.6.1.1 REGISTRATION REQUEST message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended Protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Registration request message identity | Message type  9.7 | M | V | 1 |
|  | 5GS registration type | 5GS registration type  9.11.3.7 | M | V | 1/2 |
|  | ngKSI | NAS key set identifier  9.11.3.32 | M | V | 1/2 |
|  | 5GS mobile identity | 5GS mobile identity  9.11.3.4 | M | LV-E | 6-n |
| C- | Non-current native NAS key set identifier | NAS key set identifier  9.11.3.32 | O | TV | 1 |
| 10 | 5GMM capability | 5GMM capability  9.11.3.1 | O | TLV | 3-15 |
| 2E | UE security capability | UE security capability  9.11.3.54 | O | TLV | 4-10 |
| 2F | Requested NSSAI | NSSAI  9.11.3.37 | O | TLV | 4-74 |
| 52 | Last visited registered TAI | 5GS tracking area identity  9.11.3.8 | O | TV | 7 |
| 17 | S1 UE network capability | S1 UE network capability  9.11.3.48 | O | TLV | 4-15 |
| 40 | Uplink data status | Uplink data status  9.11.3.57 | O | TLV | 4-34 |
| 50 | PDU session status | PDU session status  9.11.3.44 | O | TLV | 4-34 |
| B- | MICO indication | MICO indication  9.11.3.31 | O | TV | 1 |
| 2B | UE status | UE status  9.11.3.56 | O | TLV | 3 |
| 77 | Additional GUTI | 5GS mobile identity  9.11.3.4 | O | TLV-E | 14 |
| 25 | Allowed PDU session status | Allowed PDU session status  9.11.3.13 | O | TLV | 4-34 |
| 18 | UE's usage setting | UE's usage setting  9.11.3.55 | O | TLV | 3 |
| 51 | Requested DRX parameters | 5GS DRX parameters  9.11.3.2A | O | TLV | 3 |
| 70 | EPS NAS message container | EPS NAS message container  9.11.3.24 | O | TLV-E | 4-n |
| 74 | LADN indication | LADN indication  9.11.3.29 | O | TLV-E | 3-811 |
| 8- | Payload container type | Payload container type  9.11.3.40 | O | TV | 1 |
| 7B | Payload container | Payload container  9.11.3.39 | O | TLV-E | 4-65538 |
| 9- | Network slicing indication | Network slicing indication  9.11.3.36 | O | TV | 1 |
| 53 | 5GS update type | 5GS update type  9.11.3.9A | O | TLV | 3 |
| 41 | Mobile station classmark 2 | Mobile station classmark 2  9.11.3.31C | O | TLV | 5 |
| 42 | Supported codecs | Supported codec list  9.11.3.51A | O | TLV | 5-n |
| 71 | NAS message container | NAS message container  9.11.3.33 | O | TLV-E | 4-n |
| 60 | EPS bearer context status | EPS bearer context status  9.11.3.23A | O | TLV | 4 |
| 6E | Requested extended DRX parameters | Extended DRX parameters  9.11.3.26A | O | TLV | 3-4 |
| 6A | T3324 value | GPRS timer 3  9.11.2.5 | O | TLV | 3 |
| 67 | UE radio capability ID | UE radio capability ID  9.11.3.68 | O | TLV | 3-n |
| 35 | Requested mapped NSSAI | Mapped NSSAI  9.11.3.31B | O | TLV | 3-42 |
| 48 | Additional information requested | Additional information requested  9.11.3.12A | O | TLV | 3 |
| 1A | Requested WUS assistance information | WUS assistance information  9.11.3.71 | O | TLV | 3-n |
| A- | N5GC indication | N5GC indication  9.11.3.72 | O | TV | 1 |
| 30 | Requested NB-N1 mode DRX parameters | NB-N1 mode DRX parameters  9.11.3.73 | O | TLV | 3 |
| 29 | UE request type | UE request type  9.11.3.76 | O | TLV | 3 |
| 28 | Paging restriction | Paging restriction  9.11.3.77 | O | TLV | 3-35 |
| 72 | Service-level-AA container | Service-level-AA container  9.11.2.10 | O | TLV-E | 4-65538 |
| 32 | NID | NID  9.11.3.79 | O | TLV | 8 |
| 16 | UE determined PLMN with disaster condition | PLMN identity  9.11.3.85 | O | TLV | 5 |
| 2A | Requested PEIPS assistance information | PEIPS assistance information  9.11.3.80 | O | TLV | 3-n |
| 3B | Requested T3512 value | GPRS timer 3  9.11.2.5 | O | TLV | 3 |
| 3C | Unavailability information | Unavailability information  9.11.2.20 | O | TLV | 3-9 |
| 3F | Non-3GPP path switching information | Non-3GPP path switching information  9.11.3.102 | O | TLV | 3 |
| 56 | AUN3 indication | AUN3 indication  9.11.3.104 | O | TLV | 3 |

#### 8.2.6.2 Non-current native NAS key set identifier

the UE shall include this IE if the UE has a valid non-current native 5G NAS security context when the UE performs an inter-system change from S1 mode to N1 mode in 5GMM-CONNECTED mode and the UE uses a mapped 5G NAS security context to protect the REGISTRATION REQUEST message

#### 8.2.6.3 5GMM capability

the UE shall include this IE unless the UE performs a periodic registration updating procedure

#### 8.2.6.4 UE security capability

the UE shall include this IE unless the UE performs a periodic registration updating procedure

#### 8.2.6.5 requested NSSAI

this IE is included if the UE needs to indicate the requested NSSAI to the network

#### 8.2.6.6 last visited registered TAI

this IE shall be included if the UE holds a valid last visited registered TAI

#### 8.2.6.7 S1 UE network capability

a UE supporting S1 mode shall include this IE unless the UE performs a periodic registration updating procedure

#### 8.2.6.8 uplink data status

this IE shall be included if the UE has uplink user data pending to be sent or the UE has active multicast MBS session(s) unless the UE performs a periodic registration updating procedure

#### 8.2.6.9 PDU session status

this IE shall be included when the UE needs to indicate the PDU sessions that are associated with the access type that the message is sent over that are active within the UE

#### 8.2.6.10 MICO indication

the UE may include this IE to request the use of MICO mode

#### 8.2.6.11 UE status

this IE shall be included if the UE in single-registration mode performs the registration procedure due to inter-system change from S1 mode to N1 mode or if the UE in dual-registration mode and EMM state EMM-REGISTERED performs initial registration

#### 8.2.6.12 additional GUTI

this IE shall be included

a) if the UE performs the registration procedure due to inter-system change from S1 mode to N1 mode the UE operates in single-registration mode and the UE has a valid 5G-GUTI; or

b) the UE holds two valid native 5G-GUTIs and one of the valid native 5G-GUTI was assigned by the PLMN with which the UE is performing the registration

#### 8.2.6.13 allowed PDU session status

this IE shall be included if the REGISTRATION REQUEST message is sent as a response to paging with the access type indicating non-3GPP access

#### 8.2.6.14 UE's usage setting

this IE shall be included if the UE supports IMS voice

#### 8.2.6.15 requested DRX parameters

if the UE wants to use or change the UE specific DRX parameters the UE shall include the requested DRX parameters IE in the REGISTRATION REQUEST message

#### 8.2.6.16 EPS NAS message container

the UE operating in the single-registration mode shall include this information element as specified in subclause 5.5.1.3.2 if the UE performs mobility from S1 mode to N1 mode in 5GMM-IDLE mode the content of this message container is the complete integrity protected TRACKING AREA UPATE REQUEST message using EPS security context

the UE performing initial registration shall include this information element if

a) the UE

1) was previously registered in S1 mode before entering state EMM-DEREGISTERED; and

2) has received an "interworking without N26 interface not supported" indication from the network; and

b) EPS security context and a valid 4G-GUTI are available

the content of this message container is the complete integrity protected ATTACH REQUEST message using EPS security context

#### 8.2.6.17 LADN indication

the UE shall include this information element when the UE needs to request LADN information for specific LADN DNN(s) or to indicate a request for LADN information

#### 8.2.6.17A payload container type

this IE shall be included if the UE includes the payload container IE

NOTE in this version of the protocol the payload container type IE in the REGISTRATION REQUEST message is set to "UE policy container" as described in subclauses 5.5.1.2.2 and 5.5.1.3.2

#### 8.2.6.18 payload container

within a PLMN this IE shall be included if

a) the UE has one or more stored UE policy sections identified by a UPSI with the PLMN ID part indicating the HPLMN or the selected PLMN for the registration procedure for mobility and periodic registration update due to inter-system change from S1 mode to N1 mode of a UE operating in the single-registration mode or for the registration procedure for initial registration; or

b) the UE does not have any stored UE policy section identified by a UPSI with the PLMN ID part indicating the HPLMN or the selected PLMN for the registration procedure for mobility and periodic registration update due to inter-system change from S1 mode to N1 mode of a UE operating in the single-registration mode or for the registration procedure for initial registration and the UE needs to send a UE policy container to the network

within an SNPN this IE shall be included if

a) the UE has one or more stored UE policy sections for the selected SNPN for the registration procedure for initial registration; or

b) the UE does not have any UE policy section for the selected SNPN for the registration procedure for initial registration and the UE needs to send a UE policy container to the network

#### 8.2.6.19 network slicing indication

this IE shall be included when a requested NSSAI is included in the REGISTRATION REQUEST message and the requested NSSAI is created from the default configured NSSAI

#### 8.2.6.20 5GS update type

this IE shall be included when the UE is performing the registration procedure to indicate any of the following

a) the UE requests the use of SMS over NAS or there is a change in the UE's requirements to use SMS over NAS;

b) a change in the UE's radio capability for NG-RAN; or

c) the UE requests CIoT 5GS optimizations

#### 8.2.6.21 NAS message container

this IE shall be included if the UE is sending a REGISTRATION REQUEST message as an initial NAS message the UE has a valid 5G NAS security context and the UE needs to send non-cleartext IEs

#### 8.2.6.22 requested extended DRX parameters

the UE shall include this IE if the UE needs to use extended DRX or change the extended DRX parameters

#### 8.2.6.23 EPS bearer context status

the UE shall include this IE if the UE operating in the single-registration mode performs inter-system change from S1 mode to N1 mode and the UE has locally deactivated EPS bearer context(s) for which interworking to 5GS is supported while the UE was in S1 mode without notifying the network

#### 8.2.6.24 T3324 value

the UE may include this IE during the registration update procedure if it requests to use MICO mode and use the active time timer

#### 8.2.6.25 mobile station classmark 2

this IE shall be included if the UE supports 5G-SRVCC from NG-RAN to UTRAN (see 3GPP TS 23.216 [6A])

#### 8.2.6.26 supported codecs

this IE shall be included if the UE supports 5G-SRVCC from NG-RAN to UTRAN

#### 8.2.6.27 UE radio capability ID

this IE shall be included if the UE is not in NB-N1 mode the UE supports RACS and the UE needs to signal a UE radio capability ID to the network

#### 8.2.6.28 requested mapped NSSAI

this IE shall be included by the UE when the UE has a PDN connection or a PDU session to transfer to visited PLMN associated only with an S-NSSAI that is applicable in the HPLMN as specified in subclause 5.5.1.3.2

#### 8.2.6.29 additional information requested

the UE shall include this IE if the UE supports ciphered broadcast assistance data and the UE needs to obtain new ciphering keys for ciphered broadcast assistance data

#### 8.2.6.30 requested WUS assistance information

the UE may include this IE if

- the UE supports WUS assistance information;

- the UE is not performing initial registration for emergency services; and

- the UE does not have an active emergency PDU session

#### 8.2.6.31 void

#### 8.2.6.32 N5GC indication

this IE shall be included in the REGISTRATION REQUEST message when the W-AGF acting on behalf of an N5GC device performs registration procedure for initial registration

#### 8.2.6.33 requested NB-N1 mode DRX parameters

the UE shall include this IE if the UE wants to use or change the UE specific DRX parameters for NB-N1 mode

#### 8.2.6.34 UE request type

the UE shall include this IE if the MUSIM UE requests the release of the NAS signalling connection

#### 8.2.6.35 paging restriction

the UE shall include this IE if the request type is set to "NAS signalling connection release" in the UE request type IE and the UE requests the network to restrict paging

#### 8.2.6.35 Service-level-AA container

the UE shall include this IE if the UE supporting UAS services requests a registration for UAS services

#### 8.2.6.36 NID

the UE shall include this IE if the 5G-GUTI in the 5GS mobile identity IE was assigned by an SNPN other than the SNPN with which the UE is registering

#### 8.2.6.37 UE determined PLMN with disaster condition

the UE shall include this IE when the UE needs to indicate the UE determined PLMN with disaster condition determined as specified in 3GPP TS 23.122 [5]

#### 8.2.6.38 requested PEIPS assistance information

the UE may include this IE if the UE supports NR paging subgrouping the UE is not performing initial registration for emergency services is not registered for emergency services and does not have an active emergency PDU session

#### 8.2.6.39 requested T3512 value

the UE may include this IE during the registration procedure if it requests to use MICO mode and T3324 IE is included to request a particular T3512 timer value

#### 8.2.6.40 unavailability information

this IE shall be included if an event is triggered in the UE that would make the UE unavailable for a certain period

#### 8.2.6.41 Non-3GPP path switching information

the UE may include this IE during the registration procedure for mobility registration update if it requests from the network to keep using the user plane resources of the old non-3GPP access during path switching to the new non-3GPP access

#### 8.2.6.42 AUN3 indication

this IE shall be included in the REGISTRATION REQUEST message when the 5G-RG is acting on behalf of an AUN3 device performs registration procedure for initial registration

### 8.2.7 registration accept

#### 8.2.7.1 message definition

the REGISTRATION ACCEPT message is sent by the AMF to the UE see table 8.2.7.1.1

message type REGISTRATION ACCEPT

significance dual

direction network to UE

table 8.2.7.1.1 REGISTRATION ACCEPT message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Registration accept message identity | Message type  9.7 | M | V | 1 |
|  | 5GS registration result | 5GS registration result  9.11.3.6 | M | LV | 2 |
| 77 | 5G-GUTI | 5GS mobile identity  9.11.3.4 | O | TLV-E | 14 |
| 4A | Equivalent PLMNs | PLMN list  9.11.3.45 | O | TLV | 5-47 |
| 54 | TAI list | 5GS tracking area identity list  9.11.3.9 | O | TLV | 9-114 |
| 15 | Allowed NSSAI | NSSAI  9.11.3.37 | O | TLV | 4-74 |
| 11 | Rejected NSSAI | Rejected NSSAI  9.11.3.46 | O | TLV | 4-42 |
| 31 | Configured NSSAI | NSSAI  9.11.3.37 | O | TLV | 4-146 |
| 21 | 5GS network feature support | 5GS network feature support  9.11.3.5 | O | TLV | 3-6 |
| 50 | PDU session status | PDU session status  9.11.3.44 | O | TLV | 4-34 |
| 26 | PDU session reactivation result | PDU session reactivation result  9.11.3.42 | O | TLV | 4-34 |
| 72 | PDU session reactivation result error cause | PDU session reactivation result error cause  9.11.3.43 | O | TLV-E | 5-515 |
| 79 | LADN information | LADN information  9.11.3.30 | O | TLV-E | 13-1715 |
| B- | MICO indication | MICO indication  9.11.3.31 | O | TV | 1 |
| 9- | Network slicing indication | Network slicing indication  9.11.3.36 | O | TV | 1 |
| 27 | Service area list | Service area list  9.11.3.49 | O | TLV | 6-114 |
| 5E | T3512 value | GPRS timer 3  9.11.2.5 | O | TLV | 3 |
| 5D | Non-3GPP de-registration timer value | GPRS timer 2  9.11.2.4 | O | TLV | 3 |
| 16 | T3502 value | GPRS timer 2  9.11.2.4 | O | TLV | 3 |
| 34 | Emergency number list | Emergency number list  9.11.3.23 | O | TLV | 5-50 |
| 7A | Extended emergency number list | Extended emergency number list  9.11.3.26 | O | TLV-E | 7-65538 |
| 73 | SOR transparent container | SOR transparent container  9.11.3.51 | O | TLV-E | 20-n |
| 78 | EAP message | EAP message  9.11.2.2 | O | TLV-E | 7-1503 |
| A- | NSSAI inclusion mode | NSSAI inclusion mode  9.11.3.37A | O | TV | 1 |
| 76 | Operator-defined access category definitions | Operator-defined access category definitions  9.11.3.38 | O | TLV-E | 3-8323 |
| 51 | Negotiated DRX parameters | 5GS DRX parameters  9.11.3.2A | O | TLV | 3 |
| D- | Non-3GPP NW policies | Non-3GPP NW provided policies  9.11.3.36A | O | TV | 1 |
| 60 | EPS bearer context status | EPS bearer context status  9.11.3.23A | O | TLV | 4 |
| 6E | Negotiated extended DRX parameters | Extended DRX parameters  9.11.3.26A | O | TLV | 3-4 |
| 6C | T3447 value | GPRS timer 3  9.11.2.5 | O | TLV | 3 |
| 6B | T3448 value | GPRS timer 2  9.11.2.4 | O | TLV | 3 |
| 6A | T3324 value | GPRS timer 3  9.11.2.5 | O | TLV | 3 |
| 67 | UE radio capability ID | UE radio capability ID  9.11.3.68 | O | TLV | 3-n |
| E- | UE radio capability ID deletion indication | UE radio capability ID deletion indication  9.11.3.69 | O | TV | 1 |
| 39 | Pending NSSAI | NSSAI  9.11.3.37 | O | TLV | 4-146 |
| 74 | Ciphering key data | Ciphering key data  9.11.3.18C | O | TLV-E | 34-n |
| 75 | CAG information list | CAG information list  9.11.3.18A | O | TLV-E | 3-n |
| 1B | Truncated 5G-S-TMSI configuration | Truncated 5G-S-TMSI configuration  9.11.3.70 | O | TLV | 3 |
| 1C | Negotiated WUS assistance information | WUS assistance information  9.11.3.71 | O | TLV | 3-n |
| 29 | Negotiated NB-N1 mode DRX parameters | NB-N1 mode DRX parameters  9.11.3.73 | O | TLV | 3 |
| 68 | Extended rejected NSSAI | Extended rejected NSSAI  9.11.3.75 | O | TLV | 5-90 |
| 7B | Service-level-AA container | Service-level-AA container  9.11.2.10 | O | TLV-E | 4-65538 |
| 33 | Negotiated PEIPS assistance information | PEIPS assistance information  9.11.3.80 | O | TLV | 3-n |
| 35 | 5GS additional request result | 5GS additional request result  9.11.3.81 | O | TLV | 3 |
| 70 | NSSRG information | NSSRG information  9.11.3.82 | O | TLV-E | 7-4099 |
| 14 | Disaster roaming wait range | Registration wait range  9.11.3.84 | O | TLV | 4 |
| 2C | Disaster return wait range | Registration wait range  9.11.3.84 | O | TLV | 4 |
| 13 | List of PLMNs to be used in disaster condition | List of PLMNs to be used in disaster condition  9.11.3.83 | O | TLV | 2-n |
| 1D | Forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" | 5GS tracking area identity list  9.11.3.9 | O | TLV | 9-114 |
| 1E | Forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service" | 5GS tracking area identity list  9.11.3.9 | O | TLV | 9-114 |
| 71 | Extended CAG information list | Extended CAG information list  9.11.3.86 | O | TLV-E | 3-n |
| 7C | NSAG information | NSAG information  9.11.3.87 | O | TLV-E | 9-3143 |
| 3D | Equivalent SNPNs | SNPN list  9.11.3.92 | O | TLV | 11-137 |
| 32 | NID | NID  9.11.3.79 | O | TLV | 8 |
| 7D | Registration accept type 6 IE container | Type 6 IE container  9.11.3.98 | O | TLV-E | 6-65538 |
| 4B | RAN timing synchronization | RAN timing synchronization  9.11.3.95 | O | TLV | 3 |
| 4C | Alternative NSSAI | Alternative NSSAI  9.11.3.97 | O | TLV | 2-146 |
| 4F | Maximum time offset | GPRS timer 3  9.11.2.5 | O | TLV | 3 |
| 5B | S-NSSAI time validity information | S-NSSAI time validity information  9.11.3.101 | O | TLV | 23-257 |
| 3C | Unavailability configuration | Unavailability configuration  9.11.2.21 | O | TLV | 3-6 |
| 5C | Feature authorization indication | Feature authorization indication  9.11.3.105 | O | TLV | 3-257 |
| 61 | On-demand NSSAI | On-demand NSSAI  9.11.3.108 | O | TLV | 5-210 |
| 63 | RAT utilization control | RAT utilization control  9.11.3.110 | O | TLV | 4 |

#### 8.2.7.2 5G-GUTI

this IE may be included to assign a 5G-GUTI to a UE

#### 8.2.7.3 equivalent PLMNs

this IE may be included in order to assign an equivalent PLMNs list to a UE

#### 8.2.7.4 TAI list

this IE may be included to assign a TAI list to a UE

#### 8.2.7.5 allowed NSSAI

this IE shall be included

a) if

1) one or more S-NSSAIs in the requested NSSAI of the REGISTRATION REQUEST message are allowed by the AMF for a network not supporting NSSAA;

2) one or more S-NSSAIs in the requested NSSAI of the REGISTRATION REQUEST message are not subject to network slice-specific authentication and authorization and are allowed by the AMF; or

3) the network slice-specific authentication and authorization has been successfully performed for one or more S-NSSAIs in the requested NSSAI of the REGISTRATION REQUEST message; or

63b) if the initial registration request is not for onboarding services in SNPN or the UE is not registered for onboarding services in SNPN the requested NSSAI was not included in the REGISTRATION REQUEST message or none of the requested NSSAI are allowed; and

1) the network does not support NSSAA; or

2) the network has one or more default S-NSSAIs which are not subject to network slice-specific authentication and authorization

#### 8.2.7.6 rejected NSSAI

the network may include this IE to inform the UE of one or more S-NSSAIs that were included in the requested NSSAI in the REGISTRATION REQUEST message but were rejected by the network

#### 8.2.7.7 configured NSSAI

the network may include this IE if the network needs to provide the UE with a new configured NSSAI for the current PLMN or SNPN and the UE is neither registering nor registered for onboarding services in SNPN

#### 8.2.7.8 5GS network feature support

the network may include this IE to inform the UE of the support of certain features if this IE is not included then the UE shall interpret this as a receipt of an information element with all bits of the value part coded as zero

#### 8.2.7.9 PDU session status

this IE shall be included when the network needs to indicate the PDU sessions that are associated with the access type the message is sent over that are active in the network

#### 8.2.7.10 PDU session reactivation result

this IE shall be included

- if the uplink data status IE is included in the REGISTRATION REQUEST message; or

- if the allowed PDU session status IE is included in the REGISTRATION REQUEST message and there is at least one PDU session indicated in the allowed PDU session status IE for which the user-plane resources can be re-established over 3GPP access

#### 8.2.7.11 PDU session reactivation result error cause

this IE may be included if the PDU session reactivation result IE is included and there exist one or more PDU sessions for which the user-plane resources cannot be re-established to indicate the cause of failure to re-establish the user-plane resources

#### 8.2.7.12 LADN information

the network shall include this IE if there are valid LADN service area(s) for the subscribed DNN(s) of the UE in the current registration area

#### 8.2.7.13 MICO indication

the network shall include the MICO indication IE if

a)- the UE included the MICO indication IE in the REGISTRATION REQUEST message; and

b) the network supports and accepts the use of MICO mode

#### 8.2.7.14 network slicing indication

this IE shall be included if the user's network slicing subscription has changed in the UDM of a PLMN or an SNPN

#### 8.2.7.15 service area list

this IE may be included to assign new service area restrictions to the UE

#### 8.2.7.16 T3512 value

the AMF shall include this IE during a registration procedure over 3GPP access when the 5GS registration type IE does not indicate "periodic registration updating" the AMF may include this IE during the mobility and periodic registration update procedure over 3GPP access when the 5GS registration type IE indicates "periodic registration updating"

#### 8.2.7.17 Non-3GPP de-registration timer value

this IE may be included if the network needs to indicate to the UE registered over non-3GPP access the value of a non-3GPP de-registration timer value

#### 8.2.7.18 T3502 value

this IE may be included to indicate a value for timer T3502

#### 8.2.7.19 emergency number list

this IE may be sent by the network if this IE is sent the contents of this IE indicates a list of emergency numbers valid within the same country as in the PLMN from which this IE is received

#### 8.2.7.20 extended emergency number list

this IE may be sent by the network if this IE is sent the contents of this IE indicates a list of emergency numbers (with URN information) valid within the same country as in the PLMN from which this IE is received or valid only in the PLMN or SNPN from which this IE is received

#### 8.2.7.21 SOR transparent container

this IE may be sent by the network

#### 8.2.7.22 EAP message

EAP message IE is included if the REGISTRATION ACCEPT message is sent as part of registration for emergency services and is used to convey EAP-failure message

#### 8.2.7.23 NSSAI inclusion mode

this IE shall be included if required by operatory policy

#### 8.2.7.24 Operator-defined access category definitions

this IE may be included to assign new operator-defined access category definitions to the UE or delete the operator-defined access category definitions at the UE side

#### 8.2.7.25 negotiated DRX parameters

the network shall include this IE if the requested DRX parameters IE was included in the REGISTRATION REQUEST message

#### 8.2.7.26 Non-3GPP NW policies

the AMF shall not include this IE during a registration procedure over non-3GPP access

this IE is included if the network needs to indicate whether emergency numbers provided via non-3GPP access can be used to initiate UE detected emergency calls (see 3GPP TS 24.302 [16]) if this IE is not included then the UE shall interpret this as a receipt of an information element with all bits of the value part coded as zero

NOTE in this version of the specification this IE is applicable in case the UE is connected to a PLMN using an ePDG as specified in 3GPP TS 24.302 [16]

#### 8.2.7.27 negotiated extended DRX parameters

the network shall include the negotiated extended DRX parameters IE if

- the UE included the requested extended DRX parameters IE in the REGISTRATION REQUEST message; and

- the network supports eDRX and accepts the use of eDRX

#### 8.2.7.28 T3447 value

the network may include T3447 value IE if

- the UE has indicated support for service gap control in the REGISTRATION REQUEST message; and

- the 5GMM context contains a service gap time value

#### 8.2.7.29 T3448 value

the network may include this IE if the congestion control for transport of user data via the control plane is active and the UE supports the control plane CIoT 5GS optimizations

#### 8.2.7.30 T3324 value

the AMF shall include this IE if the UE has requested active time value in the REGISTRATION REQEUST message and the AMF decides to accept the use of MICO mode and the use of the active time

#### 8.2.7.31 EPS bearer context status

this IE shall be included when the network generated an EPS bearer context status information for the UE during the inter-system change from S1 mode to N1 mode and the network supports N26 interface

#### 8.2.7.32 UE radio capability ID

this IE may be included if the UE is not in NB-N1 mode both the UE and the network support RACS and the network needs to assign a network-assigned UE radio capability ID to the UE

#### 8.2.7.33 UE radio capability ID deletion indication

this IE may be included if the UE is not in NB-N1 mode both the UE and the network support RACS and the network needs to trigger the UE to delete all network-assigned UE radio capability IDs stored at the UE for the serving PLMN or SNPN

#### 8.2.7.34 pending NSSAI

the network may include this IE to inform the UE of one or more S-NSSAIs that are pending as the network slice-specific authentication and authorization procedure is not completed

#### 8.2.7.35 ciphering key data

this IE is included if the network needs to send ciphering key data to the UE for ciphered broadcast assistance data

#### 8.2.7.36 CAG information list

this IE may be included to assign a new "CAG information list" to the UE or delete the "CAG information list" at the UE side

#### 8.2.7.37 truncated 5G-S-TMSI configuration

the network shall include this IE if

- the UE is in NB-N1 mode;

- the UE requests "control plane CIoT 5GS optimization" in the 5GS update type IE of REGISTRATION REQUEST message;

- the AMF decides to accept the requested CIoT 5GS optimization; and

- the network is configured to provide the truncated 5G-S-TMSI configuration for control plane CIoT 5GS optimizations

#### 8.2.7.38 negotiated NB-N1 mode DRX parameters

the network shall include the negotiated NB-N1 mode DRX parameters IE if the requested NB-N1 mode DRX parameters IE was included in the REGISTRATION REQUEST message

#### 8.2.7.39 negotiated WUS assistance information

the network shall include the negotiated WUS assistance information IE if

- the UE supports WUS assistance information;

- the AMF supports and accepts the use of WUS assistance information;

- the UE is not performing the initial registration for emergency services; and

- the UE does not have an active emergency PDU session

#### 8.2.7.40 extended rejected NSSAI

if the UE supports extended rejected NSSAI the network may include this IE to inform the UE of one or more S-NSSAIs that were included in the requested NSSAI in the REGISTRATION REQUEST message but were rejected by the network

#### 8.2.7.41 Service-level-AA container

the network shall include this IE if the UUAA procedure is triggered for the UE supporting UAS services the network may include this IE if there is a valid successful UUAA result for the UE in the UE 5GMM context upon a registration for UAS services is requested from the UE

#### 8.2.7.42 negotiated PEIPS assistance information

the network shall include the negotiated PEIPS assistance information IE if

- the UE supports NR paging subgrouping;

- the AMF supports and accepts the use of PEIPS assistance information for the UE; and

- the UE is not performing initial registration for emergency services and does not have an active emergency PDU session

#### 8.2.7.43 5GS additional request result

the network may include this IE to inform the UE about the result of additional request

#### 8.2.7.44 NSSRG information

this IE may be included to provide NSSRG information associated with the configured NSSAI

#### 8.2.7.45 disaster roaming wait range

this IE may be included to assign a new disaster roaming wait range to the UE

#### 8.2.7.46 disaster return wait range

this IE may be included to assign a new disaster return wait range to the UE

#### 8.2.7.47 list of PLMNs to be used in disaster condition

this IE may be included by an allowed PLMN to assign a new "list of PLMN(s) to be used in disaster condition" associated with the serving PLMN to the UE

#### 8.2.7.48 forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming"

this IE is included to indicate the forbidden TAI(s) to be stored in the list of "5GS forbidden tracking areas for roaming" this IE is included only if the message is sent via satellite NG-RAN access

#### 8.2.7.49 forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service"

this IE is included to indicate the forbidden TAI(s) to be stored in the list of "5GS forbidden tracking areas for regional provision of service" this IE is included only if the message is sent via satellite NG-RAN access

#### 8.2.7.50 extended CAG information list

if the UE supports extended CAG information list the network may include this IE to assign a new "CAG information list" to the UE or delete the "CAG information list" at the UE side

#### 8.2.7.51 NSAG information

if the UE has set the NSAG bit to "NSAG supported" in the 5GMM capability IE of the REGISTRATION REQUEST message over 3GPP access the network may include this IE to provide NSAG information to the UE otherwise the network shall not include this IE (see the 'comprehension required' scheme in subclause 11.2.5 of 3GPP TS 24.007 [11])

#### 8.2.7.52 equivalent SNPNs

this IE may be included in order to assign an equivalent SNPNs list to a UE by an AMF of an SNPN

#### 8.2.7.53 NID

this IE shall be included if the UE supports equivalent SNPNs and the serving SNPN changes

#### 8.2.7.54 registration accept type 6 IE container

##### 8.2.7.54.1 general

this information element may be included only if the network knows that the UE will not treat this IE as unknown 'comprehension required' IE otherwise the network shall not include this IE (see the 'comprehension required' scheme in subclause 11.2.5 of 3GPP TS 24.007 [11])

in this version of the specification only the transfer of the information elements specified in table 8.2.7.54.1.1 is supported in the registration accept type 6 IE container information element in the present message for the handling of an information element with an IEI not listed in table 8.2.7.54.1.1 i.e. with an IEI unknown in the registration accept type 6 IE container information element see subclause 7.6.4.1

table 8.2.7.54.1.1 information elements and IEIs for the registration accept type 6 IE container

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
| 01 | Extended LADN information | Extended LADN information  9.11.3.96 | O | TLV-E | 15-1787 |
| 02 | S-NSSAI location validity information | S-NSSAI location validity information  9.11.3.100 | O | TLV-E | 17-38611 |
| 03 | Partially allowed NSSAI | Partial NSSAI  9.11.3.103 | O | TLV-E | 3-808 |
| 04 | Partially rejected NSSAI | Partial NSSAI  9.11.3.103 | O | TLV-E | 3-808 |

##### 8.2.7.54.2 extended LADN information

the network shall include this IE if the UE supports LADN per DNN and S-NSSAI and there are valid LADN service area(s) for the subscribed DNN(s) of the UE and S-NSSAI associated with the LADN in the current registration area

##### 8.2.7.54.3 S-NSSAI location validity information

the network may include this IE to update the S-NSSAI location validity information

##### 8.2.7.54.4 void

##### 8.2.7.54.5 partially allowed NSSAI

the network may include this IE to assign a partially allowed NSSAI to the UE

##### 8.2.7.54.6 partially rejected NSSAI

the network may include this IE to assign a partially rejected NSSAI to the UE

#### 8.2.7.55 RAN timing synchronization

this IE may be included to provide information related to the RAN timing synchronization to a UE which has set the reconnection to the network due to RAN timing synchronization status change (RANtiming) bit to "Reconnection to the network due to RAN timing synchronization status change supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

#### 8.2.7.56 alternative NSSAI

the network may include this IE to provide the alternative NSSAI to the UE

#### 8.2.7.57 maximum time offset

this IE may be included to provide the UE with a maximum time offset

#### 8.2.7.58 S-NSSAI time validity information

if the UE supports S-NSSAI time validity information the network may include this IE to update the S-NSSAI time validity information

#### 8.2.7.59 unavailability configuration

the network should include this IE if the network needs to provide parameters related to unavailability period to the UE

##### 8.2.7.60 feature authorization indication

the network may include this IE to inform to the UE about the authorization status of the UE whether to operate as an MBSR or to operate not as an MBSR but to operate as a UE

#### 8.2.7.61 On-demand NSSAI

the network may include this IE to provide the on-demand NSSAI to the UE

#### 8.2.7.62 RAT utilization control

this IE is included to indicate the restricted RAT(s)

### 8.2.8 registration complete

#### 8.2.8.1 message definition

the REGISTRATION COMPLETE message is sent by the UE to the AMF see table 8.2.8.1.1

message type REGISTRATION COMPLETE

significance dual

direction UE to network

table 8.2.8.1.1 REGISTRATION COMPLETE message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Registration complete message identity | Message type  9.7 | M | V | 1 |
| 73 | SOR transparent container | SOR transparent container  9.11.3.51 | O | TLV-E | 20 |

#### 8.2.8.2 SOR transparent container

this IE may be sent by the UE if this IE is sent the contents of this IE indicates the UE acknowledgement of successful reception of the SOR transparent container IE in the REGISTRATION ACCEPT message this IE shall indicate the ME support of SOR-CMCI

### 8.2.9 registration reject

#### 8.2.9.1 message definition

the REGISTRATION REJECT message is sent by the AMF to the UE see table 8.2.9.1.1

message type REGISTRATION REJECT

significance dual

direction network to UE

table 8.2.9.1.1 REGISTRATION REJECT message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Registration reject message identity | Message type  9.7 | M | V | 1 |
|  | 5GMM cause | 5GMM cause  9.11.3.2 | M | V | 1 |
| 5F | T3346 value | GPRS timer 2  9.11.2.4 | O | TLV | 3 |
| 16 | T3502 value | GPRS timer 2  9.11.2.4 | O | TLV | 3 |
| 78 | EAP message | EAP message  9.11.2.2 | O | TLV-E | 7-1503 |
| 69 | Rejected NSSAI | Rejected NSSAI  9.11.3.46 | O | TLV | 4-42 |
| 75 | CAG information list | CAG information list  9.11.3.18A | O | TLV-E | 3-n |
| 68 | Extended rejected NSSAI | Extended rejected NSSAI  9.11.3.75 | O | TLV | 5-90 |
| 2C | Disaster return wait range | Registration wait range  9.11.3.84 | O | TLV | 4 |
| 71 | Extended CAG information list | Extended CAG information list  9.11.3.86 | O | TLV-E | 3-n |
| 3A | Lower bound timer value | GPRS timer 3  9.11.2.5 | O | TLV | 3 |
| 1D | Forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" | 5GS tracking area identity list  9.11.3.9 | O | TLV | 9-114 |
| 1E | Forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service" | 5GS tracking area identity list  9.11.3.9 | O | TLV | 9-114 |
| 3E | N3IWF identifier | N3IWF identifier  9.11.3.93 | O | TLV | 7-n |
| 4D | TNAN information | TNAN information  9.11.3.94 | O | TLV | 3-n |
| 62 | Extended 5GMM cause | Extended 5GMM cause  9.11.3.109 | O | TLV | 3 |
| 63 | RAT utilization control | RAT utilization control  9.11.3.110 | O | TLV | 4-n |

NOTE it is possible for AMFs compliant with version 17.7.0 or 17.8.0 of this specification to send the forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" IE with IEI of value "3B" for this message or the forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service" IE with IEI of value "3C" for this message

#### 8.2.9.2 T3346 value

the AMF may include this IE when the general NAS level mobility management congestion control is active

#### 8.2.9.3 T3502 value

this IE may be included to indicate a value for timer T3502 during the initial registration

#### 8.2.9.4 EAP message

EAP message IE is included if the REGISTRATION REJECT message is used to convey EAP-failure message

#### 8.2.9.5 rejected NSSAI

the network may include this IE to inform the UE of one or more S-NSSAIs that were included in the requested NSSAI in the REGISTRATION REQUEST message but were rejected by the network

#### 8.2.9.6 CAG information list

this IE may be included to assign a new "CAG information list" to the UE or delete the "CAG information list" at the UE side

#### 8.2.9.7 extended rejected NSSAI

if the UE supports extended rejected NSSAI the network may include this IE to inform the UE of one or more S-NSSAIs that were included in the requested NSSAI in the REGISTRATION REQUEST message but were rejected by the network

#### 8.2.9.8 disaster return wait range

this IE may be included to assign a new disaster return wait range to the UE

#### 8.2.9.9 extended CAG information list

if the UE supports extended CAG information list the network may include this IE to assign a new "CAG information list" to the UE or delete the "CAG information list" at the UE side

#### 8.2.9.10 lower bound timer value

the AMF may include this IE when the 5GMM cause is set to #78 "PLMN not allowed to operate at the present UE location" to provide a minimum time value for an entry added to the list of "PLMNs not allowed to operate at the present UE location"

#### 8.2.9.11 forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming"

this IE is included to indicate the forbidden TAI(s) to be stored in the list of "5GS forbidden tracking areas for roaming" this IE is included only if the message is sent via satellite NG-RAN access

#### 8.2.9.12 forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service"

this IE is included to indicate the forbidden TAI(s) to be stored in the list of "5GS forbidden tracking areas for regional provision of service" this IE is included only if the message is sent via satellite NG-RAN access

#### 8.2.9.13 N3IWF identifier

the network may include this IE if the UE supports slice-based N3IWF selection over non-3GPP access network

#### 8.2.9.14 TNAN information

the network may include this IE if the UE supports slice-based TNGF selection over trusted non-3GPP access network

#### 8.2.9.15 extended 5GMM cause

this IE may be included by the network to indicate additional information associated with the 5GMM cause value #15 "no suitable cells in tracking area"

#### 8.2.9.16 RAT utilization control

this IE is included to indicate the restricted RAT(s)

### 8.2.10 UL NAS transport

#### 8.2.10.1 message definition

the UL NAS TRANSPORT message transports message payload and associated information to the AMF see table 8.2.10.1.1

message type UL NAS TRANSPORT

significance dual

direction UE to network

table 8.2.10.1.1 UL NAS TRANSPORT message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | UL NAS TRANSPORT message identity | Message type  9.7 | M | V | 1 |
|  | Payload container type | Payload container type  9.11.3.40 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Payload container | Payload container  9.11.3.39 | M | LV-E | 3-65537 |
| 12 | PDU session ID | PDU session identity 2  9.11.3.41 | C | TV | 2 |
| 59 | Old PDU session ID | PDU session identity 2  9.11.3.41 | O | TV | 2 |
| 8- | Request type | Request type  9.11.3.47 | O | TV | 1 |
| 22 | S-NSSAI | S-NSSAI  9.11.2.8 | O | TLV | 3-10 |
| 25 | DNN | DNN  9.11.2.1B | O | TLV | 3-102 |
| 24 | Additional information | Additional information  9.11.2.1 | O | TLV | 3-n |
| A- | MA PDU session information | MA PDU session information  9.11.3.31A | O | TV | 1 |
| F- | Release assistance indication | Release assistance indication  9.11.3.46A | O | TV | 1 |
| 4E | Non-3GPP access path switching indication | Non-3GPP access path switching indication  9.11.3.99 | O | TLV | 3 |
| 5A | Alternative S-NSSAI | S-NSSAI  9.11.2.8 | O | TLV | 3-10 |
| 9- | Payload container information | Payload container information  9.11.3.106 | O | TV | 1 |

#### 8.2.10.2 PDU session ID

the UE shall include this IE when the payload container type IE is set to "N1 SM information" or "CIoT user data

#### 8.2.10.3 old PDU session ID

the UE shall include this IE if the UL NAS TRANSPORT message transports a PDU SESSION ESTABLISHMENT REQUEST message upon receiving the PDU SESSION MODIFICATION COMMAND message with the 5GSM cause IE set to #39 "reactivation requested" and the payload container type IE is set to "N1 SM information"

#### 8.2.10.4 request type

the UE shall include this IE when the PDU session ID IE is included and the payload container IE contains the PDU SESSION ESTABLISHMENT REQUEST message or the PDU SESSION MODIFICATION REQUEST which is not initiated to indicate a change of 3GPP PS data off UE status associated to a PDU session

#### 8.2.10.5 S-NSSAI

the UE may include this IE when the request type IE is set to "initial request" "existing PDU session" or "MA PDU request" the payload container type IE is set to "N1 SM information" and the UE is not registered for onboarding services in SNPN

#### 8.2.10.6 DNN

the UE may include this IE when the request type IE is set to "initial request" "existing PDU session" or "MA PDU request" the payload container type IE is set to "N1 SM information" and the UE is not registered for onboarding services in SNPN

#### 8.2.10.7 additional information

this IE is included when the payload container type IE is set to "LTE positioning protocol (LPP) message container" "UPP-CMI container" "SLPP message container" or "Location services (LCS) message container"

#### 8.2.10.8 MA PDU session information

the UE may include this IE if the request type IE is included and is not set to "initial emergency request " or "existing emergency PDU session" in the UL NAS TRANSPORT message

#### 8.2.10.9 release assistance indication

the UE may include this IE to inform the network whether

- no further uplink and no further downlink data transmission is expected; or

- only a single downlink data transmission (e.g acknowledgement or response to uplink data) and no further uplink data transmission subsequent to the uplink data transmission is expected

#### 8.2.10.10 Non-3GPP access path switching indication

the UE may include this IE when the payload container type IE is set to "N1 SM information" to indicate whether the UE supports the non-3GPP access path switching for the PDU session

#### 8.2.10.11 alternative S-NSSAI

the UE shall include this IE if the UE can provide alternative S-NSSAI associated with the S-NSSAI to be replaced to the network

#### 8.2.10.12 payload container information

the UE may include this IE when the payload container type IE is set to "Location services (LCS) message container"

### 8.2.11 DL NAS transport

#### 8.2.11.1 message definition

the DL NAS TRANSPORT message transports message payload and associated information to the UE see table 8.2.11.1.1

message type DL NAS TRANSPORT

significance dual

direction network to UE

table 8.2.11.1.1 DL NAS TRANSPORT message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | DL NAS TRANSPORT message identity | Message type  9.7 | M | V | 1 |
|  | Payload container type | Payload container type  9.11.3.40 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Payload container | Payload container  9.11.3.39 | M | LV-E | 3-65537 |
| 12 | PDU session ID | PDU session identity 2  9.11.3.41 | C | TV | 2 |
| 24 | Additional information | Additional information  9.11.2.1 | O | TLV | 3-n |
| 58 | 5GMM cause | 5GMM cause  9.11.3.2 | O | TV | 2 |
| 37 | Back-off timer value | GPRS timer 3  9.11.2.5 | O | TLV | 3 |
| 3A | Lower bound timer value | GPRS timer 3  9.11.2.5 | O | TLV | 3 |

#### 8.2.11.2 PDU session ID

the AMF shall include this IE when the payload container type IE is set to "N1 SM information" or "CIoT user data container"

#### 8.2.11.3 additional information

this IE is included when the payload container type IE is set to "LTE positioning protocol (LPP) message container" "UPP-CMI container" "SLPP message container" or "Location services (LCS) message container"

#### 8.2.11.4 5GMM cause

the AMF shall include this IE when the payload container IE contains an uplink payload which was not forwarded and the payload container type IE is not set to "Multiple payloads"

#### 8.2.11.5 Back-off timer value

the AMF may include this IE to indicate the back-off timer value when the payload container IE is included and the payload container type IE is not set to "Multiple payloads"

#### 8.2.11.6 lower bound timer value

the AMF may include this IE when the 5GMM cause is set to #78 "PLMN not allowed to operate at the present UE location" to provide a minimum time value for an entry added to the list of "PLMNs not allowed to operate at the present UE location"

### 8.2.12 De-registration request (UE originating de-registration)

#### 8.2.12.1 message definition

the DEREGISTRATION REQUEST message is sent by the UE to the AMF see table 8.2.12.1.1

message type DEREGISTRATION REQUEST

significance dual

direction UE to network

table 8.2.12.1.1 DEREGISTRATION REQUEST message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | De-registration request message identity | Message type  9.7 | M | V | 1 |
|  | De-registration type | De-registration type  9.11.3.20 | M | V | 1/2 |
|  | ngKSI | NAS key set identifier  9.11.3.32 | M | V | 1/2 |
|  | 5GS mobile identity | 5GS mobile identity  9.11.3.4 | M | LV-E | 6-n |
| 3C | Unavailability information | Unavailability information  9.11.2.20 | O | TLV | 3-9 |
| 71 | NAS message container | NAS message container  9.11.3.33 | O | TLV-E | 4-n |

#### 8.2.12.2 unavailability information

the UE may include this IE when an event is triggered in the UE that would make the UE unavailable for a certain period and the use of unavailability period is not due to NR satellite access discontinuous coverage

#### 8.2.12.3 NAS message container

this IE shall be included if the UE is sending a DEREGISTRATION REQUEST message as an initial NAS message and the UE needs to send non-cleartext IEs

### 8.2.13 De-registration accept (UE originating de-registration)

#### 8.2.13.1 message definition

the DEREGISTRATION ACCEPT message is sent by the AMF to the UE see table 8.2.13.1.1

message type DEREGISTRATION ACCEPT

significance dual

direction network to UE

table 8.2.13.1.1 DEREGISTRATION ACCEPT message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | De-registration accept message identity | Message type  9.7 | M | V | 1 |

### 8.2.14 De-registration request (UE terminated de-registration)

#### 8.2.14.1 message definition

the DEREGISTRATION REQUEST message is sent by the AMF to the UE see table 8.2.14.1.1

message type DEREGISTRATION REQUEST

significance dual

direction network to UE

table 8.2.14.1.1 DEREGISTRATION REQUEST message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | De-registration request message identity | Message type  9.7 | M | V | 1 |
|  | De-registration type | De-registration type  9.11.3.20 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
| 58 | 5GMM cause | 5GMM cause  9.11.3.2 | O | TV | 2 |
| 5F | T3346 value | GPRS timer 2  9.11.2.4 | O | TLV | 3 |
| 6D | Rejected NSSAI | Rejected NSSAI  9.11.3.46 | O | TLV | 4-42 |
| 75 | CAG information list | CAG information list  9.11.3.18A | O | TLV-E | 3-n |
| 68 | Extended rejected NSSAI | Extended rejected NSSAI  9.11.3.75 | O | TLV | 5-90 |
| 2C | Disaster return wait range | Registration wait range  9.11.3.84 | O | TLV | 4 |
| 71 | Extended CAG information list | Extended CAG information list  9.11.3.86 | O | TLV-E | 3-n |
| 3A | Lower bound timer value | GPRS timer 3  9.11.2.5 | O | TLV | 3 |
| 1D | Forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" | 5GS tracking area identity list  9.11.3.9 | O | TLV | 9-114 |
| 1E | Forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service" | 5GS tracking area identity list  9.11.3.9 | O | TLV | 9-114 |
| 63 | RAT utilization control | RAT utilization control  9.11.3.110 | O | TLV | 4-n |

NOTE it is possible for AMFs compliant with version 17.7.0 or 17.8.0 of this specification to send the forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" IE with IEI of value "3B" for this message or the forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service" IE with IEI of value "3C" for this message

#### 8.2.14.2 5GMM cause

this information element is included if a 5GMM cause is provided

#### 8.2.14.3 T3346 value

the AMF may include this IE when the general NAS level mobility management congestion control is active

#### 8.2.14.4 rejected NSSAI

the AMF may include this IE to inform the UE of one or more S-NSSAIs that were rejected by the network

#### 8.2.14.5 CAG information list

this IE may be included to assign a new "CAG information list" to the UE or delete the "CAG information list" at the UE side

#### 8.2.14.6 extended rejected NSSAI

if the UE supports extended rejected NSSAI the AMF may include this IE to inform the UE of one or more S-NSSAIs that were rejected by the network

#### 8.2.14.7 disaster return wait range

this IE may be included to assign a new disaster return wait range to the UE

#### 8.2.14.7A extended CAG information list

if the UE supports extended CAG information list the network may include this IE to assign a new "CAG information list" to the UE or delete the "CAG information list" at the UE side

#### 8.2.14.8 lower bound timer value

the AMF may include this IE when the 5GMM cause is set to #78 "PLMN not allowed to operate at the present UE location" to provide a minimum time value for an entry added to the list of "PLMNs not allowed to operate at the present UE location"

#### 8.2.14.9 forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming"

this IE is included to indicate the forbidden TAI(s) to be stored in the list of "5GS forbidden tracking areas for roaming" this IE is included only if the message is sent via satellite NG-RAN access

#### 8.2.14.10 forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service"

this IE is included to indicate the forbidden TAI(s) to be stored in the list of "5GS forbidden tracking areas for regional provision of service" this IE is included only if the message is sent via satellite NG-RAN access

#### 8.2.14.11 RAT utilization control

see subclause 9.9.3.3A in 3GPP TS 24.301 [15]

### 8.2.15 De-registration accept (UE terminated de-registration)

#### 8.2.15.1 message definition

the DEREGISTRATION ACCEPT message is sent by the UE to the AMF see table 8.2.15.1.1

message type DEREGISTRATION ACCEPT

significance dual

direction UE to network

table 8.2.15.1.1.1 DEREGISTRATION ACCEPT message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | De-registration accept message identity | Message type  9.7 | M | V | 1 |

### 8.2.16 service request

#### 8.2.16.1 message definition

the SERVICE REQUEST message is sent by the UE to the AMF in order to request the establishment of an N1 NAS signalling connection to request the establishment of user-plane resources for PDU sessions which are established without user-plane resources or both see table 8.2.16.1.1

message type SERVICE REQUEST

significance dual

direction UE to network

table 8.2.16.1.1 SERVICE REQUEST message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Service request message identity | Message type  9.7 | M | V | 1 |
|  | ngKSI | NAS key set identifier  9.11.3.32 | M | V | 1/2 |
|  | Service type | Service type  9.11.3.50 | M | V | 1/2 |
|  | 5G-S-TMSI | 5GS mobile identity  9.11.3.4 | M | LV-E | 9 |
| 40 | Uplink data status | Uplink data status  9.11.3.57 | O | TLV | 4-34 |
| 50 | PDU session status | PDU session status  9.11.3.44 | O | TLV | 4-34 |
| 25 | Allowed PDU session status | Allowed PDU session status  9.11.3.13 | O | TLV | 4-34 |
| 71 | NAS message container | NAS message container  9.11.3.33 | O | TLV-E | 4-n |
| 29 | UE request type | UE request type  9.11.3.76 | O | TLV | 3 |
| 28 | Paging restriction | Paging restriction  9.11.3.77 | O | TLV | 3-35 |

#### 8.2.16.2 uplink data status

this IE shall be included if the UE has uplink user data pending to be sent

#### 8.2.16.3 PDU session status

this IE shall be included when the UE needs to indicate the PDU sessions that are associated with the access type that the message is sent over that are active within the UE

#### 8.2.16.4 allowed PDU session status

this IE shall be included if the SERVICE REQUEST message is sent as a response to paging with the access type indicating non-3GPP access or notification via 3GPP access for PDU session(s) associated with non-3GPP access

#### 8.2.16.5 NAS message container

this IE shall be included if the UE is sending a SERVICE REQUEST message as an initial NAS message and the UE needs to send non-cleartext IEs

#### 8.2.16.6 UE request type

the UE shall include this IE if the MUSIM UE requests the release of the NAS signalling connection or rejects the paging request from the network

#### 8.2.16.7 paging restriction

the UE shall include this IE if the request type is set to "NAS signalling connection release" or to "Rejection of paging" in the UE request type IE and the UE requests the network to restrict paging

### 8.2.17 service accept

#### 8.2.17.1 message definition

the SERVICE ACCEPT message is sent by the AMF to the UE in order to accept the service request procedure see table 8.2.17.1.1

message type SERVICE ACCEPT

significance dual

direction network to UE

table 8.2.17.1.1 SERVICE ACCEPT message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Service accept message identity | Message type  9.7 | M | V | 1 |
| 50 | PDU session status | PDU session status  9.11.3.44 | O | TLV | 4-34 |
| 26 | PDU session reactivation result | PDU session reactivation result  9.11.3.42 | O | TLV | 4-34 |
| 72 | PDU session reactivation result error cause | PDU session reactivation result error cause  9.11.3.43 | O | TLV-E | 5-515 |
| 78 | EAP message | EAP message  9.11.2.2 | O | TLV-E | 7-1503 |
| 6B | T3448 value | GPRS timer 2  9.11.2.4 | O | TLV | 3 |
| 34 | 5GS additional request result | 5GS additional request result  9.11.3.81 | O | TLV | 3 |
| 1D | Forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" | 5GS tracking area identity list  9.11.3.9 | O | TLV | 9-114 |
| 1E | Forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service" | 5GS tracking area identity list  9.11.3.9 | O | TLV | 9-114 |

#### 8.2.17.2 PDU session status

this IE shall be included when the network needs to indicate the PDU sessions that are associated with the access type that the message is sent over that are active within the network

#### 8.2.17.3 PDU session reactivation result

this IE shall be included

- if the uplink data status IE is included in the SERVICE REQUEST message; or

- if the allowed PDU session status IE is included in the SERVICE REQUEST message and there is at least one PDU session indicated in the allowed PDU session status IE for which user-plane resources can be re-established over 3GPP access

#### 8.2.17.4 PDU session reactivation result error cause

this IE may be included if the PDU session reactivation result IE is included and there exist one or more PDU sessions for which the user-plane resources cannot be re-established to indicate the cause of failure to re-establish the user-plane resources

#### 8.2.17.5 EAP message

EAP message IE is included if the SERVICE ACCEPT message is sent to a UE registered for emergency services and is used to convey EAP-failure message

#### 8.2.17.6 T3448 value

the network may include this IE if the congestion control for transport of user data via the control plane is active and the UE supports the control plane CIoT 5GS optimizations

#### 8.2.17.7 5GS additional request result

the network may include this IE to inform the UE about the result of additional request

#### 8.2.17.8 forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming"

this IE is included to indicate the forbidden TAI(s) to be stored in the list of "5GS forbidden tracking areas for roaming" this IE is included only if the message is sent via satellite NG-RAN access

#### 8.2.17.9 forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service"

this IE is included to indicate the forbidden TAI(s) to be stored in the list of "5GS forbidden tracking areas for regional provision of service" this IE is included only if the message is sent via satellite NG-RAN access

### 8.2.18 service reject

#### 8.2.18.1 message definition

the SERVICE REJECT message is sent by the AMF to the UE in order to reject the service request procedure see table 8.2.18.1.1

message type SERVICE REJECT

significance dual

direction network to UE

table 8.2.18.1.1 SERVICE REJECT message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Service reject message identity | Message type  9.7 | M | V | 1 |
|  | 5GMM cause | 5GMM cause  9.11.3.2 | M | V | 1 |
| 50 | PDU session status | PDU session status  9.11.3.44 | O | TLV | 4-34 |
| 5F | T3346 value | GPRS timer 2  9.11.2.4 | O | TLV | 3 |
| 78 | EAP message | EAP message  9.11.2.2 | O | TLV-E | 7-1503 |
| 6B | T3448 value | GPRS timer 2  9.11.2.4 | O | TLV | 3 |
| 75 | CAG information list | CAG information list  9.11.3.18A | O | TLV-E | 3-n |
| 2C | Disaster return wait range | Registration wait range  9.11.3.84 | O | TLV | 4 |
| 71 | Extended CAG information list | Extended CAG information list  9.11.3.86 | O | TLV-E | 3-n |
| 3A | Lower bound timer value | GPRS timer 3  9.11.2.5 | O | TLV | 3 |
| 1D | Forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" | 5GS tracking area identity list  9.11.3.9 | O | TLV | 9-114 |
| 1E | Forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service" | 5GS tracking area identity list  9.11.3.9 | O | TLV | 9-114 |

NOTE it is possible for AMFs compliant with version 17.7.0 or 17.8.0 of this specification to send the forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" IE with IEI of value "3B" for this message or the forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service" IE with IEI of value "3C" for this message

#### 8.2.18.2 PDU session status

this IE shall be included when the network needs to indicate the PDU sessions that are associated with the access type that the message is sent over that are active within the network

#### 8.2.18.3 T3346 value

the AMF may include this IE when the general NAS level mobility management congestion control is active

#### 8.2.18.4 EAP message

EAP message IE is included if the SERVICE REJECT message is used to convey EAP-failure message

#### 8.2.18.5 T3448 value

the network may include this IE if the congestion control for transport of user data via the control plane is active and the UE supports the control plane CIoT 5GS optimizations

#### 8.2.18.6 CAG information list

this IE may be included to assign a new "CAG information list" to the UE or delete the "CAG information list" at the UE side

#### 8.2.18.7 disaster return wait range

this IE may be included to assign a new disaster return wait range to the UE

#### 8.2.18.8 extended CAG information list

if the UE supports extended CAG information list the network may include this IE to assign a new "CAG information list" to the UE or delete the "CAG information list" at the UE side

#### 8.2.18.9 lower bound timer value

the AMF may include this IE when the 5GMM cause is set to #78 "PLMN not allowed to operate at the present UE location" to provide a minimum time value for an entry added to the list of "PLMNs not allowed to operate at the present UE location"

#### 8.2.18.10 forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming"

this IE is included to indicate the forbidden TAI(s) to be stored in the list of "5GS forbidden tracking areas for roaming" this IE is included only if the message is sent via satellite NG-RAN access

#### 8.2.18.11 forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service"

this IE is included to indicate the forbidden TAI(s) to be stored in the list of "5GS forbidden tracking areas for regional provision of service" this IE is included only if the message is sent via satellite NG-RAN access

### 8.2.19 configuration update command

#### 8.2.19.1 message definition

the CONFIGURATION UPDATE COMMAND message is sent by the AMF to the UE see table 8.2.19.1.1

message type CONFIGURATION UPDATE COMMAND

significance dual

direction network to UE

table 8.2.19.1.1 CONFIGURATION UPDATE COMMAND message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Configuration update command message identity | Message type  9.7 | M | V | 1 |
| D- | Configuration update indication | Configuration update indication  9.11.3.18 | O | TV | 1 |
| 77 | 5G-GUTI | 5GS mobile identity  9.11.3.4 | O | TLV-E | 14 |
| 54 | TAI list | 5GS tracking area identity list  9.11.3.9 | O | TLV | 9-114 |
| 15 | Allowed NSSAI | NSSAI  9.11.3.37 | O | TLV | 4-74 |
| 27 | Service area list | Service area list  9.11.3.49 | O | TLV | 6-114 |
| 43 | Full name for network | Network name  9.11.3.35 | O | TLV | 3-n |
| 45 | Short name for network | Network name  9.11.3.35 | O | TLV | 3-n |
| 46 | Local time zone | Time zone  9.11.3.52 | O | TV | 2 |
| 47 | Universal time and local time zone | Time zone and time  9.11.3.53 | O | TV | 8 |
| 49 | Network daylight saving time | Daylight saving time  9.11.3.19 | O | TLV | 3 |
| 79 | LADN information | LADN information  9.11.3.30 | O | TLV-E | 3-1715 |
| B- | MICO indication | MICO indication  9.11.3.31 | O | TV | 1 |
| 9- | Network slicing indication | Network slicing indication  9.11.3.36 | O | TV | 1 |
| 31 | Configured NSSAI | NSSAI  9.11.3.37 | O | TLV | 4-146 |
| 11 | Rejected NSSAI | Rejected NSSAI  9.11.3.46 | O | TLV | 4-42 |
| 76 | Operator-defined access category definitions | Operator-defined access category definitions  9.11.3.38 | O | TLV-E | 3-8323 |
| F- | SMS indication | SMS indication  9.11.3.50A | O | TV | 1 |
| 6C | T3447 value | GPRS timer 3  9.11.2.5 | O | TLV | 3 |
| 75 | CAG information list | CAG information list  9.11.3.18A | O | TLV-E | 3-n |
| 67 | UE radio capability ID | UE radio capability ID  9.11.3.68 | O | TLV | 3-n |
| A- | UE radio capability ID deletion indication | UE radio capability ID deletion indication  9.11.3.69 | O | TV | 1 |
| 44 | 5GS registration result | 5GS registration result  9.11.3.6 | O | TLV | 3 |
| 1B | Truncated 5G-S-TMSI configuration | Truncated 5G-S-TMSI configuration  9.11.3.70 | O | TLV | 3 |
| C- | Additional configuration indication | Additional configuration indication  9.11.3.74 | O | TV | 1 |
| 68 | Extended rejected NSSAI | Extended rejected NSSAI  9.11.3.75 | O | TLV | 5-90 |
| 72 | Service-level-AA container | Service-level-AA container  9.11.2.10 | O | TLV-E | 4-65538 |
| 70 | NSSRG information | NSSRG information  9.11.3.82 | O | TLV-E | 7-4099 |
| 14 | Disaster roaming wait range | Registration wait range  9.11.3.84 | O | TLV | 4 |
| 2C | Disaster return wait range | Registration wait range  9.11.3.84 | O | TLV | 4 |
| 13 | List of PLMNs to be used in disaster condition | List of PLMNs to be used in disaster condition  9.11.3.83 | O | TLV | 2-n |
| 71 | Extended CAG information list | Extended CAG information list  9.11.3.86 | O | TLV-E | 3-n |
| 1F | Updated PEIPS assistance information | PEIPS assistance information  9.11.3.80 | O | TLV | 3-n |
| 73 | NSAG information | NSAG information  9.11.3.87 | O | TLV-E | 9-3143 |
| E- | Priority indicator | Priority indicator  9.11.3.91 | O | TV | 1 |
| 4B | RAN timing synchronization | RAN timing synchronization  9.11.3.95 | O | TLV | 3 |
| 78 | Extended LADN information | Extended LADN information  9.11.3.96 | O | TLV-E | 3-1787 |
| 4C | Alternative NSSAI | Alternative NSSAI  9.11.3.97 | O | TLV | 2-146 |
| 7B | S-NSSAI location validity information | S-NSSAI location validity information  9.11.3.100 | O | TLV-E | 17-38611 |
| 5B | S-NSSAI time validity information | S-NSSAI time validity information  9.11.3.101 | O | TLV | 23-257 |
| 4F | Maximum time offset | GPRS timer 3  9.11.2.5 | O | TLV | 3 |
| 74 | Partially allowed NSSAI | Partial NSSAI  9.11.3.103 | O | TLV-E | 3-808 |
| 7A | Partially rejected NSSAI | Partial NSSAI  9.11.3.103 | O | TLV-E | 3-808 |
| 5C | Feature authorization indication | Feature authorization indication  9.11.3.105 | O | TLV | 3-257 |
| 61 | On-demand NSSAI | On-demand NSSAI  9.11.3.108 | O | TLV | 5-210 |
| 63 | RAT utilization control | RAT utilization control  9.11.3.110 | O | TLV | 2-n |

#### 8.2.19.2 configuration update indication

the AMF shall include this IE if the AMF needs to request an acknowledgement or a registration procedure from the UE

#### 8.2.19.3 5G-GUTI

this IE may be included to assign a new 5G-GUTI to the UE

#### 8.2.19.4 TAI list

this IE may be included to assign a new TAI list to the UE

#### 8.2.19.5 allowed NSSAI

this IE may be included to assign a new allowed NSSAI to the UE not registered for onboarding services in SNPN

#### 8.2.19.6 service area list

this IE may be included to assign a new service area list to the UE

#### 8.2.19.7 full name for network

this IE may be included to assign a new full name for network to the UE

#### 8.2.19.8 short name for network

this IE may be included to assign a new short name for network to the UE

#### 8.2.19.9 local time zone

this IE may be included to assign a new local time zone to the UE

#### 8.2.19.10 universal time and local time zone

this IE may be included to assign new universal time and local time zone to the UE

#### 8.2.19.11 network daylight saving time

this IE may be included to assign new network daylight saving time to the UE

#### 8.2.19.12 LADN information

this IE may be included to assign new LADN information to the UE or delete the LADN information at the UE side

#### 8.2.19.13 MICO indication

this IE may be included to request the UE to re-negotiate MICO mode

#### 8.2.19.14 network slicing indication

this IE shall be included if the user's network slicing subscription has changed in the UDM of a PLMN or an SNPN

#### 8.2.19.15 configured NSSAI

the AMF shall include this IE when the AMF needs to provide the UE with a new configured NSSAI for the current PLMN or SNPN and the UE is neither registering nor registered for onboarding services in SNPN

#### 8.2.19.16 rejected NSSAI

the network may include this IE to inform the UE of one or more S-NSSAIs that were previously sent to the UE in the allowed NSSAI or the pending NSSAI but are now considered rejected by the network

#### 8.2.19.17 Operator-defined access category definitions

this IE may be included to assign new operator-defined access category definitions to the UE or delete the operator-defined access category definitions at the UE side

#### 8.2.19.18 SMS indication

this IE may be included to indicate that the ability for the UE to use SMS over NAS has changed

#### 8.2.19.19 T3447 value

this IE may be included to assign a new T3447 value to the UE

#### 8.2.19.20 CAG information list

this IE may be included to assign new "CAG information list" to the UE or delete the "CAG information list" at the UE side

#### 8.2.19.21 UE radio capability ID

this IE may be included if the UE is not in NB-N1 mode both the UE and the network support RACS and the network needs to assign a network-assigned UE radio capability ID to the UE

#### 8.2.19.22 UE radio capability ID deletion indication

this IE may be included if the UE is not in NB-N1 mode both the UE and the network support RACS and the network needs to trigger the UE to delete all network-assigned UE radio capability IDs stored at the UE for the serving PLMN or serving SNPN

#### 8.2.19.23 5GS registration result

this IE shall be included if the network wants to indicate to the UE that the UE is registered for emergency services

#### 8.2.19.24 truncated 5G-S-TMSI configuration

this IE may be included to provide a new truncated 5G-S-TMSI configuration to the UE in NB-N1 mode if the network is configured to provide the truncated 5G-S-TMSI configuration for control plane CIoT 5GS optimizations

#### 8.2.19.25 additional configuration indication

the network may include this IE when requesting the UE to register without the release of the N1 NAS signalling connection

#### 8.2.19.26 extended rejected NSSAI

if the UE supports extended rejected NSSAI the network may include this IE to inform the UE of one or more S-NSSAIs that were previously sent to the UE in the allowed NSSAI or the pending NSSAI but are now considered rejected by the network

#### 8.2.19.27 Service-level-AA container

the network shall include this IE when the AMF receives the Service-level-AA payload or the UUAA-MM result from the UAS-NF during the UUAA-MM procedure or the UUAA revocation procedure the network shall also include this IE if the AMF receives from the UAS-NF the CAA-Level UAV ID as part of the UUAA-MM procedure

#### 8.2.19.28 NSSRG information

this IE may be included to provide NSSRG information associated with the configured NSSAI

#### 8.2.19.29 disaster roaming wait range

this IE may be included to assign a new disaster roaming wait range to the UE

#### 8.2.19.30 disaster return wait range

this IE may be included to assign a new disaster return wait range to the UE

#### 8.2.19.31 list of PLMNs to be used in disaster condition

this IE may be included by an allowed PLMN to assign a new "list of PLMN(s) to be used in disaster condition" associated with the serving PLMN to the UE

#### 8.2.19.32 extended CAG information list

if the UE supports extended CAG information list the network may include this IE to assign a new "CAG information list" to the UE or delete the "CAG information list" at the UE side

#### 8.2.19.33 updated PEIPS assistance information

the AMF may include this IE if the UE supports NR paging subgrouping the AMF supports and accepts the use of PEIPIS assistance information for the UE the UE is not registered for emergency services the UE does not have an active emergency PDU session and the network needs to update PEIPS assistance information for the UE

#### 8.2.19.34 NSAG information

if the UE has set the NSAG bit to "NSAG supported" in the 5GMM capability IE of the REGISTRATION REQUEST message and the CONFIGURATION UPDATE COMMAND message is sent over 3GPP access the network may include this IE to provide NSAG information to the UE

#### 8.2.19.35 priority indicator

the network shall include this IE when it needs to inform the UE that the use of access identity 1 is valid or is no longer valid

#### 8.2.19.36 RAN timing synchronization

this IE may be included to provide information related to the RAN timing synchronization to a UE which has set the reconnection to the network due to RAN timing synchronization status change (RANtiming) bit to "Reconnection to the network due to RAN timing synchronization status change supported" in the 5GMM capability IE of the REGISTRATION REQUEST message

#### 8.2.19.37 extended LADN information

this IE may be included to assign new extended LADN information to the UE or delete the extended LADN information at the UE side

#### 8.2.19.38 alternative NSSAI

the network may include this IE to provide the mapping information between the S-NSSAI to be replaced and the alternative S-NSSAI to the UE

#### 8.2.19.39 S-NSSAI location validity information

the network may include this IE to update the S-NSSAI location validity information

#### 8.2.19.40 S-NSSAI time validity information

the network may include this IE to update the S-NSSAI time validity information

#### 8.2.19.41 maximum time offset

this IE may be included to provide the UE with a maximum time offset

#### 8.2.19.42 partially allowed NSSAI

the network may include this IE to assign a partially allowed NSSAI to the UE

#### 8.2.19.43 partially rejected NSSAI

the network may include this IE to assign a partially rejected NSSAI to the UE

#### 8.2.19.44 feature authorization indication

the network may include this IE to inform to the UE about the authorization status of the UE whether to operate as an MBSR or to operate not as an MBSR but to operate as a UE

#### 8.2.19.45 On-demand NSSAI

the network may include this IE to provide the on-demand NSSAI to the UE

#### 8.2.19.46 RAT utilization control

this IE is included to indicate the restricted RAT(s)

### 8.2.20 configuration update complete

#### 8.2.20.1 message definition

the CONFIGURATION UPDATE COMPLETE message is sent by the UE to the AMF see table 8.2.20.1.1

message type CONFIGURATION UPDATE COMPLETE

significance dual

direction UE to network

table 8.2.20.1.1 CONFIGURATION UPDATE COMPLETE message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Configuration update complete message identity | Message type  9.7 | M | V | 1 |

#### 8.2.20.2 void

### 8.2.21 identity request

#### 8.2.21.1 message definition

the IDENTITY REQUEST message is sent by the AMF to the UE to request the UE to provide specified identity see table 8.2.21.1.1

message type IDENTITY REQUEST

significance dual

direction AMF to UE

table 8.2.21.1.1 IDENTITY REQUEST message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Identity request message identity | Message type  9.7 | M | V | 1 |
|  | Identity type | 5GS identity type  9.11.3.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |

### 8.2.22 identity response

#### 8.2.22.1 message definition

the IDENTITY RESPONSE message is sent by the UE to the AMF to provide the requested identity see table 8.2.22.1

message type IDENTITY RESPONSE

significance dual

direction UE to AMF

table 8.2.22.1.1 IDENTITY RESPONSE message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Identity response message identity | Message type  9.7 | M | V | 1 |
|  | Mobile identity | 5GS mobile identity  9.11.3.4 | M | LV-E | 3-n |

### 8.2.23 notification

#### 8.2.23.1 message definition

the NOTIFICATION message is sent by the AMF to the UE to notify the UE to initiate a service request procedure see table 8.2.23.1.1

message type NOTIFICATION

significance dual

direction network to UE

table 8.2.23.1.1 NOTIFICATION message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Notification message identity | Message type  9.7 | M | V | 1 |
|  | Access type | Access type  9.11.2.1A | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |

### 8.2.24 notification response

#### 8.2.24.1 message definition

the NOTIFICATION RESPONSE message is sent by the UE to the AMF to notify the failure to initiate the service request procedure as a response of notification see table 8.2.24.1.1

message type NOTIFICATION RESPONSE

significance dual

direction UE to network

table 8.2.2341.1 NOTIFICATION RESPONSE message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Notification response message identity | Message type  9.7 | M | V | 1 |
| 50 | PDU session status | PDU session status  9.11.3.44 | O | TLV | 4-34 |

#### 8.2.24.2 PDU session status

this information element shall be included when the UE needs to indicate over non-3GPP access the PDU sessions that are associated with the 3GPP access type that are active within the UE

### 8.2.25 security mode command

#### 8.2.25.1 message definition

the SECURITY MODE COMMAND message is sent by the AMF to the UE to establish NAS signalling security see table 8.2.25.1.1

message type SECURITY MODE COMMAND

significance dual

direction network to UE

table 8.2.25.1.1 SECURITY MODE COMMAND message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Security mode command message identity | Message type  9.7 | M | V | 1 |
|  | Selected NAS security algorithms | NAS security algorithms  9.11.3.34 | M | V | 1 |
|  | ngKSI | NAS key set identifier  9.11.3.32 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Replayed UE security capabilities | UE security capability  9.11.3.54 | M | LV | 3-9 |
| E- | IMEISV request | IMEISV request  9.11.3.28 | O | TV | 1 |
| 57 | Selected EPS NAS security algorithms | EPS NAS security algorithms  9.11.3.25 | O | TV | 2 |
| 36 | Additional 5G security information | Additional 5G security information  9.11.3.12 | O | TLV | 3 |
| 78 | EAP message | EAP message  9.11.2.2 | O | TLV-E | 7-1503 |
| 38 | ABBA | ABBA  9.11.3.10 | O | TLV | 4-n |
| 19 | Replayed S1 UE security capabilities | S1 UE security capability  9.11.3.48A | O | TLV | 4-7 |
| 55 | AUN3 device security key | AUN3 device security key  9.11.3.107 | O | TLV | 36-257 |

NOTE it is possible for AMFs compliant with version 18.3.0 or 18.3.1 of this specification to send the AUN3 device security key IE with a fixed length of 66 octets

#### 8.2.25.2 IMEISV request

the AMF may include this information element to request the UE to send its IMEISV with the corresponding SECURITY MODE COMPLETE message

#### 8.2.25.3 void

#### 8.2.25.4 selected EPS NAS security algorithms

this IE shall be included if the AMF supports N26 interface the UE set the S1 mode bit to "S1 mode supported" in the 5GMM capability IE of the REGISTRATION REQUEST message and the AMF needs to provide the selected EPS NAS security algorithms to the UE

#### 8.2.25.5 additional 5G security information

the network shall include this IE if

a) the network needs to provide the UE with horizontal derivation parameter; or

b) the applicable initial NAS message (i.e REGISTRATION REQUEST CONTROL PLANE SERVICE REQUEST or SERVICE REQUEST) does not successfully pass the integrity check at the AMF (see subclause 5.4.2.2)

#### 8.2.25.6 EAP message

this IE is included when the EAP success message is sent as part of the EAP based primary authentication and key agreement procedure as specified in subclause 5.4.1.2

#### 8.2.25.7 ABBA

this IE shall be included if the message contains an EAP message IE with an EAP-success message

#### 8.2.25.8 replayed S1 UE security capabilities

this IE shall be included if the selected EPS NAS security algorithms information element is included

#### 8.2.25.9 AUN3 device security key

this IE shall be included when the SECURITY MODE COMMAND message is provided to a 5G-RG that is acting on behalf of an AUN3 device if the EAP message IE is set to an EAP-success message

### 8.2.26 security mode complete

#### 8.2.26.1 message definition

the SECURITY MODE COMPLETE message is sent by the UE to the AMF in response to a SECURITY MODE COMMAND message see table 8.2.26.1.1

message type SECURITY MODE COMPLETE

significance dual

direction UE to network

table 8.2.26.1.1 SECURITY MODE COMPLETE message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Security mode complete message identity | Message type  9.6 | M | V | 1 |
| 77 | IMEISV | 5GS mobile identity  9.11.3.4 | O | TLV-E | 12 |
| 71 | NAS message container | NAS message container  9.11.3.33 | O | TLV-E | 4-n |
| 78 | non-IMEISV PEI | 5GS mobile identity  9.11.3.4 | O | TLV-E | 7-n |

#### 8.2.26.2 IMEISV

the UE shall include this information element if the IMEISV was requested within the corresponding SECURITY MODE COMMAND message

#### 8.2.26.3 NAS message container

the UE shall include this information element

a) if during an ongoing registration procedure or service request procedure the AMF included the additional 5G security information with the RINMR bit set to "Retransmission of the initial NAS message requested" in the SECURITY MODE COMMAND message as described in 3GPP TS 33.501 [24]; or

b) if during an ongoing registration procedure the UE does not have a valid 5G NAS security context

#### 8.2.26.4 non-IMEISV PEI

the 5G-RG or the W-AGF acting on behalf of the FN-RG (or on behalf of the N5GC device) shall include this information element if the IMEISV was requested within the corresponding SECURITY MODE COMMAND message the IMEISV is not available but MAC address is available

the UE shall include this information element if the IMEISV was requested within the corresponding SECURITY MODE COMMAND message the IMEISV is not available but EUI-64 is available

### 8.2.27 security mode reject

#### 8.6.27.1 message definition

the SECURITY MODE REJECT message is sent by the UE to the AMF to indicate that the corresponding security mode command has been rejected see table 8.2.27.1.1

message type SECURITY MODE REJECT

significance dual

direction UE to network

table 8.2.27.1.1 SECURITY MODE REJECT message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Security mode reject message identity | Message type  9.6 | M | V | 1 |
|  | 5GMM cause | 5GMM cause  9.11.3.2 | M | V | 1 |

### 8.2.28 security protected 5GS NAS message

#### 8.2.28.1 message definition

this message is sent by the UE or the network to transfer a plain 5GS NAS message as specified in subclause 8.2 together with the sequence number and the message authentication code protecting the message see table 8.2.28.1.1

message type SECURITY PROTECTED 5GS NAS MESSAGE

significance dual

direction both

table 8.2.28.1.1 SECURITY PROTECTED 5GS NAS MESSAGE message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Message authentication code | Message authentication code  9.8 | M | V | 4 |
|  | Sequence number | Sequence number  9.10 | M | V | 1 |
|  | Plain 5GS NAS message | Plain 5GS NAS message  9.9 | M | V | 3-n |

NOTE the minimum length of plain 5GS NAS message IE can be 2 octets if it includes a test mode control message specified in 3GPP TS 38.509 [31AA]

### 8.2.29 5GMM status

#### 8.2.29.1 message definition

the 5GMM STATUS message is sent by the UE or by the AMF at any time to report certain error conditions see table 8.2.29.1.1

message type 5GMM STATUS

significance local

direction both

table 8.2.29.1.1 5GMM STATUS message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | 5GMM STATUS message identity | Message type  9.7 | M | V | 1 |
|  | 5GMM cause | 5GMM cause  9.11.3.2 | M | V | 1 |

### 8.2.30 control plane service request

#### 8.2.30.1 message definition

the CONTROL PLANE SERVICE REQUEST message is sent by the UE to the AMF when the UE is using 5GS services with control plane CIoT 5GS optimization see table 8.2.30.1.1

message type CONTROL PLANE SERVICE REQUEST

significance dual

direction UE to network

table 8.2.30.1.1 CONTROL PLANE SERVICE REQUEST message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Control plane service request message identity | Message type  9.7 | M | V | 1 |
|  | Control plane service type | Control plane service type  9.11.3.18D | M | V | 1/2 |
|  | ngKSI | NAS key set identifier  9.11.3.32 | M | V | 1/2 |
| 6F | CIoT small data container | CIoT small data container  9.11.3.18B | O | TLV | 4-257 |
| 8- | Payload container type | Payload container type  9.11.3.40 | O | TV | 1 |
| 7B | Payload container | Payload container  9.11.3.39 | O | TLV-E | 4-65538 |
| 12 | PDU session ID | PDU session identity 2  9.11.3.41 | C | TV | 2 |
| 50 | PDU session status | PDU session status  9.11.3.44 | O | TLV | 4-34 |
| F- | Release assistance indication | Release assistance indication  9.11.3.46A | O | TV | 1 |
| 40 | Uplink data status | Uplink data status  9.11.3.57 | O | TLV | 4-34 |
| 71 | NAS message container | NAS message container  9.11.3.33 | O | TLV-E | 4-n |
| 24 | Additional information | Additional information  9.11.2.1 | O | TLV | 3-n |
| 25 | Allowed PDU session status | Allowed PDU session status  9.11.3.13 | O | TLV | 4-34 |
| 29 | UE request type | UE request type  9.11.3.76 | O | TLV | 3 |
| 28 | Paging restriction | Paging restriction  9.11.3.77 | O | TLV | 3-35 |

#### 8.2.30.2 CIoT small data container

this IE shall be included if the UE needs to send uplink small user data SMS or location services message that is not more than 254 bytes and there is no other optional IE to be sent

NOTE when the UE determines to use the CIoT small data container IE to send uplink data in this message there is no other optional IEs in this message

#### 8.2.30.3 payload container type

this IE shall be included if the UE includes the payload container IE

#### 8.2.30.4 payload container

this IE shall be included if the UE needs to send uplink CIoT user data SMS or location services message

#### 8.2.30.5 PDU session ID

the UE shall include this IE when the payload container type IE is set to "CIoT user data container"

#### 8.2.30.6 PDU session status

this IE shall be included when the UE needs to indicate the PDU sessions that are associated with the access type that the message is sent over that are active within the UE

#### 8.2.30.7 release assistance indication

the UE may include this IE to inform the network whether

- no further uplink and no further downlink data transmission is expected; or

- only a single downlink data transmission (e.g acknowledgement or response to uplink data) and no further uplink data transmission subsequent to the uplink data transmission is expected

#### 8.2.30.8 uplink data status

this IE shall be included if the UE has uplink user data pending to be sent over the user plane

#### 8.2.30.9 NAS message container

this IE shall be included if the UE is sending a CONTROL PLANE SERVICE REQUEST message as an initial NAS message and the UE needs to send non-cleartext IEs

#### 8.2.30.10 additional information

the UE may include this IE when the payload container type IE is set to "Location services message container"

#### 8.2.30.11 allowed PDU session status

this IE shall be included if the CONTROL PLANE SERVICE REQUEST message is sent as a response to paging with the access type indicating non-3GPP access or notification via 3GPP access for PDU session(s) associated with non-3GPP access

#### 8.2.30.12 UE request type

the UE shall include this IE if the MUSIM UE requests the release of the NAS signalling connection or rejects the paging request from the network

#### 8.2.30.13 paging restriction

the UE shall include this IE if the request type is set to "NAS signalling connection release" or to "Rejection of paging" in the UE request type IE and the UE requests the network to restrict paging

### 8.2.31 network slice-specific authentication command

#### 8.2.31.1 message definition

the NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message is sent by the AMF to the UE for authentication of the upper layers of the UE see table 8.2.31.1.1

message type NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND

significance dual

direction network to UE

table 8.2.31.1.1 NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message identity | Message type  9.7 | M | V | 1 |
|  | S-NSSAI | S-NSSAI  9.11.2.8 | M | LV | 2-5 |
|  | EAP message | EAP message  9.11.2.2 | M | LV-E | 6-1502 |

### 8.2.32 network slice-specific authentication complete

#### 8.2.32.1 message definition

the NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE message is sent by the UE to the AMF in response to the NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message and indicates acceptance of the NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message see table 8.2.32.1.1

message type NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE

significance dual

direction UE to network

table 8.2.32.1.1 NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE message identity | Message type  9.7 | M | V | 1 |
|  | S-NSSAI | S-NSSAI  9.11.2.8 | M | LV | 2-5 |
|  | EAP message | EAP message  9.11.2.2 | M | LV-E | 6-1502 |

### 8.2.33 network slice-specific authentication result

#### 8.2.33.1 message definition

the NETWORK SLICE-SPECIFIC AUTHENTICATION RESULT message is sent by the AMF to the UE for indicating the result of the network slice-specific authentication and authorization procedure see table 8.2.33.1.1

message type NETWORK SLICE-SPECIFIC AUTHENTICATION RESULT

significance dual

direction network to UE

table 8.2.33.1.1 NETWORK SLICE-SPECIFIC AUTHENTICATION RESULT message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | NETWORK SLICE-SPECIFIC AUTHENTICATION RESULT message identity | Message type  9.7 | M | V | 1 |
|  | S-NSSAI | S-NSSAI  9.11.2.8 | M | LV | 2-5 |
|  | EAP message | EAP message  9.11.2.2 | M | LV-E | 6-1502 |

### 8.2.34 relay key request

#### 8.2.34.1 message definition

the RELAY KEY REQUEST message is sent by the UE to the AMF for initiation of PC5 keys establishment with the 5G ProSe remote UE or the 5G ProSe end UE as specified in 3GPP TS 33.503 [56] see table 8.2.34.1

message type RELAY KEY REQUEST

significance dual

direction UE to network

table 8.2.34.1 RELAY KEY REQUEST message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Relay key request message identity | Message type  9.7 | M | V | 1 |
|  | PRTI | ProSe relay transaction identity  9.11.3.88 | M | V | 1 |
|  | Relay key request parameters | Relay key request parameters  9.11.3.89 | M | LV | 22-65537 |

### 8.2.35 relay key accept

#### 8.2.35.1 message definition

the RELAY KEY ACCEPT message is sent by the AMF to the UE as specified in 3GPP TS 33.503 [56] see table 8.2.35.1

message type RELAY KEY ACCEPT

significance dual

direction network to UE

table 8.2.35.1 RELAY KEY ACCEPT message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Relay key accept message identity | Message type  9.7 | M | V | 1 |
|  | PRTI | ProSe relay transaction identity  9.11.3.88 | M | V | 1 |
|  | Relay key response parameters | Relay key response parameters  9.11.3.90 | M | LV-E | 51-65537 |
| 78 | EAP message | EAP message  9.11.2.2 | O | TLV-E | 7-1503 |

#### 8.2.35.2 EAP message

the AMF shall include the EAP message IE if the AMF has received an EAP-success message from the AUSF

### 8.2.36 relay key reject

#### 8.2.36.1 message definition

the RELAY KEY REJECT message is sent by the AMF to the UE to indicate the rejection of the relay key request see table 8.2.36.1

message type RELAY KEY REJECT

significance dual

direction network to UE

table 8.2.36.1 RELAY KEY REJECT message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Relay key reject message identity | Message type  9.7 | M | V | 1 |
|  | PRTI | ProSe relay transaction identity  9.11.3.88 | M | V | 1 |
| 78 | EAP message | EAP message  9.11.2.2 | O | TLV-E | 7-1503 |

#### 8.2.36.2 EAP message

EAP message IE is included if the RELAY KEY REJECT message is used to convey EAP-failure message

### 8.2.37 relay authentication request

#### 8.2.37.1 message definition

the RELAY AUTHENTICATION REQUEST message is sent by the network to the UE to initiate authentication of the 5G ProSe remote UE or the 5G ProSe end UE as specified in 3GPP TS 33.503 [56] see table 8.2.37.1

message type RELAY AUTHENTICATION REQUEST

significance dual

direction network to UE

table 8.2.37.1 RELAY AUTHENTICATION REQUEST message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Relay authentication request message identity | Message type  9.7 | M | V | 1 |
|  | PRTI | ProSe relay transaction identity  9.11.3.88 | M | V | 1 |
|  | EAP message | EAP message  9.11.2.2 | M | LV-E | 7-1503 |

### 8.2.38 relay authentication response

#### 8.2.38.1 message definition

the RELAY AUTHENTICATION RESPONSE message is sent by the UE to the network to forward the authentication response from the 5G ProSe remote UE or the 5G ProSe end UE as specified in 3GPP TS 33.503 [56] see table 8.2.38.1

message type RELAY AUTHENTICATION RESPONSE

significance dual

direction UE to network

table 8.2.38.1 RELAY AUTHENTICATION RESPONSE message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | Security header type | Security header type  9.3 | M | V | 1/2 |
|  | Spare half octet | Spare half octet  9.5 | M | V | 1/2 |
|  | Relay authentication response message identity | Message type  9.7 | M | V | 1 |
|  | PRTI | ProSe relay transaction identity  9.11.3.88 | M | V | 1 |
|  | EAP message | EAP message  9.11.2.2 | M | LV-E | 6-1502 |

## 8.3 5GS session management messages

### 8.3.1 PDU session establishment request

#### 8.3.1.1 message definition

the PDU SESSION ESTABLISHMENT REQUEST message is sent by the UE to the SMF to initiate establishment of a PDU session see table 8.3.1.1.1

message type PDU SESSION ESTABLISHMENT REQUEST

significance dual

direction UE to network

table 8.3.1.1.1 PDU SESSION ESTABLISHMENT REQUEST message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | PDU session ID | PDU session identity  9.4 | M | V | 1 |
|  | PTI | Procedure transaction identity  9.6 | M | V | 1 |
|  | PDU SESSION ESTABLISHMENT REQUEST message identity | Message type  9.7 | M | V | 1 |
|  | Integrity protection maximum data rate | Integrity protection maximum data rate  9.11.4.7 | M | V | 2 |
| 9- | PDU session type | PDU session type  9.11.4.11 | O | TV | 1 |
| A- | SSC mode | SSC mode  9.11.4.16 | O | TV | 1 |
| 28 | 5GSM capability | 5GSM capability  9.11.4.1 | O | TLV | 3-15 |
| 55 | Maximum number of supported packet filters | Maximum number of supported packet filters  9.11.4.9 | O | TV | 3 |
| B- | Always-on PDU session requested | Always-on PDU session requested  9.11.4.4 | O | TV | 1 |
| 39 | SM PDU DN request container | SM PDU DN request container  9.11.4.15 | O | TLV | 3-255 |
| 7B | Extended protocol configuration options | Extended protocol configuration options  9.11.4.6 | O | TLV-E | 4-65538 |
| 66 | IP header compression configuration | IP header compression configuration  9.11.4.24 | O | TLV | 5-257 |
| 6E | DS-TT Ethernet port MAC address | DS-TT Ethernet port MAC address  9.11.4.25 | O | TLV | 8 |
| 6F | UE-DS-TT residence time | UE-DS-TT residence time  9.11.4.26 | O | TLV | 10 |
| 74 | Port management information container | Port management information container  9.11.4.27 | O | TLV-E | 8-65538 |
| 1F | Ethernet header compression configuration | Ethernet header compression configuration  9.11.4.28 | O | TLV | 3 |
| 29 | Suggested interface identifier | PDU address  9.11.4.10 | O | TLV | 11 |
| 72 | Service-level-AA container | Service-level-AA container  9.11.2.10 | O | TLV-E | 4-65538 |
| 70 | Requested MBS container | Requested MBS container  9.11.4.30 | O | TLV-E | 8-65538 |
| 34 | PDU session pair ID | PDU session pair ID  9.11.4.32 | O | TLV | 3 |
| 35 | RSN | RSN  9.11.4.33 | O | TLV | 3 |
| 36 | URSP rule enforcement reports | URSP rule enforcement reports  9.11.4.38 | O | TLV | 4-n |

#### 8.3.1.2 PDU session type

this IE shall be included in the message when the UE requests to establish a new PDU session

#### 8.3.1.3 SSC mode

this IE is included in the message when the UE requests to establish a new PDU session with a DN and requests an SSC mode

#### 8.3.1.4 maximum number of supported packet filters

this IE shall be included in the message when the selected PDU session type is "IPv4" "IPv6" "IPv4v6" or "Ethernet" and the UE can support more than 16 packet filters for this PDU session

#### 8.3.1.5 5GSM capability

this IE is included in the message when the UE requests to establish a new PDU session or to transfer an existing PDN connection and any of the 5GSM capabilities supported by the UE is relevant for the PDU session

#### 8.3.1.6 void

#### 8.3.1.7 Always-on PDU session requested

the UE shall include this IE if the UE requests to establish a PDU session as an always-on PDU session

#### 8.3.1.8 SM PDU DN request container

this IE is included in the message when the UE requests to establish a new PDU session with a DN and needs to provide information for the PDU session authentication and authorization by the external DN

#### 8.3.1.9 extended protocol configuration options

this IE is included in the message when the UE needs to transmit (protocol) data (e.g configuration parameters error codes or messages/events) to the network

#### 8.3.1.10 IP header compression configuration

the UE shall include the IP header compression configuration IE if

- the PDU session type value of the PDU session type IE is set to "IPv4" "IPv6" or "IPv4v6";

- the UE indicates "Control plane CIoT 5GS optimization supported" and "IP header compression for control plane CIoT 5GS optimization supported" in the 5GMM capability IE of the REGISTRATION REQUEST message; and

- the network indicates "Control plane CIoT 5GS optimization supported" and "IP header compression for control plane CIoT 5GS optimization supported" in the 5GS network support feature IE of the REGISTRATION ACCEPT message

#### 8.3.1.11 DS-TT ethernet port MAC address

this IE shall be included in the message if the UE supports transfer of port management information containers and the UE requests to establish a new PDU session of "Ethernet" PDU session type

#### 8.3.1.12 UE-DS-TT residence time

this IE shall be included in the message if

a) the UE supports transfer of port management information containers; and

b) the UE-DS-TT residence time is available at the UE

#### 8.3.1.13 port management information container

this IE shall be included in the message if the UE supports transfer of port management information containers

#### 8.3.1.14 ethernet header compression configuration

the UE shall include the ethernet header compression configuration IE if

- the PDU session type value of the PDU session type IE is set to "Ethernet";

- the UE indicated "Control plane CIoT 5GS optimization supported" and "Ethernet header compression for control plane CIoT 5GS optimization supported" in the 5GMM capability IE of the REGISTRATION REQUEST message; and

- the network indicated "Control plane CIoT 5GS optimization supported" and "Ethernet header compression for control plane CIoT 5GS optimization supported" in the 5GS network support feature IE of the REGISTRATION ACCEPT message

#### 8.3.1.15 suggested interface identifier

this IE may be included by the W-AGF acting on behalf of the FN-RG

#### 8.3.1.16 Service-level-AA container

this IE shall be included in the message when the UE needs to establish a PDU session for the UAS services

#### 8.3.1.17 requested MBS container

this IE is included in the message when the UE requests to join one or more multicast MBS sessions that are associated with the PDU session

#### 8.3.1.18 PDU session pair ID

this IE shall be included in the message when the UE needs to include a PDU session pair ID

#### 8.3.1.19 RSN

this IE shall be included in the message when the UE needs to include an RSN

#### 8.3.1.20 URSP rule enforcement reports

this IE is included in the message when the UE sends one or more URSP rule enforcement reports to the network

### 8.3.2 PDU session establishment accept

#### 8.3.2.1 message definition

the PDU SESSION ESTABLISHMENT ACCEPT message is sent by the SMF to the UE in response to PDU SESSION ESTABLISHMENT REQUEST message and indicates successful establishment of a PDU session see table 8.3.2.1.1

message type PDU SESSION ESTABLISHMENT ACCEPT

significance dual

direction network to UE

table 8.3.2.1.1 PDU SESSION ESTABLISHMENT ACCEPT message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | PDU session ID | PDU session identity  9.4 | M | V | 1 |
|  | PTI | Procedure transaction identity  9.6 | M | V | 1 |
|  | PDU SESSION ESTABLISHMENT ACCEPT message identity | Message type  9.7 | M | V | 1 |
|  | Selected PDU session type | PDU session type  9.11.4.11 | M | V | 1/2 |
|  | Selected SSC mode | SSC mode  9.11.4.16 | M | V | 1/2 |
|  | Authorized QoS rules | QoS rules  9.11.4.13 | M | LV-E | 6-65538 |
|  | Session AMBR | Session-AMBR  9.11.4.14 | M | LV | 7 |
| 59 | 5GSM cause | 5GSM cause  9.11.4.2 | O | TV | 2 |
| 29 | PDU address | PDU address  9.11.4.10 | O | TLV | 7-31 |
| 56 | RQ timer value | GPRS timer  9.11.2.3 | O | TV | 2 |
| 22 | S-NSSAI | S-NSSAI  9.11.2.8 | O | TLV | 3-10 |
| 8- | Always-on PDU session indication | Always-on PDU session indication  9.11.4.3 | O | TV | 1 |
| 75 | Mapped EPS bearer contexts | Mapped EPS bearer contexts  9.11.4.8 | O | TLV-E | 7-65538 |
| 78 | EAP message | EAP message  9.11.2.2 | O | TLV-E | 7-1503 |
| 79 | Authorized QoS flow descriptions | QoS flow descriptions  9.11.4.12 | O | TLV-E | 6-65538 |
| 7B | Extended protocol configuration options | Extended protocol configuration options  9.11.4.6 | O | TLV-E | 4-65538 |
| 25 | DNN | DNN  9.11.2.1B | O | TLV | 3-102 |
| 17 | 5GSM network feature support | 5GSM network feature support  9.11.4.18 | O | TLV | 3-15 |
| 18 | Serving PLMN rate control | Serving PLMN rate control  9.11.4.20 | O | TLV | 4 |
| 77 | ATSSS container | ATSSS container  9.11.4.22 | O | TLV-E | 3-65538 |
| C- | Control plane only indication | Control plane only indication  9.11.4.23 | O | TV | 1 |
| 66 | IP header compression configuration | IP header compression configuration  9.11.4.24 | O | TLV | 5-257 |
| 1F | Ethernet header compression configuration | Ethernet header compression configuration  9.11.4.28 | O | TLV | 3 |
| 72 | Service-level-AA container | Service-level-AA container  9.11.2.10 | O | TLV-E | 4-65538 |
| 71 | Received MBS container | Received MBS container  9.11.4.31 | O | TLV-E | 9-65538 |
| 70 | N3QAI | N3QAI  9.11.4.36 | O | TLV-E | 9-n |
| 73 | Protocol description | Protocol description  9.11.4.39 | O | TLV-E | 6-n |
| 38 | ECN marking for L4S indication | ECN marking for L4S indication  9.11.4.40 | O | TLV | 2-257 |

#### 8.3.2.2 5GSM cause

this IE is included when the selected PDU session type is different from the PDU session type requested by the UE

#### 8.3.2.3 PDU address

this IE is included when the selected PDU session type is "IPv4" "IPv6" or "IPv4v6"

#### 8.3.2.4 RQ timer value

this IE is included when the network needs to provide the RQ timer value

#### 8.3.2.5 S-NSSAI

this IE shall be included in the message when the SMF received from the AMF an S-NSSAI together with the PDU SESSION ESTABLISHMENT REQUEST message the PDU session is a non-emergency PDU session and the UE is not registered for onboarding services in SNPN

#### 8.3.2.6 Always-on PDU session indication

the network shall include this IE if the network decides to inform the UE whether the PDU session is established as an always-on PDU session

#### 8.3.2.7 mapped EPS bearer contexts

this IE is included when interworking with EPS is supported for the PDU session

#### 8.3.2.8 EAP message

this IE is included when the external DN successfully performed authentication and authorization of the UE using EAP

#### 8.3.2.9 authorized QoS flow descriptions

this IE is included when the network needs to provide authorized QoS flow descriptions

#### 8.3.2.10 extended protocol configuration options

this IE is included in the message when the network needs to transmit (protocol) data (e.g configuration parameters error codes or messages/events) to the UE

#### 8.3.2.11 DNN

the IE shall be included in the message when the PDU session is a non-emergency PDU session and the UE is not registered for onboarding services in SNPN

#### 8.3.2.12 5GSM network feature support

this IE is included when the network needs to indicate support of 5GSM network features

#### 8.3.2.13 void

#### 8.3.2.14 serving PLMN rate control

this IE shall be included when the network needs to indicate the maximum uplink control plane user data the UE is allowed to send per 6 minute interval

#### 8.3.2.15 ATSSS container

the IE shall be included in the message when the PDU session is an MA PDU session

#### 8.3.2.16 control plane only indication

the network shall include the control plane only indication IE if the network determines that the associated PDU session is only for control plane CIoT 5GS optimization

#### 8.3.2.17 IP header compression configuration

the SMF may include the IP header compression configuration IE if

- the network accepts an IP PDU session type;

- control plane CIoT 5GS optimization is selected; and

- the UE provided the IP header compression configuration IE in the PDU SESSION ESTABLISHMENT REQUEST message

#### 8.3.2.18 ethernet header compression configuration

the SMF may include the ethernet header compression configuration IE if

- the network accepts an ethernet PDU session type;

- control plane CIoT 5GS optimization is selected; and

- the UE provided the ethernet header compression configuration IE in the PDU SESSION ESTABLISHMENT REQUEST message

#### 8.3.2.19 Service-level-AA container

the SMF shall include the Service-level-AA container IE if the service-level authentication and authorization procedure is completed successfully by the external DN

#### 8.3.2.20 received MBS container

the network shall include this IE if the UE has requested to join one or more multicast MBS sessions

#### 8.3.2.21 N3QAI

this IE is included when the network needs to provide the N3QAI to the UE

#### 8.3.2.22 protocol description

this IE is included when the network needs to indicate the protocol description for UL PDU set handling to the UE

#### 8.3.2.23 ECN marking for L4S indication

this IE is included when the network determines the ECN marking for L4S for the 5G-RG

### 8.3.3 PDU session establishment reject

#### 8.3.3.1 message definition

the PDU SESSION ESTABLISHMENT REJECT message is sent by the SMF to the UE in response to PDU SESSION ESTABLISHMENT REQUEST message and indicates unsuccessful establishment of a PDU session see table 8.3.3.1.1

message type PDU SESSION ESTABLISHMENT REJECT

significance dual

direction network to UE

table 8.3.3.1.1 PDU SESSION ESTABLISHMENT REJECT message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | PDU session ID | PDU session identity  9.4 | M | V | 1 |
|  | PTI | Procedure transaction identity  9.6 | M | V | 1 |
|  | PDU SESSION ESTABLISHMENT REJECT message identity | Message type  9.7 | M | V | 1 |
|  | 5GSM cause | 5GSM cause  9.11.4.2 | M | V | 1 |
| 37 | Back-off timer value | GPRS timer 3  9.11.2.5 | O | TLV | 3 |
| F- | Allowed SSC mode | Allowed SSC mode  9.11.4.5 | O | TV | 1 |
| 78 | EAP message | EAP message  9.11.2.2 | O | TLV-E | 7-1503 |
| 61 | 5GSM congestion re-attempt indicator | 5GSM congestion re-attempt indicator  9.11.4.21 | O | TLV | 3 |
| 7B | Extended protocol configuration options | Extended protocol configuration options  9.11.4.6 | O | TLV-E | 4-65538 |
| 1D | Re-attempt indicator | Re-attempt indicator  9.11.4.17 | O | TLV | 3 |
| 72 | Service-level-AA container | Service-level-AA container  9.11.2.10 | O | TLV-E | 4-65538 |

#### 8.3.3.2 Back-off timer value

the network may include this IE if the 5GSM cause is not #28 "unknown PDU session type" #39 "reactivation requested" #46 "out of LADN service area" #50 "PDU session type IPv4 only allowed" #51 "PDU session type IPv6 only allowed" #54 "PDU session does not exist" #57 "PDU session type IPv4v6 only allowed" #58 "PDU session type unstructured only allowed" #61 "PDU session type ethernet only allowed",#68 "not supported SSC mode" or #86 "UAS services not allowed" to request a minimum time interval before procedure retry is allowed

#### 8.3.3.3 allowed SSC mode

this IE is included when the network rejects the PDU SESSION ESTABLISHMENT REQUEST with cause #68 "not supported SSC mode

#### 8.3.3.4 EAP message

this IE is included when the external DN unsuccessfully performed authentication and authorization of the UE using EAP

#### 8.3.3.4A 5GSM congestion re-attempt indicator

the network may include this IE only if it includes the Back-off timer value IE and the 5GSM cause value is either #67 "insufficient resources for specific slice and DNN" or #69 "insufficient resources for specific slice"

#### 8.3.3.5 extended protocol configuration options

this IE is included in the message when the network needs to transmit (protocol) data (e.g configuration parameters error codes or messages/events) to the UE

#### 8.3.3.6 Re-attempt indicator

the network may include this IE if the network includes the Back-off timer value IE and the 5GSM cause value is not #26 "insufficient resources" #28 "unknown PDU session type" #39 "reactivation requested" #46 "out of LADN service area" #54 "PDU session does not exist" #67 "insufficient resources for specific slice and DNN" #68 "not supported SSC mode" or #69 "insufficient resources for specific slice"

#### 8.3.3.7 Service-level-AA container

the network shall include this IE if the service-level authentication and authorization procedure has completed unsuccessfully and the 5GSM cause is #29 "user authentication or authorization failed" the network shall include the service-level-AA response if provided by the DN in the service-level-AA container

### 8.3.4 PDU session authentication command

#### 8.3.4.1 message definition

the PDU SESSION AUTHENTICATION COMMAND message is sent by the SMF to the UE for authentication of the UE establishing the PDU session or of the UE participating in the PDU session see table 8.3.4.1.1

message type PDU SESSION AUTHENTICATION COMMAND

significance dual

direction network to UE

table 8.3.4.1.1 PDU SESSION AUTHENTICATION COMMAND message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | PDU session ID | PDU session identity  9.4 | M | V | 1 |
|  | PTI | Procedure transaction identity  9.6 | M | V | 1 |
|  | PDU SESSION AUTHENTICATION COMMAND message identity | Message type  9.7 | M | V | 1 |
|  | EAP message | EAP message  9.11.2.2 | M | LV-E | 6-1502 |
| 7B | Extended protocol configuration options | Extended protocol configuration options  9.11.4.6 | O | TLV-E | 4-65538 |

#### 8.3.4.2 extended protocol configuration options

this IE is included in the message when the network needs to transmit (protocol) data (e.g configuration parameters error codes or messages/events) to the UE

NOTE how the extended protocol configuration options IE is used by the network and the UE during the PDU session authentication and authorization procedure is not specified in this release of the specification

#### 8.3.4.3 void

### 8.3.5 PDU session authentication complete

#### 8.3.5.1 message definition

the PDU SESSION AUTHENTICATION COMPLETE message is sent by the UE to the SMF in response to the PDU SESSION AUTHENTICATION COMMAND message and indicates acceptance of the PDU SESSION AUTHENTICATION COMMAND message see table 8.3.5.1.1

message type PDU SESSION AUTHENTICATION COMPLETE

significance dual

direction UE to network

table 8.3.5.1.1 PDU SESSION AUTHENTICATION COMPLETE message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | PDU session ID | PDU session identity  9.4 | M | V | 1 |
|  | PTI | Procedure transaction identity  9.6 | M | V | 1 |
|  | PDU SESSION AUTHENTICATION COMPLETE message identity | Message type  9.7 | M | V | 1 |
|  | EAP message | EAP message  9.11.2.2 | M | LV-E | 6-1502 |
| 7B | Extended protocol configuration options | Extended protocol configuration options  9.11.4.6 | O | TLV-E | 4-65538 |

#### 8.3.5.2 extended protocol configuration options

this IE is included in the message when the UE needs to transmit (protocol) data (e.g configuration parameters error codes or messages/events) to the network

NOTE how the extended protocol configuration options IE is used by the network and the UE during the PDU session authentication and authorization procedure is not specified in this release of the specification

#### 8.3.5.3 void

### 8.3.6 PDU session authentication result

#### 8.3.6.1 message definition

the PDU SESSION AUTHENTICATION RESULT message is sent by the SMF to the UE for indication of successful result of authentication of the UE participating in the PDU session see table 8.3.6.1.1

message type PDU SESSION AUTHENTICATION RESULT

significance dual

direction network to UE

table 8.3.6.1.1 PDU SESSION AUTHENTICATION RESULT message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | PDU session ID | PDU session identity  9.4 | M | V | 1 |
|  | PTI | Procedure transaction identity  9.6 | M | V | 1 |
|  | PDU SESSION AUTHENTICATION RESULT message identity | Message type  9.7 | M | V | 1 |
| 78 | EAP message | EAP message  9.11.2.2 | O | TLV-E | 7-1503 |
| 7B | Extended protocol configuration options | Extended protocol configuration options  9.11.4.6 | O | TLV-E | 4-65538 |

#### 8.3.6.2 EAP message

this IE shall be included when the external DN performs authentication and authorization of the UE using EAP and it completes successfully

#### 8.3.6.3 extended protocol configuration options

this IE is included in the message when the network needs to transmit (protocol) data (e.g configuration parameters error codes or messages/events) to the UE

NOTE how the extended protocol configuration options IE is used by the network and the UE during the PDU session authentication and authorization procedure is not specified in this release of the specification

### 8.3.7 PDU session modification request

#### 8.3.7.1 message definition

the PDU SESSION MODIFICATION REQUEST message is sent by the UE to the SMF to request a modification of a PDU session see table 8.3.7.1.1

message type PDU SESSION MODIFICATION REQUEST

significance dual

direction UE to network

table 8.3.7.1.1 PDU SESSION MODIFICATION REQUEST message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | PDU session ID | PDU session identity  9.4 | M | V | 1 |
|  | PTI | Procedure transaction identity  9.6 | M | V | 1 |
|  | PDU SESSION MODIFICATION REQUEST message identity | Message type  9.7 | M | V | 1 |
| 28 | 5GSM capability | 5GSM capability  9.11.4.1 | O | TLV | 3-15 |
| 59 | 5GSM cause | 5GSM cause  9.11.4.2 | O | TV | 2 |
| 55 | Maximum number of supported packet filters | Maximum number of supported packet filters  9.11.4.9 | O | TV | 3 |
| B- | Always-on PDU session requested | Always-on PDU session requested  9.11.4.4 | O | TV | 1 |
| 13 | Integrity protection maximum data rate | Integrity protection maximum data rate  9.11.4.7 | O | TV | 3 |
| 7A | Requested QoS rules | QoS rules  9.11.4.13 | O | TLV-E | 7-65538 |
| 79 | Requested QoS flow descriptions | QoS flow descriptions  9.11.4.12 | O | TLV-E | 6-65538 |
| 75 | Mapped EPS bearer contexts | Mapped EPS bearer contexts  9.11.4.8 | O | TLV-E | 7-65538 |
| 7B | Extended protocol configuration options | Extended protocol configuration options  9.11.4.6 | O | TLV-E | 4-65538 |
| 74 | Port management information container | Port management information container  9.11.4.27 | O | TLV-E | 4-65538 |
| 66 | IP header compression configuration | Header compression configuration  9.11.4.24 | O | TLV | 5-257 |
| 1F | Ethernet header compression configuration | Ethernet header compression configuration  9.11.4.28 | O | TLV | 3 |
| 70 | Requested MBS container | Requested MBS container  9.11.4.30 | O | TLV-E | 8-65538 |
| 72 | Service-level-AA container | Service-level-AA container  9.11.2.10 | O | TLV-E | 4-65538 |
| 73 | Non-3GPP delay budget | Non-3GPP delay budget  9.11.4.37 | O | TLV-E | 6-n |
| 36 | URSP rule enforcement reports | URSP rule enforcement reports  9.11.4.38 | O | TLV | 4-n |

NOTE it is possible for UEs compliant with version 15.2.1 or earlier versions of this specification to send the mapped EPS bearer contexts IE with IEI of value "7F" for this message

#### 8.3.7.2 5GSM capability

this IE is included in the message

1) for a PDN connection established when in S1 mode after an inter-system change from S1 mode to N1 mode if the UE is a UE operating in single-registration mode in a network supporting N26 interface the UE has not previously successfully performed the UE-requested PDU session modification to provide this capability and

a) if the PDU session is of "IPv4" "IPv6" "IPv4v6" or "Ethernet" PDU session type and the UE supports reflective QoS; or

b) if the PDU session is of "IPv6" or "IPv4v6" PDU session type and the UE supports multi-homed IPv6 PDU session; or

2) if the UE needs to revoke the previously indicated support of reflective QoS

#### 8.3.7.3 5GSM cause

this IE is included in the message to indicate the reason for the deletion of one or more non-default QoS rules QoS flow descriptions or mapped EPS bearer contexts

#### 8.3.7.4 maximum number of supported packet filters

this IE shall be included in the message for a PDN connection established when in S1 mode after an inter-system change from S1 mode to N1 mode if the UE is a UE operating in single-registration mode in a network supporting N26 interface the UE has not previously successfully performed the UE-requested PDU session modification to provide this capability the PDU session type is "IPv4" "IPv6" "IPv4v6" or "Ethernet" and the UE can support more than 16 packet filters for this PDU session

#### 8.3.7.5 Always-on PDU session requested

this IE shall be included in the message for a PDN connection established when in S1 mode after an inter-system change from S1 mode to N1 mode if the UE is a UE operating in single-registration mode in a network supporting N26 interface the UE has not previously successfully performed the UE-requested PDU session modification to provide this capability and the UE requests the PDU session to be an always-on PDU session in the 5GS

#### 8.3.7.6 integrity protection maximum data rate

this IE shall be included in the message for a PDN connection established when in S1 mode after an inter-system change from S1 mode to N1 mode if the UE is a UE operating in single-registration mode in a network supporting N26 interface and the UE has not previously successfully performed the UE-requested PDU session modification to provide this capability

#### 8.3.7.7 requested QoS rules

this IE is included in the message when the UE requests a specific QoS handling

#### 8.3.7.8 requested QoS flow descriptions

this IE is included in the message when the UE requests a specific QoS flow descriptions

#### 8.3.7.9 extended protocol configuration options

this IE is included in the message when the UE needs to transmit (protocol) data (e.g configuration parameters error codes or messages/events) to the network

#### 8.3.7.10 mapped EPS bearer contexts

this IE is included when the UE requests to delete one or more mapped EPS bearer contexts

#### 8.3.7.11 port management information container

this IE shall be included when the UE needs to convey a port management information container

#### 8.3.7.12 IP header compression configuration

this IE is included in the message

a) if the UE wishes to re-negotiate IP header compression configuration associated to a PDU session and both the UE and the network supports control plane CIoT 5GS optimization and IP header compression; or

b) to negotiate IP header compression configuration associated to a PDU session after an inter-system change from S1 mode to N1 mode when both the UE and the network support control plane CIoT 5GS optimization and IP header compression and the UE is operating in single-registration mode in the network supporting N26 interface

#### 8.3.7.13 ethernet header compression configuration

this IE is included in the message

a) if the UE wishes to re-negotiate ethernet header compression configuration associated to a PDU session and both the UE and the network support control plane CIoT 5GS optimization and ethernet header compression; or

b) to negotiate ethernet header compression configuration associated to a PDU session after an inter-system change from S1 mode to N1 mode

#### 8.3.7.14 requested MBS container

this IE is included in the message when the UE requests to join or leave one or more multicast MBS sessions that are associated with the PDU session

#### 8.3.7.15 Service-level-AA container

this IE shall be included in the message when the UE needs to modify an established PDU session for C2 communication

#### 8.3.7.16 Non-3GPP delay budget

this IE is included in the message when the UE requests a specific QoS handling for the PDU session established for PIN

#### 8.3.7.17 URSP rule enforcement reports

this IE is included in the message when the UE sends one or more URSP rule enforcement reports to the network

### 8.3.8 PDU session modification reject

#### 8.3.8.1 message definition

the PDU SESSION MODIFICATION REJECT message is sent by the SMF to the UE to indicate rejection of the PDU SESSION MODIFICATION REQUEST see table 8.3.8.1.1

message type PDU SESSION MODIFICATION REJECT

significance dual

direction network to UE

table 8.3.8.1.1 PDU SESSION MODIFICATION REJECT message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | PDU session ID | PDU session identity  9.4 | M | V | 1 |
|  | PTI | Procedure transaction identity  9.6 | M | V | 1 |
|  | PDU SESSION MODIFICATION REJECT message identity | Message type  9.7 | M | V | 1 |
|  | 5GSM cause | 5GSM cause  9.11.4.2 | M | V | 1 |
| 37 | Back-off timer value | GPRS timer 3  9.11.2.5 | O | TLV | 3 |
| 61 | 5GSM congestion re-attempt indicator | 5GSM congestion re-attempt indicator  9.11.4.21 | O | TLV | 3 |
| 7B | Extended protocol configuration options | Extended protocol configuration options  9.11.4.6 | O | TLV-E | 4-65538 |
| 1D | Re-attempt indicator | Re-attempt indicator  9.11.4.17 | O | TLV | 3 |

#### 8.3.8.2 Back-off timer value

the network may include this IE if the 5GSM cause is not #26 "insufficient resources" #37 "5GS QoS not accepted" #44 "Semantic errors in packet filter(s)" #45 "Syntactical error in packet filter(s)" #46 "out of LADN service area" #59 "unsupported 5QI value" #67 "insufficient resources for specific slice and DNN" #69 "insufficient resources for specific slice" #83 "Semantic error in the QoS operation" or #84 "Syntactical error in the QoS operation" to request a minimum time interval before procedure retry is allowed

#### 8.3.8.2A 5GSM congestion re-attempt indicator

the network may include this IE only if it includes the Back-off timer value IE and the 5GSM cause value is either #67 "insufficient resources for specific slice and DNN" or #69 "insufficient resources for specific slice"

#### 8.3.8.3 extended protocol configuration options

this IE is included in the message when the network needs to transmit (protocol) data (e.g configuration parameters error codes or messages/events) to the UE

#### 8.3.8.4 Re-attempt indicator

the network may include this IE only if it includes the Back-off timer value IE and the 5GSM cause value is not #26 "insufficient resources" #37 "5GS QoS not accepted" #44 "Semantic errors in packet filter(s)" #45 "Syntactical error in packet filter(s)" #46 "out of LADN service area" #59 "unsupported 5QI value" #67 "insufficient resources for specific slice and DNN" #69 "insufficient resources for specific slice" #83 "Semantic error in the QoS operation" or #84 "Syntactical error in the QoS operation"

### 8.3.9 PDU session modification command

#### 8.3.9.1 message definition

the PDU SESSION MODIFICATION COMMAND message is sent by the SMF to the UE to indicate a modification of a PDU session see table 8.3.9.1.1

message type PDU SESSION MODIFICATION COMMAND

significance dual

direction network to UE

table 8.3.9.1.1 PDU SESSION MODIFICATION COMMAND message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | PDU session ID | PDU session identity  9.4 | M | V | 1 |
|  | PTI | Procedure transaction identity  9.6 | M | V | 1 |
|  | PDU SESSION MODIFICATION COMMAND message identity | Message type  9.7 | M | V | 1 |
| 59 | 5GSM cause | 5GSM cause  9.11.4.2 | O | TV | 2 |
| 2A | Session AMBR | Session-AMBR  9.11.4.14 | O | TLV | 8 |
| 56 | RQ timer value | GPRS timer  9.11.2.3 | O | TV | 2 |
| 8- | Always-on PDU session indication | Always-on PDU session indication  9.11.4.3 | O | TV | 1 |
| 7A | Authorized QoS rules | QoS rules  9.11.4.13 | O | TLV-E | 7-65538 |
| 75 | Mapped EPS bearer contexts | Mapped EPS bearer contexts  9.11.4.8 | O | TLV-E | 7-65538 |
| 79 | Authorized QoS flow descriptions | QoS flow descriptions  9.11.4.12 | O | TLV-E | 6-65538 |
| 7B | Extended protocol configuration options | Extended protocol configuration options  9.11.4.6 | O | TLV-E | 4-65538 |
| 77 | ATSSS container | ATSSS container  9.11.4.22 | O | TLV-E | 3-65538 |
| 66 | IP header compression configuration | IP header compression configuration  9.11.4.24 | O | TLV | 5-257 |
| 74 | Port management information container | Port management information container  9.11.4.27 | O | TLV-E | 4-65538 |
| 1E | Serving PLMN rate control | Serving PLMN rate control  9.11.4.20 | O | TLV | 4 |
| 1F | Ethernet header compression configuration | Ethernet header compression configuration  9.11.4.28 | O | TLV | 3 |
| 71 | Received MBS container | Received MBS container  9.11.4.31 | O | TLV-E | 9-65538 |
| 72 | Service-level-AA container | Service-level-AA container  9.11.2.10 | O | TLV-E | 4-65538 |
| 5A | Alternative S-NSSAI | S-NSSAI  9.11.2.8 | O | TLV | 3-10 |
| 70 | N3QAI | N3QAI  9.11.4.36 | O | TLV-E | 9-n |
| 73 | Protocol description | Protocol description  9.11.4.39 | O | TLV-E | 6-n |
| 38 | ECN marking for L4S indication | ECN marking for L4S indication  9.11.4.40 | O | TLV | 2-257 |

NOTE it is possible for networks compliant with version 15.2.1 or earlier versions of this specification to send the mapped EPS bearer contexts IE with IEI of value "7F" for this message

#### 8.3.9.2 5GSM cause

this IE is included when the network performs the PDU session anchor relocation for SSC mode 3

#### 8.3.9.3 Session-AMBR

this IE is included when the session-AMBR of the PDU session is modified

#### 8.3.9.4 RQ timer value

this IE is included when the network needs to provide the RQ timer value

#### 8.3.9.5 Always-on PDU session indication

the network shall include this IE if the network decides to inform the UE whether the PDU session is an always-on PDU session

#### 8.3.9.6 authorized QoS rules

this IE is included when the authorized QoS rules of the PDU session are modified

#### 8.3.9.7 mapped EPS bearer contexts

this IE is included when interworking with EPS is supported for the PDU session and the mapped EPS bearer contexts is modified

#### 8.3.9.8 authorized QoS flow descriptions

this IE is included when the authorized QoS flow descriptions of the PDU session are modified

#### 8.3.9.9 extended protocol configuration options

this IE is included in the message when the network needs to transmit (protocol) data (e.g configuration parameters error codes or messages/events) to the UE

#### 8.3.9.10 void

#### 8.3.9.11 ATSSS container

the IE is included in the message when the network needs to indicate that the ATSSS parameters of the MA PDU session are modified

#### 8.3.9.12 IP header compression configuration

this IE is included in the message if the network wishes to re-negotiate IP header compression configuration associated to a PDU session and both the UE and the network support control plane CIoT 5GS optimization and IP header compression

#### 8.3.9.13 port management information container

this IE shall be included when the network needs to convey a port management information container

#### 8.3.9.14 serving PLMN rate control

this IE shall be included when the network needs to indicate the maximum uplink control plane user data the UE is allowed to send per 6 minute interval

#### 8.3.9.15 ethernet header compression configuration

this IE is included in the message if the network wishes to re-negotiate ethernet header compression configuration associated to a PDU session and both the UE and the network support control plane CIoT 5GS optimization and ethernet header compression

#### 8.3.9.16 received MBS container

the network shall include this IE if

- the UE has requested to join or leave one or more multicast MBS sessions;

- the network wants to remove joined UE from one or more multicast MBS sessions; or

- the network wants to update the MBS service area of multicast MBS session that the UE has joined; or

- the network wants to update the MBS security information of multicast MBS session that the UE has joined

#### 8.3.9.17 Service-level-AA container

the SMF shall include the service-level-AA container IE if the service-level authentication and authorization procedure for re-authentication purpose is completed successfully by the external DN

#### 8.3.9.18 alternative S-NSSAI

this IE shall be included when the network needs to provide the alternative S-NSSAI to replace the S-NSSAI of the SSC mode 1 or SSC mode 3 PDU session

#### 8.3.9.19 N3QAI

this IE is included when the network needs to provide the N3QAI to the UE

#### 8.3.9.20 protocol description

this IE is included when the network needs to provide the protocol description for UL PDU set handling to the UE

#### 8.3.9.21 ECN marking for L4S indication

this IE is included when the network determines the ECN marking for L4S for the 5G-RG

### 8.3.10 PDU session modification complete

#### 8.3.10.1 message definition

the PDU SESSION MODIFICATION COMPLETE message is sent by the UE to the SMF in response to the PDU SESSION MODIFICATION COMMAND message and indicates an acceptance of the PDU SESSION MODIFICATION COMMAND message see table 8.3.10.1.1

message type PDU SESSION MODIFICATION COMPLETE

significance dual

direction UE to network

table 8.3.10.1.1 PDU SESSION MODIFICATION COMPLETE message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | PDU session ID | PDU session identity  9.4 | M | V | 1 |
|  | PTI | Procedure transaction identity  9.6 | M | V | 1 |
|  | PDU SESSION MODIFICATION COMPLETE message identity | Message type  9.7 | M | V | 1 |
| 7B | Extended protocol configuration options | Extended protocol configuration options  9.11.4.6 | O | TLV-E | 4-65538 |
| 74 | Port management information container | Port management information container  9.11.4.27 | O | TLV-E | 4-65538 |

NOTE it is possible for UEs compliant with version 15.3.0 of this specification to include the 5GSM cause IE with IEI 59 in the PDU SESSION MODIFICATION COMPLETE message and therefore the IEI 59 cannot be used for other optional IEs other than the 5GSM cause IE for future extensions of the PDU SESSION MODIFICATION COMPLETE message

#### 8.3.10.2 extended protocol configuration options

this IE is included in the message when the UE needs to transmit (protocol) data (e.g configuration parameters error codes or messages/events) to the network

#### 8.3.10.3 port management information container

this IE shall be included when the UE needs to convey a port management information container

### 8.3.11 PDU session modification command reject

#### 8.3.11.1 message definition

the PDU SESSION MODIFICATION COMMAND REJECT message is sent by the UE to the SMF to indicate rejection of the PDU SESSION MODIFICATION COMMAND message see table 8.3.11.1.1

message type PDU SESSION MODIFICATION COMMAND REJECT

significance dual

direction UE to network

table 8.3.11.1.1 PDU SESSION MODIFICATION COMMAND REJECT message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | PDU session ID | PDU session identity  9.4 | M | V | 1 |
|  | PTI | Procedure transaction identity  9.6 | M | V | 1 |
|  | PDU SESSION MODIFICATION COMMAND REJECT message identity | Message type  9.7 | M | V | 1 |
|  | 5GSM cause | 5GSM cause  9.11.4.2 | M | V | 1 |
| 7B | Extended protocol configuration options | Extended protocol configuration options  9.11.4.6 | O | TLV-E | 4-65538 |

#### 8.3.11.2 extended protocol configuration options

this IE is included in the message when the UE needs to transmit (protocol) data (e.g configuration parameters error codes or messages/events) to the network

### 8.3.12 PDU session release request

#### 8.3.12.1 message definition

the PDU SESSION RELEASE REQUEST message is sent by the UE to the SMF to request a release of a PDU session see table 8.3.12.1.1

message type PDU SESSION RELEASE REQUEST

significance dual

direction UE to network

table 8.3.12.1.1 PDU SESSION RELEASE REQUEST message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | PDU session ID | PDU session identity  9.4 | M | V | 1 |
|  | PTI | Procedure transaction identity  9.6 | M | V | 1 |
|  | PDU SESSION RELEASE REQUEST message identity | Message type  9.7 | M | V | 1 |
| 59 | 5GSM cause | 5GSM cause  9.11.4.2 | O | TV | 2 |
| 7B | Extended protocol configuration options | Extended protocol configuration options  9.11.4.6 | O | TLV-E | 4-65538 |

#### 8.3.12.2 5GSM cause

this IE is included in the message to indicate the reason for releasing the PDU session

#### 8.3.12.3 extended protocol configuration options

this IE is included in the message when the UE needs to transmit (protocol) data (e.g configuration parameters error codes or messages/events) to the network

### 8.3.13 PDU session release reject

#### 8.3.13.1 message definition

the PDU SESSION RELEASE REJECT message is sent by the SMF to the UE to indicate rejection of request a release of a PDU session see table 8.3.13.1.1

message type PDU SESSION RELEASE REJECT

significance dual

direction network to UE

table 8.3.13.1.1 PDU SESSION RELEASE REJECT message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | PDU session ID | PDU session identity  9.4 | M | V | 1 |
|  | PTI | Procedure transaction identity  9.6 | M | V | 1 |
|  | PDU SESSION RELEASE REJECT message identity | Message type  9.7 | M | V | 1 |
|  | 5GSM cause | 5GSM cause  9.11.4.2 | M | V | 1 |
| 7B | Extended protocol configuration options | Extended protocol configuration options  9.11.4.6 | O | TLV-E | 4-65538 |

#### 8.3.13.2 extended protocol configuration options

this IE is included in the message when the network needs to transmit (protocol) data (e.g configuration parameters error codes or messages/events) to the UE

### 8.3.14 PDU session release command

#### 8.3.14.1 message definition

the PDU SESSION RELEASE COMMAND message is sent by the SMF to the UE to indicate a release of a PDU session see table 8.3.14.1.1

message type PDU SESSION RELEASE COMMAND

significance dual

direction network to UE

table 8.3.14.1.1 PDU SESSION RELEASE COMMAND message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | PDU session ID | PDU session identity  9.4 | M | V | 1 |
|  | PTI | Procedure transaction identity  9.6 | M | V | 1 |
|  | PDU SESSION RELEASE COMMAND message identity | Message type  9.7 | M | V | 1 |
|  | 5GSM cause | 5GSM cause  9.11.4.2 | M | V | 1 |
| 37 | Back-off timer value | GPRS timer 3  9.11.2.5 | O | TLV | 3 |
| 78 | EAP message | EAP message  9.11.2.2 | O | TLV-E | 7-1503 |
| 61 | 5GSM congestion re-attempt indicator | 5GSM congestion re-attempt indicator  9.11.4.21 | O | TLV | 3 |
| 7B | Extended protocol configuration options | Extended protocol configuration options  9.11.4.6 | O | TLV-E | 4-65538 |
| D- | Access type | Access type  9.11.2.1A | O | TV | 1 |
| 72 | Service-level-AA container | Service-level-AA container  9.11.2.10 | O | TLV-E | 4-65538 |
| 5A | Alternative S-NSSAI | S-NSSAI  9.11.2.8 | O | TLV | 3-10 |

#### 8.3.14.2 Back-off timer value

the network may include this IE to request a minimum time interval before procedure retry is allowed

#### 8.3.14.3 EAP message

this IE is included when the external DN performs re-authentication and re-authorization of the UE using EAP and it completes unsuccessfully

#### 8.3.14.4 extended protocol configuration options

this IE is included in the message when the network wants to transmit (protocol) data (e.g configuration parameters error codes or messages/events) to the UE

#### 8.3.14.5 5GSM congestion re-attempt indicator

the network may include this IE only if it includes the Back-off timer value IE and the 5GSM cause value is either #67 "insufficient resources for specific slice and DNN" or #69 "insufficient resources for specific slice"

#### 8.3.14.6 access type

this IE is included in the message when the network releases user-plane reources of an MA PDU session specifically over either 3GPP access or non-3GPP access

#### 8.3.14.7 Service-level-AA container

the SMF shall include the service-level-AA container IE if the service-level authentication and authorization procedure for re-authentication purpose is completed unsuccessfully by the external DN

#### 8.3.14.8 alternative S-NSSAI

this IE shall be included when the network needs to trigger the re-establishment of the PDU session with the alternative S-NSSAI in SSC mode 2 or SSC mode 1

### 8.3.15 PDU session release complete

#### 8.3.15.1 message definition

the PDU SESSION RELEASE COMPLETE message is sent by the UE to the SMF in response to the PDU SESSION RELEASE COMMAND message and indicates an acceptance of a release of the PDU session see table 8.3.15.1.1

message type PDU SESSION RELEASE COMPLETE

significance dual

direction UE to network

table 8.3.15.1.1 PDU SESSION RELEASE COMPLETE message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | PDU session ID | PDU session identity  9.4 | M | V | 1 |
|  | PTI | Procedure transaction identity  9.6 | M | V | 1 |
|  | PDU SESSION RELEASE COMPLETE message identity | Message type  9.7 | M | V | 1 |
| 59 | 5GSM cause | 5GSM cause  9.11.4.2 | O | TV | 2 |
| 7B | Extended protocol configuration options | Extended protocol configuration options  9.11.4.6 | O | TLV-E | 4-65538 |

#### 8.3.15.2 5GSM cause

this IE is included in the message when the UE needs to indicate to the network that an error encountered with a mandatory information element in the PDU SESSION RELEASE COMMAND message

#### 8.3.15.3 extended protocol configuration options

this IE is included in the message when the UE needs to transmit (protocol) data (e.g configuration parameters error codes or messages/events) to the network

### 8.3.16 5GSM status

#### 8.3.16.1 message definition

the 5GSM STATUS message is sent by the SMF or the UE to pass information on the status of the indicated PDU session and report certain error conditions see table 8.3.16.1.1

message type 5GSM STATUS

significance dual

direction both

table 8.3.16.1.1 5GSM STATUS message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | PDU session ID | PDU session identity  9.4 | M | V | 1 |
|  | PTI | Procedure transaction identity  9.6 | M | V | 1 |
|  | 5GSM STATUS message identity | Message type  9.7 | M | V | 1 |
|  | 5GSM cause | 5GSM cause  9.11.4.2 | M | V | 1 |

### 8.3.17 Service-level authentication command

#### 8.3.17.1 message definition

the SERVICE-LEVEL AUTHENTICATION COMMAND message is sent by the SMF to the UE for service-level authentication and authorization procedure see table 8.3.17.1.1

message type SERVICE-LEVEL AUTHENTICATION COMMAND

significance dual

direction network to UE

table 8.3.17.1.1 SERVICE-LEVEL AUTHENTICATION COMMAND message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | PDU session ID | PDU session identity  9.4 | M | V | 1 |
|  | PTI | Procedure transaction identity  9.6 | M | V | 1 |
|  | SERVICE-LEVEL AUTHENTICATION COMMAND message identity | Message type  9.7 | M | V | 1 |
|  | Service-level-AA container | Service-level-AA container  9.11.2.10 | M | LV-E | 5-n |

### 8.3.18 Service-level authentication complete

#### 8.3.18.1 message definition

the SERVICE-LEVEL AUTHENTICATION COMPLETE message is sent by the UE to the SMF in response to the SERVICE-LEVEL AUTHENTICATION COMMAND message and indicates acceptance of the SERVICE-LEVEL AUTHENTICATION COMMAND message see table 8.3.18.1.1

message type SERVICE-LEVEL AUTHENTICATION COMPLETE

significance dual

direction UE to network

table 8.3.18.1.1 SERVICE-LEVEL AUTHENTICATION COMPLETE message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | PDU session ID | PDU session identity  9.4 | M | V | 1 |
|  | PTI | Procedure transaction identity  9.6 | M | V | 1 |
|  | SERVICE-LEVEL AUTHENTICATION COMPLETE message identity | Message type  9.7 | M | V | 1 |
|  | Service-level-AA container | Service-level-AA container  9.11.2.10 | M | LV-E | 5-n |

### 8.3.19 remote UE report

#### 8.3.19.1 message definition

the REMOTE UE REPORT message is sent by the UE to the network to report connection or disconnection of 5G ProSe remote UE(s) see table 8.3.19.1

message type REMOTE UE REPORT

significance dual

direction UE to network

table 8.3.19.1 REMOTE UE REPORT message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | PDU session ID | PDU session identity  9.4 | M | V | 1 |
|  | PTI | Procedure transaction identity  9.6 | M | V | 1 |
|  | Remote UE report message identity | Message type  9.7 | M | V | 1 |
| 76 | Remote UE context connected | Remote UE context list  9.11.4.29 | O | TLV-E | 16-65538 |
| 70 | Remote UE context disconnected | Remote UE context list  9.11.4.29 | O | TLV-E | 16-65538 |

#### 8.3.19.2 remote UE context connected

this IE is included in the message by the UE acting as a 5G ProSe layer-3 UE-to-network relay UE to provide the network with newly connected 5G ProSe remote UE information as specified in 3GPP TS 23.304 [6E]

#### 8.3.19.3 remote UE context disconnected

this IE is included in the message by the UE acting as a 5G ProSe layer-3 UE-to-network relay UE to provide the network with disconnected 5G ProSe remote UE information as specified in 3GPP TS 23.304 [6E]

### 8.3.20 remote UE report response

#### 8.3.20.1 message definition

the REMOTE UE REPORT RESPONSE message is sent by the network to the UE to acknowledge receipt of a remote UE report message see table 8.3.20.1

message type REMOTE UE REPORT RESPONSE

significance dual

direction network to UE

table 8.3.20.1 REMOTE UE REPORT RESPONSE message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | Extended protocol discriminator | Extended protocol discriminator  9.2 | M | V | 1 |
|  | PDU session ID | PDU session identity  9.4 | M | V | 1 |
|  | PTI | Procedure transaction identity  9.6 | M | V | 1 |
|  | Remote UE report response message identity | Message type  9.7 | M | V | 1 |

#### 8.3.20.2 void

#### 8.3.20.3 void

#### 8.3.20.4 void

# 9 general message format and information elements coding

## 9.1 overview

### 9.1.1 NAS message format

within the protocols defined in the present document every 5GS NAS message is a standard L3 message as defined in 3GPP TS 24.007 [11] this means that the message consists of the following parts

1) if the message is a plain 5GS NAS message

a) extended protocol discriminator;

b) security header type associated with a half spare octet or PDU session identity;

c) procedure transaction identity;

d) message type;

e) other information elements as required

2) if the message is a security protected 5GS NAS message

a) extended protocol discriminator;

b) security header type associated with a half spare octet;

c) message authentication code;

d) sequence number;

e) plain 5GS NAS message as defined in item 1

the organization of a plain 5GS NAS message is illustrated in the example shown in figure 9.1.1.1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Extended protocol discriminator | | | | | | | | octet 1 |
| Security header type associated with a spare half octet; or  PDU session identity | | | | | | | | octet 2 |
| Procedure transaction identity | | | | | | | | octet 2a\* |
| Message type | | | | | | | | octet 3 |
|  | | | | | | | | octet 4 |
| Other information elements as required | | | | | | | |  |
|  | | | | | | | | octet n |

figure 9.1.1.1 general message organization example for a plain 5GS NAS message

the PDU session identity and the procedure transaction identity are only used in messages with extended protocol discriminator 5GS session management octet 2a with the procedure transaction identity shall only be included in these messages

the organization of a security protected 5GS NAS message is illustrated in the example shown in figure 9.1.1.2

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Extended protocol discriminator | | | | | | | | octet 1 |
| Security header type associated with a spare half octet | | | | | | | | octet 2 |
|  | | | | | | | | octet 3 |
| Message authentication code | | | | | | | |  |
|  | | | | | | | |  |
|  | | | | | | | | octet 6 |
| Sequence number | | | | | | | | octet 7 |
|  | | | | | | | | octet 8 |
| Plain 5GS NAS message | | | | | | | |  |
|  | | | | | | | | octet n |

figure 9.1.1.2 general message organization example for a security protected 5GS NAS message

unless specified otherwise in the message descriptions of clause 8 and annex d a particular information element shall not be present more than once in a given message

### 9.1.2 field format and mapping

when a field is contained within a single octet the lowest numbered bit of the field represents the least significant bit

when a field extends over more than one octet the order of bit values progressively decreases as the octet number increases in that part of the field contained in a given octet the lowest numbered bit represents the least significant bit the most significant bit of the field is represented by the highest numbered bit of the lowest numbered octet of the field the least significant bit of the field is represented by the lowest numbered bit of the highest numbered octet of the field

for example a bit number can be identified as a couple (o b) where o is the octet number and b is the relative bit number within the octet figure 9.1.2.1 illustrates a field that spans from bit (1 3) to bit (2 7) the most significant bit of the field is mapped on bit (1 3) and the least significant bit is mapped on bit (2 7)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
|  |  |  |  |  | 24 | 23 | 22 | 1st octet of field |
| 21 | 20 |  |  |  |  |  |  | 2nd octet of field |

figure 9.1.2.1 field mapping convention

## 9.2 extended protocol discriminator

bits 1 to 8 of the first octet of every 5GS NAS message contain the extended protocol discriminator (EPD) IE the EPD and its use are defined in 3GPP TS 24.007 [11] the extended protocol discriminator in the header (see 3GPP TS 24.007 [11]) of a security protected 5GS NAS message is encoded as "5GS mobility management messages"

## 9.3 security header type

bits 1 to 4 of the second octet of every 5GMM message contain the security header type IE this IE includes control information related to the security protection of a 5GMM message the total size of the security header type IE is 4 bits

the security header type IE can take the values shown in table 9.3.1

table 9.3.1 security header type

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Security header type (octet 1) | | | | |
| Bits | | | | |
| 4 | 3 | 2 | 1 |  |
| 0 | 0 | 0 | 0 | Plain 5GS NAS message, not security protected |
|  |  |  |  |  |
|  |  |  |  | Security protected 5GS NAS message: |
| 0 | 0 | 0 | 1 | Integrity protected |
| 0 | 0 | 1 | 0 | Integrity protected and ciphered |
| 0 | 0 | 1 | 1 | Integrity protected with new 5G NAS security context (NOTE 1) |
| 0 | 1 | 0 | 0 | Integrity protected and ciphered with new 5G NAS security context (NOTE 2) |
|  |  |  |  |  |
| All other values are reserved. | | | | |
|  | | | | |
| NOTE 1: This codepoint may be used only for a SECURITY MODE COMMAND message.  NOTE 2: This codepoint may be used only for a SECURITY MODE COMPLETE message. | | | | |

a 5GMM message received with the security header type encoded as 0000 shall be treated as not security protected plain 5GS NAS message a protocol entity sending a not security protected 5GMM message shall send the message as plain 5GS NAS message and encode the security header type as 0000

## 9.4 PDU session identity

bits 1 to 8 of the second octet of every 5GSM message contain the PDU session identity IE the PDU session identity and its use to identify a message flow are defined in 3GPP TS 24.007 [11]

## 9.5 spare half octet

this element is used in the description of 5GMM and 5GSM messages when an odd number of half octet type 1 information elements are used this element is filled with spare bits set to zero and is placed in bits 5 to 8 of the octet unless otherwise specified

## 9.6 procedure transaction identity

bits 1 to 8 of the third octet of every 5GSM message contain the procedure transaction identity bits 1 to 8 of the first octet of every UE policy delivery message contain the procedure transaction identity the procedure transaction identity and its use are defined in 3GPP TS 24.007 [11]

## 9.7 message type

the message type IE and its use are defined in 3GPP TS 24.007 [11] tables 9.7.1 and 9.7.2 define the value part of the message type IE used in the 5GS mobility management protocol and 5GS session management protocol

table 9.7.1 message types for 5GS mobility management

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bits | | | | | | | |  |  |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |  |
|  |  |  |  |  |  |  |  |  |  |
| 0 | 1 | - | - | - | - | - | - |  | 5GS mobility management messages |
|  |  |  |  |  |  |  |  |  |  |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |  | Registration request |
| 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |  | Registration accept |
| 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 |  | Registration complete |
| 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |  | Registration reject |
| 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |  | Deregistration request (UE originating) as specified in subclause 8.2.12) |
| 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 |  | Deregistration accept (UE originating) as specified in subclause 8.2.13) |
| 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |  | Deregistration request (UE terminated) as specified in subclause  8.2.14) |
| 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |  | Deregistration accept (UE terminated) as specified in subclause 8.2.15) |
|  |  |  |  |  |  |  |  |  |  |
| 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |  | Service request |
| 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 |  | Service reject |
| 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 |  | Service accept |
| 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 |  | Control plane service request |
|  |  |  |  |  |  |  |  |  |  |
| 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |  | Network slice-specific authentication command |
| 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 |  | Network slice-specific authentication complete |
| 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 |  | Network slice-specific authentication result |
| 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 |  | Configuration update command |
| 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |  | Configuration update complete |
| 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 |  | Authentication request |
| 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 |  | Authentication response |
| 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 |  | Authentication reject |
| 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 |  | Authentication failure |
| 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 |  | Authentication result |
| 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 |  | Identity request |
| 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 |  | Identity response |
| 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 |  | Security mode command |
| 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 |  | Security mode complete |
| 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |  | Security mode reject |
|  |  |  |  |  |  |  |  |  |  |
| 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |  | 5GMM status |
| 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 |  | Notification |
| 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 |  | Notification response |
| 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 |  | UL NAS transport |
| 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |  | DL NAS transport |
|  |  |  |  |  |  |  |  |  |  |
| 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 |  | Relay key request |
| 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 |  | Relay key accept |
| 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 |  | Relay key reject |
| 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 |  | Relay authentication request |
| 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 |  | Relay authentication response |
|  |  |  |  |  |  |  |  |  |  |

table 9.7.2 message types for 5GS session management

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bits | | | | | | | |  |  |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |  |
|  |  |  |  |  |  |  |  |  |  |
| 1 | 1 | - | - | - | - | - | - |  | 5GS session management messages |
|  |  |  |  |  |  |  |  |  |  |
| 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |  | PDU session establishment request |
| 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |  | PDU session establishment accept |
| 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 |  | PDU session establishment reject |
|  |  |  |  |  |  |  |  |  |  |
| 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |  | PDU session authentication command |
| 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 |  | PDU session authentication complete |
| 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |  | PDU session authentication result |
|  |  |  |  |  |  |  |  |  |  |
| 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 |  | PDU session modification request |
| 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |  | PDU session modification reject |
| 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 |  | PDU session modification command |
| 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |  | PDU session modification complete |
| 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 |  | PDU session modification command reject |
|  |  |  |  |  |  |  |  |  |  |
| 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 |  | PDU session release request |
| 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 |  | PDU session release reject |
| 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 |  | PDU session release command |
| 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 |  | PDU session release complete |
|  |  |  |  |  |  |  |  |  |  |
| 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 |  | 5GSM status |
|  |  |  |  |  |  |  |  |  |  |
| 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 |  | Service-level authentication command |
| 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 |  | Service-level authentication complete |
|  |  |  |  |  |  |  |  |  |  |
| 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 |  | Remote UE report |
| 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 |  | Remote UE report response |
|  |  |  |  |  |  |  |  |  |  |

## 9.8 message authentication code

the message authentication code (MAC) information element contains the integrity protection information for the message the MAC IE shall be included in the SECURITY PROTECTED 5GS NAS MESSAGE message if a valid 5G NAS security context exists and security functions are started

the message authentication code (MAC) is also included in the intra N1 mode NAS transparent container IE and in the S1 mode to N1 mode NAS transparent container IE

the usage of MAC is specified in subclause 4.4.3.3

## 9.9 plain 5GS NAS message

this IE includes a complete plain 5GS NAS message as specified in subclauses 8.2 and 8.3 the SECURITY PROTECTED 5GS NAS MESSAGE (see subclause 8.2.28) includes a complete plain 5GS NAS message as specified in subclauses 8.2 the SECURITY PROTECTED 5GS NAS MESSAGE message (see subclause 8.2.28) is not plain 5GS NAS messages and shall not be included in this IE

## 9.10 sequence number

this IE includes the NAS message sequence number (SN) which consists of the eight least significant bits of the NAS COUNT for a SECURITY PROTECTED 5GS NAS MESSAGE message

the NAS message sequence number (SN) with the eight least significant bits of the NAS COUNT is also included in the intra N1 mode NAS transparent container IE and in the N1 mode to S1 mode NAS transparent container IE

the usage of SN is specified in subclause 4.4.3

## 9.11 other information elements

### 9.11.1 general

the different formats (V LV t TV TLV LV-E TLV-E) and the five categories of information elements (type 1 2 3 4 and 6) are defined in 3GPP TS 24.007 [11]

the first octet of an information element in the non-imperative part contains the IEI of the information element if this octet does not correspond to an IEI known in the message the receiver shall determine whether this IE is of type 1 or 2 (i.e it is an information element of one octet length) or an IE of type 4 or 6 (i.e that the next octet is the length indicator or for a type 6 IE the next 2 octets are the length indicator indicating the length of the remaining of the information element) (see 3GPP TS 24.007 [11])

NOTE this requirement for the receiver is not applicable for information elements included in a type 6 IE container information element any IE in the type 6 IE container information element is of type 6 with format TLV-E; therefore the rules for the IEI value encoding defined in 3GPP TS 24.007 [11] subclause 11.2.4 are not applicable

this allows the receiver to jump over unknown information elements and to analyse any following information elements of a particular message

the definitions of information elements which are

a) common for the 5GMM and 5GSM protocols;

b) used by access stratum protocols; or

c) sent to upper layers

are described in subclause 9.11.2

the information elements of the 5GMM or 5GSM protocols can be defined by reference to an appropriate specification which provides the definition of the information element e.g. "see subclause 10.5.6.3A in 3GPP TS 24.008 [12]"

### 9.11.2 common information elements

#### 9.11.2.1 additional information

the purpose of the additional information information element is to provide additional information to upper layers in relation to the NAS transport mechanism

the additional information information element is coded as shown in figure 9.11.2.1.1 and table 9.11.2.1.1

the additional information is a type 4 information element with a minimum length of 3 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Additional information IEI | | | | | | | | octet 1 |
| Additional information length | | | | | | | | octet 2 |
| Additional information value | | | | | | | | octets 3-n |

figure 9.11.2.1.1 additional information information element

table 9.11.2.1.1 additional information information element

|  |
| --- |
| Additional information value (octet 3 to octet n) |
|  |
| The coding of the additional information value is dependent on the LCS application. |

#### 9.11.2.1A access type

the purpose of the access type information element is to indicate the access type over which the signalling or user data is pending to be sent to the UE

the access type is a type 1 information element

the access type information element is coded as shown in figure 9.11.2.1A.1 and table 9.11.2.1A.1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Access type  IEI | | | | 0  spare | | Access type | | octet 1 |

figure 9.11.2.1A.1 access type information element

table 9.11.2.1A.1 access type information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Access type value (octet 1, bit 1 to bit 2) | | | | |
|  | | | | |
| Bits | | | | |
| 2 | 1 |  |  |  |
| 0 | 1 |  |  | 3GPP access |
| 1 | 0 |  |  | Non-3GPP access |
|  | | | | |
| All other values are reserved. | | | | |

#### 9.11.2.1B DNN

the purpose of the DNN information element is to identify the data network

the DNN information element is coded as shown in figure 9.11.2.1B.1

the DNN is a type 4 information element with a minimum length of 3 octets and a maximum length of 102 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| DNN IEI | | | | | | | | octet 1 |
| Length of DNN contents | | | | | | | | octet 2 |
| DNN value | | | | | | | | octet 3  octet n |

figure 9.11.2.1B.1 DNN information element

a DNN value field contains an APN as defined in 3GPP TS 23.003 [4]

#### 9.11.2.2 EAP message

the purpose of the EAP message information element is to transport an EAP message as specified in IETF RFC 3748 [34]

the EAP message information element is coded as shown in figure 9.11.2.2.1 and table 9.11.2.2.1

the EAP message is a type 6 information element with minimum length of 7 octets and maximum length of 1503 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| EAP message IEI | | | | | | | | octet 1 |
| Length of EAP message contents | | | | | | | | octet 2  octet 3 |
| EAP message | | | | | | | | octet 4  octet n |

figure 9.11.2.2.1 EAP message information element

table 9.11.2.2.1 EAP message information element

|  |
| --- |
| EAP message (octet 4 to n) |
| An EAP message as specified in IETF RFC 3748 [34]. |

#### 9.11.2.3 GPRS timer

see subclause 10.5.7.3 in 3GPP TS 24.008 [12]

#### 9.11.2.4 GPRS timer 2

see subclause 10.5.7.4 in 3GPP TS 24.008 [12]

#### 9.11.2.5 GPRS timer 3

see subclause 10.5.7.4a in 3GPP TS 24.008 [12]

#### 9.11.2.6 intra N1 mode NAS transparent container

the purpose of the intra N1 mode NAS transparent container information element is to provide the UE with parameters that enable the UE to handle the 5G NAS security context after N1 mode to N1 mode handover

the intra N1 mode NAS transparent container information element is coded as shown in figure 9.11.2.6.1 and table 9.11.2.6.1

the intra N1 mode NAS transparent container is a type 4 information element with a length of 9 octets

the value part of the intra N1 mode NAS transparent container information element is included in specific information elements within some RRC messages sent to the UE

NOTE for these cases the coding of the information element identifier and length information of RRC is defined in 3GPP TS 38.331 [30]

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Intra N1 mode NAS transparent container IEI | | | | | | | | octet 1 |
| Length of Intra N1 mode NAS transparent container contents | | | | | | | | octet 2 |
| Message authentication code | | | | | | | | octet 3  octet 6 |
| Type of ciphering algorithm | | | | Type of integrity protection algorithm | | | | octet 7 |
| 0 | 0 Spare | 0 | KACF | TSC | Key set identifier in 5G | | | octet 8 |
| Sequence number | | | | | | | | octet 9 |

figure 9.11.2.6.1 intra N1 mode NAS transparent container information element

table 9.11.2.6.1 intra N1 mode NAS transparent container information element

|  |  |
| --- | --- |
| Message authentication code (octet 3 to 6) | |
|  | |
| This field is coded as the Message authentication code information element (see subclause 9.8). | |
|  | |
| Type of integrity protection algorithm (octet 7, bit 1 to 4) and type of ciphering algorithm (octet 7, bit 5 to 8) | |
|  | |
| These fields are coded as the type of integrity protection algorithm and type of ciphering algorithm in the NAS security algorithms information element (see subclause 9.11.3.34). | |
|  | |
| K\_AMF\_change\_flag (KACF) (octet 8, bit 5) | |
| Bit | |
| 5 |  |
| 0 | a new KAMF has not been calculated by the network |
| 1 | a new KAMF has been calculated by the network |
|  | |
| Key set identifier in 5G (octet 8, bit 1 to 3) and Type of security context flag (TSC) (octet 8, bit 4) | |
|  | |
| These fields are coded as the NAS key set identifier and type of security context flag in the NAS key set identifier information element (see subclause 9.11.3.32). | |
|  | |
| Sequence number (octet 9) | |
|  | |
| This field is coded as the Sequence number information element (see subclause 9.10) | |
|  | |

#### 9.11.2.7 N1 mode to S1 mode NAS transparent container

the purpose of the N1 mode to S1 mode NAS transparent container information element is to provide the UE with information that enables the UE to create a mapped EPS security context

the N1 mode to S1 mode NAS transparent container information element is coded as shown in figure 9.11.2.7.1 and table 9.11.2.7.1

the N1 mode to S1 mode NAS transparent container is a type 3 information element with a length of 2 octets

the value part of the N1 mode to S1 mode NAS transparent container information element is included in specific information elements within some RRC messages sent to the UE; see 3GPP TS 38.331 [30] for these cases the coding of the information element identifier and length information is defined in 3GPP TS 38.331 [30]

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| N1 mode to S1 mode NAS transparent container IEI | | | | | | | | octet 1 |
| Sequence number | | | | | | | | octet 2 |

figure 9.11.2.7.1 N1 mode to S1 mode NAS transparent container information element

table 9.11.2.7.1 N1 mode to S1 mode NAS transparent container information element

|  |
| --- |
| Sequence number (octet 2) |
|  |
| This field is coded as the Sequence number information element (see subclause 9.10). |

#### 9.11.2.8 S-NSSAI

the purpose of the S-NSSAI information element is to identify a network slice

the S-NSSAI information element is coded as shown in figure 9.11.2.8.1 and table 9.11.2.8.1

the S-NSSAI is a type 4 information element with a minimum length of 3 octets and a maximum length of 10 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| S-NSSAI IEI | | | | | | | | octet 1 |
| Length of S-NSSAI contents | | | | | | | | octet 2 |
| SST | | | | | | | | octet 3 |
| SD | | | | | | | | octet 4\*  octet 6\* |
| Mapped HPLMN SST | | | | | | | | octet 7\* |
| Mapped HPLMN SD | | | | | | | | octet 8\*  octet 10\* |

figure 9.11.2.8.1 S-NSSAI information element

table 9.11.2.8.1 S-NSSAI information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Length of S-NSSAI contents (octet 2) | | | | | | | | |
|  | | | | | | | | |
| This field indicates the length of the included S-NSSAI contents, and it can have the following values. Depending on the value of the length field the following S-NSSAI contents are included: | | | | | | | | |
| Bits | | | | | | | | |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | SST |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | SST and mapped HPLMN SST |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | SST and SD |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | SST, SD and mapped HPLMN SST |
| 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | SST, SD, mapped HPLMN SST and mapped HPLMN SD |
| All other values are reserved. | | | | | | | | |
| Slice/service type (SST) (octet 3) | | | | | | | | |
| This field contains the 8 bit SST value. The coding of the SST value part is defined in 3GPP TS 23.003 [4]. If this IE is included during the network slice-specific authentication and authorization procedure, this field contains the 8 bit SST value of an S-NSSAI in the S-NSSAI(s) of the HPLMN or the RSNPN. | | | | | | | | |
| Slice differentiator (SD) (octet 4 to octet 6)  This field contains the 24 bit SD value. The coding of the SD value part is defined in 3GPP TS 23.003 [4]. If this IE is included during the network slice-specific authentication and authorization procedure, this field contains the 24 bit SD value of an S-NSSAI in the S-NSSAI(s) of the HPLMN or the RSNPN. | | | | | | | | |
| If the SST encoded in octet 3 is not associated with a valid SD value, and the sender needs to include a mapped HPLMN SST (octet 7) and a mapped HPLMN SD (octets 8 to 10), then the sender shall set the SD value (octets 4 to 6) to "no SD value associated with the SST". | | | | | | | | |
|  | | | | | | | | |
| mapped HPLMN Slice/service type (SST) (octet 7) | | | | | | | | |
| This field contains the 8 bit SST value of an S-NSSAI in the S-NSSAI(s) of the HPLMN to which the SST value is mapped. The coding of the SST value part is defined in 3GPP TS 23.003 [4]. | | | | | | | | |
| mapped HPLMN Slice differentiator (SD) (octet 8 to octet 10)  This field contains the 24 bit SD value of an S-NSSAI in the S-NSSAI(s) of the HPLMN to which the SD value is mapped. The coding of the SD value part is defined in 3GPP TS 23.003 [4]. | | | | | | | | |
| NOTE 1: Octet 3 shall always be included.  NOTE 2: If the octet 4 is included, then octet 5 and octet 6 shall be included.  NOTE 3: If the octet 7 is included, then octets 8, 9, and 10 may be included.  NOTE 4: If the octet 8 is included, then octet 9 and octet 10 shall be included.  NOTE 5: If only HPLMN S-NSSAI or subscribed SNPN S-NSSAI is included, then octets 7 to 10 shall not be included. | | | | | | | | |

#### 9.11.2.9 S1 mode to N1 mode NAS transparent container

the purpose of the S1 mode to N1 mode NAS transparent container information element is to provide the UE with parameters that enable the UE to create a mapped 5G NAS security context and take this context into use after inter-system change to N1 mode in 5GMM-CONNECTED mode

the S1 mode to N1 mode NAS transparent container information element is coded as shown in figure 9.11.2.9.1 and table 9.11.2.9.1

the S1 mode to N1 mode NAS transparent container is a type 4 information element with a length of 10 octets

the value part of the S1 mode to N1 mode NAS transparent container information element is included in specific information elements within some RRC messages sent to the UE

NOTE for these cases the coding of the information element identifier and length information of RRC is defined in 3GPP TS 38.331 [30]

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| S1 mode to N1 mode NAS transparent container IEI | | | | | | | | octet 1 |
| Length of S1 mode to N1 mode NAS transparent container contents | | | | | | | | octet 2 |
| Message authentication code | | | | | | | | octet 3  octet 6 |
| Type of ciphering algorithm | | | | Type of integrity protection algorithm | | | | octet 7 |
| 0  Spare | NCC | | | TSC | Key set identifier in 5G | | | octet 8 |
| 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | octet 9  octet 10 |
| 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare |

figure 9.11.2.9.1 S1 mode to N1 mode NAS transparent container information element

table 9.11.2.9.1 S1 mode to N1 mode NAS transparent container information element

|  |
| --- |
| Message authentication code (octet 3 to 6) |
|  |
| This field is coded as the Message authentication code information element (see subclause 9.8). |
|  |
| Type of integrity protection algorithm (octet 7, bit 1 to 4) and type of ciphering algorithm (octet 7, bit 5 to 8) |
|  |
| These fields are coded as the type of integrity protection algorithm and type of ciphering algorithm in the NAS security algorithms information element (see subclause 9.11.3.34). |
|  |
| NCC (octet 8, bits 5 to 7) |
|  |
| This field contains the 3 bit Next hop chaining counter (see 3GPP TS 33.501 [24]) |
|  |
| Key set identifier in 5G (octet 8, bit 1 to 3) and type of security context flag (TSC) (octet 8, bit 4) |
|  |
| These fields are coded as the NAS key set identifier and type of security context flag in the NAS key set identifier information element (see subclause 9.11.3.32). |
|  |
| Octets 9 and 10 are spare and shall be coded as zero. |
| NOTE: In earlier versions of this protocol, octets 9 and 10 can have any value. In this version of the protocol, octets 9 and 10 can always be ignored by the UE. |

#### 9.11.2.10 Service-level-AA container

the purpose of the Service-level-AA container information element is to transfer upper layer information for authentication and authorization between the UE and the network

the Service-level-AA container information element is coded as shown in figure 9.11.2.10.1 figure 9.11.2.10.2 figure 9.11.2.10.3 figure 9.11.2.10.4 and table 9.11.2.10.1

the Service-level-AA container information element is a type 6 information element with a minimum length of 4 octets and a maximum length of 65538 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Service-level-AA container IEI | | | | | | | | octet 1 |
| Length of Service-level-AA container contents | | | | | | | | octet 2 |
|  | | | | | | | | octet 3 |
|  | | | | | | | | octet 4 |
| Service-level-AA container contents | | | | | | | |  |
|  | | | | | | | | octet n |

figure 9.11.2.10.1 Service-level-AA container information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Service-level-AA parameter 1 | | | | | | | | octet 4  octet x1 |
| Service-level-AA parameter 2 | | | | | | | | octet x1+1\*  octet x2\* |
| …… | | | | | | | | … |
| Service-level-AA parameter n | | | | | | | | octet xi +1\*  octet n\* |

figure 9.11.2.10.2 Service-level-AA container contents

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Type of service-level-AA parameter | | | | | | | | octet xi +1 |
| Length of service-level-AA parameter | | | | | | | | octet xi +2 |
| Value of service-level-AA parameter | | | | | | | | octet xi +3  octet n |

figure 9.11.2.10.3 Service-level-AA parameter (when the type of service-level-AA parameter field contains an IEI of a type 4 information element as specified in 3GPP TS 24.007 [11])

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Type of service-level-AA parameter | | | | | | | | octet xi +1 |
| Length of service-level-AA parameter | | | | | | | | octet xi +2  octet xi +3 |
| Value of service-level-AA parameter | | | | | | | | octet xi +4  octet n |

figure 9.11.2.10.4 Service-level-AA parameter (when the type of service-level-AA parameter field contains an IEI of a type 6 information element as specified in 3GPP TS 24.007 [11])

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Service-level-AA payload type | | | | | | | | octet xi +1  octet xi +3 |
| Service-level-AA payload | | | | | | | | octet xi +4  octet n |

figure 9.11.2.10.5 Service-level-AA parameter (when Service-level-AA payload type and its associated Service-level-AA payload are included in the Service-level-AA container contents)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Type of service-level-AA parameter | | | | Value of service-level-AA parameter | | | | octet xi+1 |

figure 9.11.2.10.6 Service-level-AA parameter (when the type of service-level-AA parameter field contains an IEI of a type 1 information element as specified in 3GPP TS 24.007 [11])

table 9.11.2.10.1 Service-level-AA container information element

|  |  |  |
| --- | --- | --- |
| Service-level-AA container contents (octet 4 to octet n); max value of 65535 octets | | |
|  | | |
| The error handlings for service-level-AA parameters specified in subclauses 7.6.1, 7.6.3 and 7.7.1 shall apply to the service-level-AA parameters included in the service-level-AA container contents. | | |
| Service-level-AA parameters  Type of service-level-AA parameter (octet xi +1)  This field contains the IEI of the service-level-AA parameter. | | |
|  | | |
| Length of service-level-AA parameter  This field indicates binary coded length of the value of the service-level-AA parameter. | | |
| Value of service-level-AA parameter  This field contains the value of the service-level-AA parameter with the value part of the referred information element based on following service-level-AA parameter reference.  The receiving entity shall ignore service-level-AA parameter with type of service-level-AA parameter field containing an unknown IEI. | | |
| IEI (hexadecimal) | Service-level-AA parameter name | Service-level-AA parameter reference |
| 10 | Service-level device ID | Service-level device ID (see subclause 9.11.2.11) |
| 20 | Service-level-AA server address | Service-level-AA server address (see subclause 9.11.2.12) |
| 30 | Service-level-AA response | Service-level-AA response (see subclause 9.11.2.14) |
| 40 | Service-level-AA payload type | Service-level-AA payload type (see subclause 9.11.2.15) (NOTE) |
| 70 | Service-level-AA payload | Service-level-AA payload (see subclause 9.11.2.13) |
| A- | Service-level-AA pending indication | Service-level-AA pending indication (see subclause 9.11.2.17) |
| 50 | Service-level-AA service status indication | Service-level-AA service status indication (see subclause 9.11.2.18) |
| NOTE: A service-level-AA payload type is always followed by the associated service-level-AA payload as shown in figure 9.11.2.10.5. | | |

#### 9.11.2.11 Service-level device ID

the purpose of the Service-level device ID information element is to carry the necessary identity for authentication and authorization by the external DN

the Service-level device ID information element is coded as shown in figure 9.11.2.11.1 and table 9.11.2.11.1

the Service-level device ID information element is a type 4 information element with minimum length of 3 octets and maximum length of 257 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Service-level device ID IEI | | | | | | | | octet 1 |
| Service-level device ID length | | | | | | | | octet 2 |
| Service-level device ID | | | | | | | | octets 3-y |

figure 9.11.2.11.1 Service-level device ID information element

table 9.11.2.11.1 Service-level device ID information element

|  |
| --- |
| Service-level device ID (octet 3 to octet y)  A service-level device ID encoded as UTF-8 string. |

#### 9.11.2.12 Service-level-AA server address

the purpose of the Service-level-AA server address information element is to carry the address of the service level authentication and authorization server

the Service-level-AA server address information element is coded as shown in figure 9.11.2.12.1 and table 9.11.2.12.1

the Service-level-AA server address information element is a type 4 information element with minimum length of 4 octets and maximum length of 257 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Service-level-AA server address IEI | | | | | | | | octet 1 |
| Service-level-AA server address length | | | | | | | | octet 2 |
| Service-level-AA server address type | | | | | | | | octet 3 |
| Service-level-AA server address | | | | | | | | octets 4-z |

figure 9.11.2.12.1 Service-level-AA server address information element

table 9.11.2.12.1 Service-level-AA server address information element

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Service-level-AA server address type (octet 3):  Bits | | | | | | | | | |
| **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |  |  |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |  | IPv4 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |  | IPv6 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |  | IPv4v6 |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |  | FQDN |
| All other values are spare. If received they shall be ignored. | | | | | | | | | |
|  | | | | | | | | | |
| If the service-level-AA server address type indicates IPv4, then the service-level-AA server address field contains an IPv4 address in octet 4 to octet 7. | | | | | | | | | |
|  | | | | | | | | | |
| If the service-level-AA server address type indicates IPv6, then the service-level-AA server address field contains an IPv6 address in octet 4 to octet 19. | | | | | | | | | |
|  | | | | | | | | | |
| If the service-level-AA server address type indicates IPv4v6, then the service-level-AA server address field contains two IP addresses. The first IP address is an IPv4 address in octet 4 to octet 7. The second IP address is an IPv6 address in octet 8 to octet 23. | | | | | | | | | |
|  | | | | | | | | | |
| If the service-level-AA server address type indicates FQDN, octet 4 to octet z is encoded as defined in subclause 19.4.2.1 in 3GPP TS 23.003 [4]. | | | | | | | | | |
|  | | | | | | | | | |

#### 9.11.2.13 Service-level-AA payload

the purpose of the Service-level-AA payload information element is to carry the upper layer payload for authentication and authorization between the UE and the service-level-AA server

the Service-level-AA payload information element is coded as shown in figure 9.11.2.13.1 and table 9.11.2.13.1

the Service-level-AA payload information element is a type 6 information element with minimum length of 4 octets and maximum length of 65538 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Service-level-AA payload IEI | | | | | | | | octet 1 |
| Service-level-AA payload length | | | | | | | | octet 2  octet 3 |
| Service-level-AA payload | | | | | | | | octets 4-s |

figure 9.11.2.13.1 Service-level-AA payload information element

table 9.11.2.13.1 Service-level-AA payload information element

|  |
| --- |
| Service-level-AA payload (octet 4 to octet s)  A payload for authentication and authorization transparently transported and which is provided from/to the upper layers. |

#### 9.11.2.14 Service-level-AA response

the purpose of the Service-level-AA response information element is to provide information regarding the service level authentication and authorization request e.g to indicate that the authentication and authorization request to the service level authentication server was successful or to notify that service level authorization is revoked

the Service-level-AA response information element is coded as shown in figure 9.11.2.14.1 and table 9.11.2.14.1

the Service-level-AA response information element is a type 4 information element with length of 3 octets

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | | 6 | 5 | | 4 | 3 | | 2 | 1 | |  | |
| Service-level-AA response IEI | | | | | | | | | | | octet 1 | |
| Service-level-AA response length | | | | | | | | | | | octet 2 | |
| 0  Spare | | 0  Spare | | | C2AR | | | SLAR | | | octet 3 | |

figure 9.11.2.14.1 Service-level-AA response information element

table 9.11.2.14.1 Service-level-AA response information element

|  |  |  |  |
| --- | --- | --- | --- |
| Service-level-AA result field (SLAR) (octet 3, bits 1 and 2) | | | |
| Bits | | | |
| **1** | **2** |  | |
| 0 | 0 |  | No information |
| 0 | 1 |  | Service level authentication and authorization was successful. |
| 1 | 0 |  | Service level authentication and authorization was not successful or service level authorization is revoked. |
| 1 | 1 |  | Reserved |
|  | | | |
| C2 authorization result field (C2AR) (octet 3, bits 3 and 4) | | | |
| Bits | | | |
| **3** | **4** |  |  |
| 0 | 0 |  | No information |
| 0 | 1 |  | C2 authorization was successful. |
| 1 | 0 |  | C2 authorization was not successful or C2 authorization is revoked. |
| 1 | 1 |  | Reserved |
|  | | | |
| Bits 5 to 8 of octet 3 are spare and shall be coded as zero. | | | |

#### 9.11.2.15 Service-level-AA payload type

the purpose of the Service-level-AA payload type information element is to indicates type of payload included in the Service-level-AA payload information element

the Service-level-AA payload type information element is coded as shown in figure 9.11.2.15.1 and table 9.11.2.15.1

the Service-level-AA payload type information element is a type 4 information element with length of 3 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Service-level-AA payload type IEI | | | | | | | | octet 1 |
| Service-level-AA payload type length | | | | | | | | octet 2 |
| Service-level-AA payload type | | | | | | | | octet 3 |

figure 9.11.2.15.1 Service-level-AA payload type information element

table 9.11.2.15.1 Service-level-AA payload type information element

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Service-level-AA payload type (octet 3):  Bits | | | | | | | | | |
| **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |  |  |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |  | UUAA payload (see NOTE 1) |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |  | C2 authorization payload (see NOTE 2) |
| All other values are spare, and the receiving entity shall ignore the service-level-AA payload type value set to a spare value. | | | | | | | | | |
|  | | | | | | | | | |
| NOTE 1: If the service-level-AA payload type indicates UUAA payload, the field for the service-level-AA payload of the Service-level AA payload information element is an application layer payload for UUAA procedure between the UE supporting UAS services and the USS.  NOTE 2: If the service-level-AA payload type indicates C2 authorization payload, the field for the service-level-AA payload of the Service-level-AA payload information element is an application layer payload for C2 authorization procedure between the UE supporting UAS services and the USS. | | | | | | | | | |

#### 9.11.2.16 void

#### 9.11.2.17 Service-level-AA pending indication

the purpose of the Service-level-AA pending indication information element is to provide an indication that the service level authentication and authorization procedure is to be performed

the Service-level-AA pending indication information element is coded as shown in figure 9.11.2.17.1 and table 9.11.2.17.1

the Service-level-AA pending indication information element is a type 1 information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Service-level-AA pending indication IEI | | | | 0  Spare | 0  Spare | 0  Spare | SLAPI | octet 1 |

figure 9.11.2.17.1 Service-level-AA pending indication

table 9.11.2.17.1 Service-level-AA pending indication

|  |  |
| --- | --- |
| Service-level-AA pending indication (SLAPI) (octet 1, bit 1) | |
| Bit | |
| 1 |  |
| 0 | reserved |
| 1 | Service-level-AA procedure is to be performed |

#### 9.11.2.18 Service-level-AA service status indication

the purpose of the Service-level-AA service status indication information element is to provide an indication of the service availability to the UE

the Service-level-AA service status indication information element is coded as shown in figure 9.11.2.18.1 and table 9.11.2.18.1

the Service-level-AA service status indication information element is a type 4 information element with a length of 3 octets

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | | 7 | | 6 | | 5 | | 4 | | 3 | |  | | 2 | | 1 | |  | |
| Service-level-AA service status indication IEI | | | | | | | | | | | | | | | | | | octet 1 | |
| Length of Service-level-AA service status indication | | | | | | | | | | | | | | | | | | octet 2 | |
| 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | UAS | | octet 3 | |

figure 9.11.2.18.1 Service-level-AA-service-status indication information element

table 9.11.2.18.1 Service-level-AA-service-status indication information element

|  |  |
| --- | --- |
| UAS (octet 3, bit 1) | |
| Bit | |
| 1 |  |
| 0 | UAS services not enabled |
| 1 | UAS services enabled |
|  | |
| Bits 2 to 8 of octet 3 are spare and shall be encoded as zero. | |

#### 9.11.2.19 time duration

see subclause 9.9.3.68 in 3GPP TS 24.301 [15]

#### 9.11.2.20 unavailability information

see subclause 9.9.3.69 in 3GPP TS 24.301 [15]

#### 9.11.2.21 unavailability configuration

see subclause 9.9.3.70 in 3GPP TS 24.301 [15]

### 9.11.3 5GS mobility management (5GMM) information elements

#### 9.11.3.1 5GMM capability

the purpose of the 5GMM capability information element is to provide the network with information concerning aspects of the UE related to the 5GCN or interworking with the EPS the contents might affect the manner in which the network handles the operation of the UE

the 5GMM capability information element is coded as shown in figure 9.11.3.1.1 and table 9.11.3.1.1

the 5GMM capability is a type 4 information element with a minimum length of 3 octets and a maximum length of 15 octets

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | | 7 | | 6 | | 5 | | 4 | | 3 | | 2 | | 1 | |  | |
| 5GMM capability IEI | | | | | | | | | | | | | | | | octet 1 | |
| Length of 5GMM capability contents | | | | | | | | | | | | | | | | octet 2 | |
| SGC | | 5G-IPHC-CP CIoT | | N3 data | | 5G-CP CIoT | | RestrictEC | | LPP | | HO attach | | S1 mode | | octet 3 | |
| RACS | | NSSAA | | 5G-LCS | | V2XCNPC5 | | V2XCEPC5 | | V2X | | 5G-UP CIoT | | 5GSRVCC | | octet 4\* | |
| 5G ProSe-l2relay | | 5G ProSe-dc | | 5G ProSe-dd | | ER-NSSAI | | 5G-EHC-CP CIoT | | multipleUP | | WUSA | | CAG | | octet 5\* | |
| PR | | RPR | | PIV | | NCR | | NR-PSSI | | 5G ProSe-l3rmt | | 5G ProSe-l2rmt | | 5G ProSe-l3relay | | octet 6\* | |
| MPSIU | | UAS | | NSAG | | Ex-CAG | | SSNPNSI | | EventNotification | | MINT | | NSSRG | | octet 7\* | |
| SBTS | | NSR | | LADN-DS | | RAN timing | | ECI | | ESI | | RCMAN | | RCMAP | | octet 8\* | |
| 5G ProSe-l2end | | 5G ProSe-l3U2U relay | | 5G ProSe-l2U2U relay | | RSLPS | | SBNS | | UN-PER | | A2XNPC5 | | A2XEPC5 | | octet 9\* | |
| A2X-Uu | | SLVI | | TempNS | | SUPL | | LCS-UPP | | PNS | | RSLP | | 5G ProSe-l3end | | octet 10\* | |
| 0  spare | | RATUC | | RSLPPU | | RSLPVU | | NSUC | | RSLPL | | NVL-SATNR | | MCSIU | | octet 11\* | |
| 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | octet 12\*-15\* | |
| Spare | | | | | | | | | | | | | | | |

figure 9.11.3.1.1 5GMM capability information element

table 9.11.3.1.1 5GMM capability information element

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| EPC NAS supported (S1 mode) (octet 3, bit 1)  Bit | | | | | | | | | | | | |
| 1 | | |  | | |  | | |  | |  | |
| 0 | | |  | | |  | | |  | | S1 mode not supported | |
| 1 | | |  | | |  | | |  | | S1 mode supported | |
|  | | | | | | | | | | | | |
| ATTACH REQUEST message containing PDN CONNECTIVITY REQUEST message for handover support (HO attach) (octet 3, bit 2)  Bit | | | | | | | | | | | | |
| 2 | |  | | |  | | |  | |  | | |
| 0 | |  | | |  | | |  | | ATTACH REQUEST message containing PDN CONNECTIVITY REQUEST message with request type set to "handover" or "handover of emergency bearer services" to transfer PDU session from N1 mode to S1 mode not supported | | |
| 1 | |  | | |  | | |  | | ATTACH REQUEST message containing PDN CONNECTIVITY REQUEST message with request type set to "handover" or "handover of emergency bearer services" to transfer PDU session from N1 mode to S1 mode supported | | |
|  | | | | | | | | | | | | |
| LTE Positioning Protocol (LPP) capability (octet 3, bit 3) | | | | | | | | | | | | |
| This bit indicates the capability to support LTE Positioning Protocol (LPP) (see 3GPP TS 37.355 [26]). | | | | | | | | | | | | |
| Bit | | | | | | | | | | | | |
| 3 | | |  | | |  | | |  | |  | |
| 0 | | |  | | |  | | |  | | LPP in N1 mode not supported | |
| 1 | | |  | | |  | | |  | | LPP in N1 mode supported | |
|  | | | | | | | | | | | | |
| Restriction on use of enhanced coverage support (RestrictEC) (octet 3, bit 4)  This bit indicates the capability to support restriction on use of enhanced coverage.  Bit | | | | | | | | | | | | |
| 4 | | |  | | |  | | |  | |  | |
| 0 | | |  | | |  | | |  | | Restriction on use of enhanced coverage not supported | |
| 1 | | |  | | |  | | |  | | Restriction on use of enhanced coverage supported | |
|  | | | | | | | | | | | | |
| Control plane CIoT 5GS optimization (5G-CP CIoT) (octet 3, bit 5)  This bit indicates the capability for control plane CIoT 5GS optimization.  Bit | | | | | | | | | | | | |
| 5 |  | | | | |  | | |  | |  | |
| 0 |  | | | | |  | | |  | | Control plane CIoT 5GS optimization not supported | |
| 1 |  | | | | |  | | |  | | Control plane CIoT 5GS optimization supported | |
|  | | | | | | | | | | | | |
| N3 data transfer (N3 data) (octet 3, bit 6)  This bit indicates the capability for N3 data transfer.  Bit | | | | | | | | | | | | |
| 6 |  | | | | |  | | |  | |  | |
| 0 |  | | | | |  | | |  | | N3 data transfer supported | |
| 1 |  | | | | |  | | |  | | N3 data transfer not supported | |
|  | | | | | | | | | | | | |
| IP header compression for control plane CIoT 5GS optimization (5G-IPHC-CP CIoT) (octet 3, bit 7)  This bit indicates the capability for IP header compression for control plane CIoT 5GS optimization.  Bit | | | | | | | | | | | | |
| 7 |  | | | | |  | | |  | |  | |
| 0 |  | | | | |  | | |  | | IP header compression for control plane CIoT 5GS optimization not supported | |
| 1 |  | | | | |  | | |  | | IP header compression for control plane CIoT 5GS optimization supported | |
|  | | | | | | | | | | | | |
| Service gap control (SGC) (octet 3, bit 8)  Bit | | | | | | | | | | | | |
| 8 | | |  | | |  | | |  | |  | |
| 0 | | |  | | |  | | |  | | service gap control not supported | |
| 1 | | |  | | |  | | |  | | service gap control supported | |
|  | | | | | | | | | | | | |
| 5G-SRVCC from NG-RAN to UTRAN (5GSRVCC) capability (octet 4, bit 1) | | | | | | | | | | | | |
| This bit indicates the capability for 5G-SRVCC from NG-RAN to UTRAN (5GSRVCC) (see 3GPP TS 23.216 [6A]). | | | | | | | | | | | | |
| Bit | | | | | | | | | | | | |
| 1 | | |  | | |  | | |  | |  | |
| 0 | | |  | | |  | | |  | | 5G-SRVCC from NG-RAN to UTRAN not supported | |
| 1 | | |  | | |  | | |  | | 5G-SRVCC from NG-RAN to UTRAN supported | |
|  | | | | | | | | | | | | |
| User plane CIoT 5GS optimization (5G-UP CIoT) (octet 4, bit 2)  This bit indicates the capability for user plane CIoT 5GS optimization.  Bit | | | | | | | | | | | | |
| 2 |  | | | | |  | | |  | |  | |
| 0 |  | | | | |  | | |  | | User plane CIoT 5GS optimization not supported | |
| 1 |  | | | | |  | | |  | | User plane CIoT 5GS optimization supported | |
|  | | | | | | | | | | | | |
| V2X capability (V2X) (octet 4, bit 3) | | | | | | | | | | | | |
| This bit indicates the capability for V2X, as specified in 3GPP TS 24.587 [19B].  Bit | | | | | | | | | | | | |
| 3 | |  | | |  | | |  | |  | | |
| 0 | |  | | |  | | |  | | V2X not supported | | |
| 1 | |  | | |  | | |  | | V2X supported | | |
|  | | | | | | | | | | | | |
| V2X communication over E-UTRA-PC5 capability (V2XCEPC5) (octet 4, bit 4) | | | | | | | | | | | | |
| This bit indicates the capability for V2X communication over E-UTRA-PC5, as specified in 3GPP TS 24.587 [19B]. | | | | | | | | | | | | |
| Bit | | | | | | | | | | | | |
| 4 | |  | | |  | | |  | |  | | |
| 0 | |  | | |  | | |  | | V2X communication over E-UTRA-PC5 not supported | | |
| 1 | |  | | |  | | |  | | V2X communication over E-UTRA-PC5 supported | | |
|  | | | | | | | | | | | | |
| V2X communication over NR-PC5 capability (V2XCNPC5) (octet 4, bit 5) | | | | | | | | | | | | |
| This bit indicates the capability for V2X communication over NR-PC5, as specified in 3GPP TS 24.587 [19B]. | | | | | | | | | | | | |
| Bit | | | | | | | | | | | | |
| 5 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | V2X communication over NR-PC5 not supported |
| 1 | | | |  | | |  | | |  | | V2X communication over NR-PC5 supported |
|  | | | | | | | | | | | | |
| Location Services (5G-LCS) notification mechanisms capability (octet 4, bit 6) | | | | | | | | | | | | |
| This bit indicates the capability to support Location Services (5G-LCS) notification mechanisms (see 3GPP TS 23.273 [6B]). | | | | | | | | | | | | |
| Bit | | | | | | | | | | | | |
| 6 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | LCS notification mechanisms not supported |
| 1 | | | |  | | |  | | |  | | LCS notification mechanisms supported |
|  | | | | | | | | | | | | |
| Network slice-specific authentication and authorization (NSSAA) (octet 4, bit 7)  This bit indicates the capability to support network slice-specific authentication and authorization.  Bit | | | | | | | | | | | | |
| 7 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Network slice-specific authentication and authorization not supported |
| 1 | | | |  | | |  | | |  | | Network slice-specific authentication and authorization supported |
|  | | | | | | | | | | | | |
| Radio capability signalling optimisation (RACS) capability (octet 4, bit 8)  Bit | | | | | | | | | | | | |
| 8 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | RACS not supported |
| 1 | | | |  | | |  | | |  | | RACS supported |
|  | | | | | | | | | | | | |
| Closed Access Group (CAG) capability (octet 5, bit 1)  Bit | | | | | | | | | | | | |
| 1 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | CAG not supported |
| 1 | | | |  | | |  | | |  | | CAG supported |
|  | | | | | | | | | | | | |
| WUS assistance (WUSA) information reception capability (octet 5, bit 2)  Bit | | | | | | | | | | | | |
| 2 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | WUS assistance information reception not supported |
| 1 | | | |  | | |  | | |  | | WUS assistance information reception supported |
|  | | | | | | | | | | | | |
| Multiple user-plane resources support (multipleUP) (octet 5, bit 3) | | | | | | | | | | | | |
| This bit indicates the capability to support multiple user-plane resources in NB-N1 mode. | | | | | | | | | | | | |
| Bit | | | | | | | | | | | | |
| 3 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Multiple user-plane resources not supported |
| 1 | | | |  | | |  | | |  | | Multiple user-plane resources supported |
|  | | | | | | | | | | | | |
|  | | | | | | | | | | | | |
| Ethernet header compression for control plane CIoT 5GS optimization (5G-EHC-CP CIoT) (octet 5, bit 4)  Bit | | | | | | | | | | | | |
| 4 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Ethernet header compression for control plane CIoT 5GS optimization not supported |
| 1 | | | |  | | |  | | |  | | Ethernet header compression for control plane CIoT 5GS optimization supported |
|  | | | | | | | | | | | | |
| Extended rejected NSSAI support (ER-NSSAI) (octet 5, bit 5) | | | | | | | | | | | | |
| This bit indicates the capability to support extended rejected NSSAI.  Bit | | | | | | | | | | | | |
| 5 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Extended rejected NSSAI not supported |
| 1 | | | |  | | |  | | |  | | Extended rejected NSSAI supported |
|  | | | | | | | | | | | | |
| 5G ProSe direct discovery (5G ProSe-dd) (octet 5, bit 6)  This bit indicates the capability for 5G ProSe direct discovery.  Bit | | | | | | | | | | | | |
| 6 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | 5G ProSe direct discovery not supported |
| 1 | | | |  | | |  | | |  | | 5G ProSe direct discovery supported |
|  | | | | | | | | | | | | |
| 5G ProSe direct communication (5G ProSe-dc) (octet 5, bit 7)  This bit indicates the capability for 5G ProSe direct communication.  Bit | | | | | | | | | | | | |
| 7 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | 5G ProSe direct communication not supported |
| 1 | | | |  | | |  | | |  | | 5G ProSe direct communication supported |
|  | | | | | | | | | | | | |
| 5G ProSe layer-2 UE-to-network-relay (5G ProSe-l2relay) (octet 5, bit 8)  This bit indicates the capability to act as a 5G ProSe layer-2 UE-to-network relay UE.  Bit | | | | | | | | | | | | |
| 8 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Acting as a 5G ProSe layer-2 UE-to-network relay UE not supported |
| 1 | | | |  | | |  | | |  | | Acting as a 5G ProSe layer-2 UE-to-network relay UE supported |
|  | | | | | | | | | | | | |
| 5G ProSe layer-3 UE-to-network-relay (5G ProSe-l3relay) (octet 6, bit 1)  This bit indicates the capability to act as a 5G ProSe layer-3 UE-to-network relay UE  Bit | | | | | | | | | | | | |
| 1 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Acting as a 5G ProSe layer-3 UE-to-network relay UE not supported |
| 1 | | | |  | | |  | | |  | | Acting as a 5G ProSe layer-3 UE-to-network relay UE supported |
|  | | | | | | | | | | | | |
| 5G ProSe layer-2 UE-to-network-remote (5G ProSe-l2rmt) (octet 6, bit 2)  This bit indicates the capability to act as a 5G ProSe layer-2 UE-to-network remote UE  Bit | | | | | | | | | | | | |
| 2 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Acting as a 5G ProSe layer-2 UE-to-network remote UE not supported |
| 1 | | | |  | | |  | | |  | | Acting as a 5G ProSe layer-2 UE-to-network remote UE supported |
|  | | | | | | | | | | | | |
| 5G ProSe layer-3 UE-to-network-remote (5G ProSe-l3rmt) (octet 6, bit 3)  This bit indicates the capability to act as a 5G ProSe layer-3 UE-to-network remote UE  Bit | | | | | | | | | | | | |
| 3 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Acting as a 5G ProSe layer-3 UE-to-network remote UE not supported |
| 1 | | | |  | | |  | | |  | | Acting as a 5G ProSe layer-3 UE-to-network remote UE supported |
|  | | | | | | | | | | | | |
| NR paging subgroup support indication (NR-PSSI) (octet 6, bit 4) | | | | | | | | | | | | |
| This bit indicates the capability to support NR paging subgrouping | | | | | | | | | | | | |
| Bit | | | | | | | | | | | | |
| 4 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | NR paging subgrouping not supported |
| 1 | | | |  | | |  | | |  | | NR paging subgrouping supported |
|  | | | | | | | | | | | | |
| N1 NAS signalling connection release (NCR) (octet 6, bit 5) | | | | | | | | | | | | |
| This bit indicates whether N1 NAS signalling connection release is supported. | | | | | | | | | | | | |
| Bit | | | | | | | | | | | | |
| 5 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | N1 NAS signalling connection release not supported |
| 1 | | | |  | | |  | | |  | | N1 NAS signalling connection release supported |
|  | | | | | | | | | | | | |
| Paging indication for voice services (PIV) (octet 6, bit 6) | | | | | | | | | | | | |
| This bit indicates whether paging indication for voice services is supported. | | | | | | | | | | | | |
| Bit | | | | | | | | | | | | |
| 6 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | paging indication for voice services not supported |
| 1 | | | |  | | |  | | |  | | paging indication for voice services supported |
|  | | | | | | | | | | | | |
| Reject paging request (RPR) (octet 6, bit 7) | | | | | | | | | | | | |
| This bit indicates whether reject paging request is supported. | | | | | | | | | | | | |
| Bit | | | | | | | | | | | | |
| 7 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | reject paging request not supported |
| 1 | | | |  | | |  | | |  | | reject paging request supported |
|  | | | | | | | | | | | | |
| Paging restriction (PR) (octet 6, bit 8) | | | | | | | | | | | | |
| This bit indicates whether paging restriction is supported. | | | | | | | | | | | | |
| Bit | | | | | | | | | | | | |
| 8 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | paging restriction not supported |
| 1 | | | |  | | |  | | |  | | paging restriction supported |
|  | | | | | | | | | | | | |
| NSSRG (octet 7, bit 1) | | | | | | | | | | | | |
| This bit indicates the capability to support the NSSRG.  Bit | | | | | | | | | | | | |
| 1 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | NSSRG not supported |
| 1 | | | |  | | |  | | |  | | NSSRG supported |
|  | | | | | | | | | | | | |
| Minimization of service interruption (MINT) (octet 7, bit 2) | | | | | | | | | | | | |
| This bit indicates the capability to support Minimization of service interruption (MINT)  Bit | | | | | | | | | | | | |
| 2 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | MINT not supported |
| 1 | | | |  | | |  | | |  | | MINT supported |
|  | | | | | | | | | | | | |
| Event notification (EventNotification) (octet 7, bit 3) | | | | | | | | | | | | |
| This bit indicates the capability to support event notification for upper layers  Bit | | | | | | | | | | | | |
| 3 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Event notification not supported |
| 1 | | | |  | | |  | | |  | | Event notification supported |
|  | | | | | | | | | | | | |
| SOR-SNPN-SI (SOR SNPN SI) (octet 7, bit 4) | | | | | | | | | | | | |
| This bit indicates the capability to support SOR-SNPN-SI.  Bit | | | | | | | | | | | | |
| 4 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | SOR-SNPN-SI not supported |
| 1 | | | |  | | |  | | |  | | SOR-SNPN-SI supported |
|  | | | | | | | | | | | | |
| Extended CAG information list support (Ex-CAG) (octet 7, bit 5) | | | | | | | | | | | | |
| This bit indicates the capability to support extended CAG information list.  Bit | | | | | | | | | | | | |
| 5 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Extended CAG information list not supported |
| 1 | | | |  | | |  | | |  | | Extended CAG information list supported |
|  | | | | | | | | | | | | |
| NSAG (octet 7, bit 6) | | | | | | | | | | | | |
| This bit indicates the capability to support NSAG.  Bit | | | | | | | | | | | | |
| 6 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | NSAG not supported |
| 1 | | | |  | | |  | | |  | | NSAG supported |
|  | | | | | | | | | | | | |
| UAS (octet 7, bit 7) | | | | | | | | | | | | |
| This bit indicates the capability to support UAS services.  Bit | | | | | | | | | | | | |
| 7 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | UAS services not supported |
| 1 | | | |  | | |  | | |  | | UAS services supported |
|  | | | | | | | | | | | | |
| MPS indicator update (MPSIU) (octet 7, bit 8) | | | | | | | | | | | | |
| This bit indicates the capability to support MPS indicator update via the UE configuration update procedure.  Bit | | | | | | | | | | | | |
| 8 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | MPS indicator update not supported |
| 1 | | | |  | | |  | | |  | | MPS indicator update supported |
|  | | | | | | | | | | | | |
| Registration complete message for acknowledging negotiated PEIPS assistance information (RCMAP) (octet 8, bit 1) | | | | | | | | | | | | |
| This bit indicates the capability for sending REGISTRATION COMPLETE message when Negotiated PEIPS assistance information IE is included in the REGISTRATION ACCEPT message.  Bit | | | | | | | | | | | | |
| 1 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Sending of REGISTRATION COMPLETE message for negotiated PEIPS assistance information not supported |
| 1 | | | |  | | |  | | |  | | Sending of REGISTRATION COMPLETE message for negotiated PEIPS assistance information supported |
|  | | | | | | | | | | | | |
| Registration complete message for acknowledging NSAG information (RCMAN) (octet 8, bit 2) | | | | | | | | | | | | |
| This bit indicates the capability for sending REGISTRATION COMPLETE message when NSAG information IE is included in the REGISTRATION ACCEPT message.  Bit | | | | | | | | | | | | |
| 2 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Sending of REGISTRATION COMPLETE message for NSAG information not supported |
| 1 | | | |  | | |  | | |  | | Sending of REGISTRATION COMPLETE message for NSAG information supported |
|  | | | | | | | | | | | | |
| Equivalent SNPNs indicator (ESI) (octet 8, bit 3) | | | | | | | | | | | | |
| This bit indicates the capability to support equivalent SNPNs.  Bit | | | | | | | | | | | | |
| 3 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Equivalent SNPNs not supported |
| 1 | | | |  | | |  | | |  | | Equivalent SNPNs supported |
|  | | | | | | | | | | | | |
| Enhanced CAG information (ECI) (octet 8, bit 4) | | | | | | | | | | | | |
| This bit indicates the capability to support enhanced CAG information.  Bit | | | | | | | | | | | | |
| 4 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Enhanced CAG information not supported |
| 1 | | | |  | | |  | | |  | | Enhanced CAG information supported |
|  | | | | | | | | | | | | |
| Reconnection to the network due to RAN timing synchronization status change (RANtiming) (octet 8, bit 5) | | | | | | | | | | | | |
| This bit indicates the capability to support Reconnection to the network due to RAN timing synchronization status change.  Bit | | | | | | | | | | | | |
| 5 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Reconnection to the network due to RAN timing synchronization status change not supported |
| 1 | | | |  | | |  | | |  | | Reconnection to the network due to RAN timing synchronization status change supported |
|  | | | | | | | | | | | | |
| LADN per DNN and S-NSSAI support (LADN-DS) (octet 8, bit 6) | | | | | | | | | | | | |
| This bit indicates the capability to support LADN per DNN and S-NSSAI.  Bit | | | | | | | | | | | | |
| 6 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | LADN per DNN and S-NSSAI not supported |
| 1 | | | |  | | |  | | |  | | LADN per DNN and S-NSSAI supported |
|  | | | | | | | | | | | | |
| Network slice replacement (NSR) (octet 8, bit 7)  This bit indicates the capability to support network slice replacement.  Bit | | | | | | | | | | | | |
| 7 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Network slice replacement not supported |
| 1 | | | |  | | |  | | |  | | Network slice replacement supported |
|  | | | | | | | | | | | | |
| Slice-based TNGF selection support (SBTS) (octet 8, bit 8) | | | | | | | | | | | | |
| This bit indicates the capability to support slice-based TNGF selection.  Bit | | | | | | | | | | | | |
| 8 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Slice-based TNGF selection not supported |
| 1 | | | |  | | |  | | |  | | Slice-based TNGF selection supported |
|  | | | | | | | | | | | | |
| A2X over E-UTRA-PC5 (A2XEPC5) (octet 9, bit 1) | | | | | | | | | | | | |
| This bit indicates the capability for A2X over E-UTRA-PC5, as specified in 3GPP TS 24.577 [60].  Bit | | | | | | | | | | | | |
| 1 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | A2X over E-UTRA-PC5 not supported |
| 1 | | | |  | | |  | | |  | | A2X over E-UTRA-PC5 supported |
|  | | | | | | | | | | | | |
| A2X over NR-PC5 (A2XNPC5) (octet 9, bit 2) | | | | | | | | | | | | |
| This bit indicates the capability for A2X over NR-PC5, as specified in 3GPP TS 24.577 [60].  Bit | | | | | | | | | | | | |
| 2 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | A2X over NR-PC5 not supported |
| 1 | | | |  | | |  | | |  | | A2X over NR-PC5 supported |
|  | | | | | | | | | | | | |
| Unavailability period (UN-PER) (octet 9, bit 3) | | | | | | | | | | | | |
| This bit indicates the capability to support unavailability period. | | | | | | | | | | | | |
| Bit | | | | | | | | | | | | |
| 3 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Unavailability period not supported |
| 1 | | | |  | | |  | | |  | | Unavailability period supported |
|  | | | | | | | | | | | | |
| Slice-based N3IWFselection support (SBNS) (octet 9, bit 4) | | | | | | | | | | | | |
| This bit indicates the capability to support slide-based N3IWF selection | | | | | | | | | | | | |
| Bit | | | | | | | | | | | | |
| 4 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Slice-based N3IWF selection not supported |
| 1 | | | |  | | |  | | |  | | Slice-based N3IWF selection supported |
|  | | | | | | | | | | | | |
| SL positioning server UE (RSLPS) (octet 9, bit 5) | | | | | | | | | | | | |
| This bit indicates the capability for SL positioning server UE, as specified in 3GPP TS 24.586 [ts23586]. | | | | | | | | | | | | |
| Bit | | | |  | | |  | | |  | |  |
| 5 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Ranging and sidelink positioning for SL positioning server UE not supported |
| 1 | | | |  | | |  | | |  | | Ranging and sidelink positioning for SL positioning server UE supported |
|  | | | | | | | | | | | | |
| 5G ProSe layer-2 UE-to-UE relay (5G ProSe-l2U2U relay) (octet 9, bit 6) | | | | | | | | | | | | |
| This bit indicates the capability to act as a 5G ProSe layer-2 UE-to-UE relay UE. | | | | | | | | | | | | |
| Bit | | | |  | | |  | | |  | |  |
| 6 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Acting as a 5G ProSe layer-2 UE-to-UE relay UE not supported |
| 1 | | | |  | | |  | | |  | | Acting as a 5G ProSe layer-2 UE-to-UE relay UE supported |
|  | | | | | | | | | | | | |
| 5G ProSe layer-3 UE-to-UE relay (5G ProSe-l3U2U relay) (octet 9, bit 7) | | | | | | | | | | | | |
| This bit indicates the capability to act as a 5G ProSe layer-3 UE-to-UE relay UE. | | | | | | | | | | | | |
| Bit | | | | | | | | | | | | |
| 7 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Acting as a 5G ProSe layer-3 UE-to-UE relay UE not supported |
| 1 | | | |  | | |  | | |  | | Acting as a 5G ProSe layer-3 UE-to-UE relay UE supported |
|  | | | | | | | | | | | | |
| 5G ProSe layer-2 end UE (5G ProSe-l2end) (octet 9, bit 8) | | | | | | | | | | | | |
| This bit indicates the capability to act as a 5G ProSe layer-2 end UE. | | | | | | | | | | | | |
| Bit | | | | | | | | | | | | |
| 8 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Acting as a 5G ProSe layer-23 UE-to-UE relayend UE not supported |
| 1 | | | |  | | |  | | |  | | Acting as a 5G ProSe layer-23 UE-to-UE relayend UE supported |
|  | | | | | | | | | | | | |
| 5G ProSe layer-3 end UE (5G ProSe-l3end) (octet 10, bit 1) | | | | | | | | | | | | |
| This bit indicates the capability to act as a 5G ProSe layer-3 end UE. | | | | | | | | | | | | |
| Bit | | | | | | | | | | | | |
| 1 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Acting as a 5G ProSe layer-3 end UE not supported |
| 1 | | | |  | | |  | | |  | | Acting as a 5G ProSe layer-3 end UE supported |
|  | | | | | | | | | | | | |
| Ranging and sidelink positioning support (RSLP) (octet 10, bit 2) | | | | | | | | | | | | |
| Bit | | | | | | | | | | | | |
| 2 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Ranging and sidelink positioning not supported |
| 1 | | | |  | | |  | | |  | | Ranging and sidelink positioning supported |
|  | | | | | | | | | | | | |
| Partial network slice (PNS) (octet 10, bit 3) | | | | | | | | | | | | |
| This bit indicates whether the UE support partial network slice in the registration area. | | | | | | | | | | | | |
| Bit | | | | | | | | | | | | |
| 3 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Partial network slice not supported |
| 1 | | | |  | | |  | | |  | | Partial network slice supported |
|  | | | | | | | | | | | | |
| LCS-UPP user plane positioning (LCS-UPP) (octet 10, bit 4) | | | | | | | | | | | | |
| This bit indicates the capability to support LCS-UPP user plane positioning (see 3GPP TS 23.273 [6B]). | | | | | | | | | | | | |
| Bit | | | | | | | | | | | | |
| 4 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | User plane positioning using LCS-UPP not supported |
| 1 | | | |  | | |  | | |  | | User plane positioning using LCS-UPP supported |
|  | | | | | | | | | | | | |
| SUPL user plane positioning (SUPL) (octet 10, bit 5) | | | | | | | | | | | | |
| This bit indicates the capability to support SUPL user plane positioning (see 3GPP TS 38.305 [67] and 3GPP TS 23.271 [68]). | | | | | | | | | | | | |
| Bit | | | | | | | | | | | | |
| 5 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | User plane positioning using SUPL not supported |
| 1 | | | |  | | |  | | |  | | User plane positioning using SUPL supported |
|  | | | | | | | | | | | | |
| S-NSSAI time validity information (TempNS) (octet 10, bit 6) | | | | | | | | | | | | |
| This bit indicates the capability to support the S-NSSAI time validity information. | | | | | | | | | | | | |
| Bit | | | | | | | | | | | | |
| 6 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | S-NSSAI time validity information not supported |
| 1 | | | |  | | |  | | |  | | S-NSSAI time validity information supported |
|  | | | | | | | | | | | | |
| S-NSSAI location validity information (SLVI) (octet 10, bit 7) | | | | | | | | | | | | |
| This bit indicates the capability to support S-NSSAI location validity information. | | | | | | | | | | | | |
| Bit | | | | | | | | | | | | |
| 7 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | S-NSSAI location validity information not supported |
| 1 | | | |  | | |  | | |  | | S-NSSAI location validity information supported |
|  | | | | | | | | | | | | |
| A2X over Uu capability (A2X-Uu) (octet 10, bit 8) | | | | | | | | | | | | |
| This bit indicates the capability for A2X over Uu, as specified in 3GPP TS 24.577 [60]. | | | | | | | | | | | | |
| Bit | | | | | | | | | | | | |
| 8 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | A2X over Uu not supported |
| 1 | | | |  | | |  | | |  | | A2X over Uu supported |
|  | | | | | | | | | | | | |
| MCS indicator update (MCSIU) (octet 11, bit 1) | | | | | | | | | | | | |
| This bit indicates the capability to support MCS indicator update via the UE configuration update procedure. | | | | | | | | | | | | |
| Bit | | | | | | | | | | | | |
| 1 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | MCS indicator update not supported |
| 1 | | | |  | | |  | | |  | | MCS indicator update supported |
|  | | | | | | | | | | | | |
| Network verified UE location over satellite NG-RAN (NVL-SATNR) (octet 11, bit 2) | | | | | | | | | | | | |
| This bit indicates the capability to support network verified UE location over satellite NG-RAN as specified in 3GPP TS 23.501 [8]. | | | | | | | | | | | | |
| Bit | | | |  | | |  | | |  | |  |
| 2 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Network verified UE location over satellite NG-RAN not supported |
| 1 | | | |  | | |  | | |  | | Network verified UE location over satellite NG-RAN supported |
|  | | | | | | | | | | | | |
| Ranging and sidelink positioning over PC5 for located UE support (RSLPL) (octet 11, bit 3)  This bit indicates the capability to support ranging and sidelink positioning over PC5 for located UE support. | | | | | | | | | | | | |
| Bit | | | | | | | | | | | | |
| 3 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Ranging and sidelink positioning for located UE not supported |
| 1 | | | |  | | |  | | |  | | Ranging and sidelink positioning for located UE supported |
|  | | | | | | | | | | | | |
| Network slice usage control (NSUC) (octet 11, bit 4) | | | | | | | | | | | | |
| This bit indicates the capability to support network slice usage control. | | | | | | | | | | | | |
| Bit | | | | | | | | | | | | |
| 4 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Network slice usage control not supported |
| 1 | | | |  | | |  | | |  | | Network slice usage control supported |
|  | | | | | | | | | | | | |
| Ranging and sidelink positioning with V2X capable UE (RSLPVU) (octet 11, bit 5) (see NOTE) | | | | | | | | | | | | |
|  | | | | | | | | | | | | |
| Bit | | | |  | | |  | | |  | |  |
| 5 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Ranging and sidelink positioning with V2X capable UE not supported |
| 1 | | | |  | | |  | | |  | | Ranging and sidelink positioning with V2X capable UE supported |
|  | | | | | | | | | | | | |
| Ranging and sidelink positioning with 5G ProSe capable UE support (RSLPPU) (octet 11, bit 6) (see NOTE) | | | | | | | | | | | | |
| Bit | | | | | | | | | | | | |
| 6 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | Ranging and sidelink positioning with 5G ProSe capable UE not supported |
| 1 | | | |  | | |  | | |  | | Ranging and sidelink positioning with 5G ProSe capable UE supported |
|  | | | | | | | | | | | | |
| RAT utilization control (RATUC) (octet 11, bit 7) | | | | | | | | | | | | |
| This bit indicates the support of RAT utilization control. | | | | | | | | | | | | |
| Bit | | | | | | | | | | | | |
| 7 | | | |  | | |  | | |  | |  |
| 0 | | | |  | | |  | | |  | | RAT utilization control not supported |
| 1 | | | |  | | |  | | |  | | RAT utilization control supported |
|  | | | | | | | | | | | | |
| Bit 8 in octet 11 and bits in octets 12 to 15 are spare and shall be coded as zero, if the respective octet is included in the information element. | | | | | | | | | | | | |
|  | | | | | | | | | | | | |
| NOTE: If both the RSLPVU bit is set to "Ranging and sidelink positioning with V2X capable UE not supported" and the RSLPPU bit is set to "Ranging and sidelink positioning with 5G ProSe capable UE not supported" in the 5GMM capability IE, then the receiving entity shall ignore the RSLPVU bit and the RSLPPU bit. | | | | | | | | | | | | |

#### 9.11.3.2 5GMM cause

the purpose of the 5GMM cause information element is to indicate the reason why a 5GMM request is rejected

the 5GMM cause information element is coded as shown in figure 9.11.3.2.1 and table 9.11.3.2.1

the 5GMM cause is a type 3 information element with length of 2 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 5GMM cause IEI | | | | | | | | octet 1 |
| Cause value | | | | | | | | octet 2 |

figure 9.11.3.2.1 5GMM cause information element

table 9.11.3.2.1 5GMM cause information element

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cause value (octet 2) | | | | | | | | | |
|  | | | | | | | | | |
| Bits | | | | | | | | | |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |  |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |  | Illegal UE |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |  | PEI not accepted |
| 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |  | Illegal ME |
| 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |  | 5GS services not allowed |
| 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |  | UE identity cannot be derived by the network |
| 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |  | Implicitly de-registered |
| 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |  | PLMN not allowed |
| 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |  | Tracking area not allowed |
| 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 |  | Roaming not allowed in this tracking area |
| 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |  | No suitable cells in tracking area |
| 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |  | MAC failure |
| 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 |  | Synch failure |
| 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 |  | Congestion |
| 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 |  | UE security capabilities mismatch |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |  | Security mode rejected, unspecified |
| 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 |  | Non-5G authentication unacceptable |
| 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 |  | N1 mode not allowed |
| 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 |  | Restricted service area |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |  | Redirection to EPC required |
| 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |  | IAB-node operation not authorized |
| 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 |  | LADN not available |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |  | No network slices available |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |  | Maximum number of PDU sessions reached |
| 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 |  | Insufficient resources for specific slice and DNN |
| 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |  | Insufficient resources for specific slice |
| 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |  | ngKSI already in use |
| 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |  | Non-3GPP access to 5GCN not allowed |
| 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 |  | Serving network not authorized |
| 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |  | Temporarily not authorized for this SNPN |
| 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 |  | Permanently not authorized for this SNPN |
| 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |  | Not authorized for this CAG or authorized for CAG cells only |
| 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 |  | Wireline access area not allowed |
| 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 |  | PLMN not allowed to operate at the present UE location |
| 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 |  | UAS services not allowed |
| 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |  | Disaster roaming for the determined PLMN with disaster condition not allowed |
| 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 |  | Selected N3IWF is not compatible with the allowed NSSAI |
| 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 |  | Selected TNGF is not compatible with the allowed NSSAI |
| 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 |  | Payload was not forwarded |
| 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 |  | DNN not supported or not subscribed in the slice |
| 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 |  | Insufficient user-plane resources for the PDU session |
| 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 |  | Onboarding services terminated |
| 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 |  | User plane positioning not authorized |
| 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |  | Semantically incorrect message |
| 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |  | Invalid mandatory information |
| 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |  | Message type non-existent or not implemented |
| 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |  | Message type not compatible with the protocol state |
| 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 |  | Information element non-existent or not implemented |
| 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |  | Conditional IE error |
| 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 |  | Message not compatible with the protocol state |
| 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 |  | Protocol error, unspecified |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| Any other value received by the mobile station shall be treated as 0110 1111, "protocol error, unspecified". Any other value received by the network shall be treated as 0110 1111, "protocol error, unspecified". | | | | | | | | | |

#### 9.11.3.2A 5GS DRX parameters

the purpose of the 5GS DRX parameters information element is to indicate that the UE wants to use DRX and for the network to indicate the DRX cycle value to be used at paging

the 5GS DRX parameters is a type 4 information element with a length of 3 octets

the 5GS DRX parameters information element is coded as shown in figure 9.11.3.2A.1 and table 9.11.3.2A.1

the value part of a DRX parameter information element is coded as shown in table 9.11.3.2A.1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 5GS DRX parameters IEI | | | | | | | | octet 1 |
| Length of 5GS DRX parameters contents | | | | | | | | octet 2 |
| 0 | 0 | 0 | 0 | DRX value | | | |  |
| spare | | | | octet 3 |

figure 9.11.3.2A.1 5GS DRX parameters information element

table 9.11.3.2A.1 5GS DRX parameters information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| DRX value (bits 4 to 1 of octet 3)  This field represents the DRX cycle parameter 'T' as defined in 3GPP TS 38.304 [28] or 3GPP TS 36.304 [25C]. | | | | |
| Bits | | | | |
| 4 | 3 | 2 | 1 |  |
| 0 | 0 | 0 | 0 | DRX value not specified |
| 0 | 0 | 0 | 1 | DRX cycle parameter T = 32 |
| 0 | 0 | 1 | 0 | DRX cycle parameter T = 64 |
| 0 | 0 | 1 | 1 | DRX cycle parameter T = 128 |
| 0 | 1 | 0 | 0 | DRX cycle parameter T = 256 |
|  | | | | |
| All other values shall be interpreted as "DRX value not specified" by this version of the protocol.  Bits 5 to 8 of octet 3 are spare and shall be coded as zero. | | | | |
|  | | | | |

#### 9.11.3.3 5GS identity type

the purpose of the 5GS identity type information element is to specify which identity is requested

the 5GS identity type is a type 1 information element

the 5GS identity type information element is coded as shown in figure 9.11.3.3.1 and table 9.11.3.3.1

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | | 4 | 3 | | 2 | 1 |  |
| 5GS identity type  IEI | | | | 0  spare | | | Type of  identity | | | octet 1 |

figure 9.11.3.3.1 5GS identity type information element

table 9.11.3.3.1 5GS identity type information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Type of identity (octet 1) | | | | |
| Bits | | | | |
| 3 | 2 | 1 |  |  |
| 0 | 0 | 1 |  | SUCI |
| 0 | 1 | 0 |  | 5G-GUTI |
| 0 | 1 | 1 |  | IMEI |
| 1 | 0 | 0 |  | 5G-S-TMSI |
| 1 | 0 | 1 |  | IMEISV |
| 1 | 1 | 0 |  | MAC address |
| 1 | 1 | 1 |  | EUI-64 |
|  | | | | |
| All other values are unused and shall be interpreted as "SUCI", if received by the UE. | | | | |

#### 9.11.3.4 5GS mobile identity

the purpose of the 5GS mobile identity information element is to provide either the SUCI the 5G-GUTI the IMEI the IMEISV the 5G-S-TMSI the MAC address or the EUI-64

the 5GS mobile identity information element is coded as shown in figures 9.11.3.4.1 9.11.3.4.2 9.11.3.4.3 9.11.3.4.4 9.11.3.4.5 9.11.3.4.6 9.11.3.4.8 and 9.11.3.4.7 and table 9.11.3.4.1

the 5GS mobile identity is a type 6 information element with a minimum length of 4

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 5GS mobile identity IEI | | | | | | | | octet 1 |
| Length of 5GS mobile identity contents | | | | | | | | octet 2  octet 3 |
| 1 | 1 | 1 | 1 | 0  spare | Type of identity | | | octet 4 |
| MCC digit 2 | | | | MCC digit 1 | | | | octet 5 |
| MNC digit 3 | | | | MCC digit 3 | | | | octet 6 |
| MNC digit 2 | | | | MNC digit 1 | | | | octet 7 |
| AMF Region ID | | | | | | | | octet 8 |
| AMF Set ID | | | | | | | | octet 9 |
| AMF Set ID (continued) | | AMF Pointer | | | | | | octet 10 |
| 5G-TMSI | | | | | | | | octet 11 |
| 5G-TMSI (continued) | | | | | | | | octet 12 |
| 5G-TMSI (continued) | | | | | | | | octet 13 |
| 5G-TMSI (continued) | | | | | | | | octet 14 |

figure 9.11.3.4.1 5GS mobile identity information element for type of identity "5G-GUTI"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 5GS mobile identity IEI | | | | | | | | octet 1 |
| Length of 5GS mobile identity contents | | | | | | | | octet 2  octet 3 |
| Identity digit 1 | | | | odd/  even  indic | Type of identity | | | octet 4 |
| Identity digit p+1 | | | | Identity digit p | | | | octet 5\* |

figure 9.11.3.4.2 5GS mobile identity information element for type of identity "IMEI" or "IMEISV"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 5GS mobile identity IEI | | | | | | | | octet 1 |
| Length of 5GS mobile identity contents | | | | | | | | octet 2  octet 3 |
| 0  spare | SUPI format | | | 0  spare | Type of identity | | | octet 4 |
| MCC digit 2 | | | | MCC digit 1 | | | | octet 5 |
| MNC digit 3 | | | | MCC digit 3 | | | | octet 6 |
| MNC digit 2 | | | | MNC digit 1 | | | | octet 7 |
| Routing indicator digit 2 | | | | Routing indicator digit 1 | | | | octet 8 |
| Routing indicator digit 4 | | | | Routing indicator digit 3 | | | | octet 9 |
| 0  Spare | 0  Spare | 0  Spare | 0  Spare | Protection scheme Id | | | | octet 10 |
| Home network public key identifier | | | | | | | | octet 11 |
| Scheme output | | | | | | | | octet 12 - x |

figure 9.11.3.4.3 5GS mobile identity information element for type of identity "SUCI" and SUPI format "IMSI"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| MSIN digit 2 | | | | MSIN digit 1 | | | | octet 12 |
| … | | | | | | | |  |
| MSIN digit n+1 | | | | MSIN digit n | | | | octet x |

figure 9.11.3.4.3a scheme output for type of identity "SUCI" SUPI format "IMSI" and protection scheme id "Null scheme"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 5GS mobile identity IEI | | | | | | | | octet 1 |
| Length of 5GS mobile identity contents | | | | | | | | octet 2  octet 3 |
| 0  Spare | SUPI format | | | 0  Spare | Type of identity | | | octet 4 |
| SUCI NAI | | | | | | | | octet 5 - y |

figure 9.11.3.4.4 5GS mobile identity information element for type of identity "SUCI" and SUPI format "Network specific identifier" "GCI" or "GLI"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 5GS mobile identity IEI | | | | | | | | octet 1 |
| Length of 5GS mobile identity contents | | | | | | | | octet 2  octet 3 |
| 1 | 1 | 1 | 1 | 0  spare | Type of identity | | | octet 4 |
| AMF Set ID | | | | | | | | octet 5 |
| AMF Set ID (continued) | | AMF Pointer | | | | | | octet 6 |
| 5G-TMSI | | | | | | | | octet 7 |
| 5G-TMSI (continued) | | | | | | | | octet 8 |
| 5G-TMSI (continued) | | | | | | | | octet 9 |
| 5G-TMSI (continued) | | | | | | | | octet 10 |

figure 9.11.3.4.5 5GS mobile identity information element for type of identity "5G-S-TMSI"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 5GS mobile identity IEI | | | | | | | | octet 1 |
| Length of 5GS mobile identity contents | | | | | | | | octet 2  octet 3 |
| 0 | 0 | 0 | 0 | 0 | Type of identity | | | octet 4 |
| spare | | | | |

figure 9.11.3.4.6 5GS mobile identity information element for type of identity "No identity"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 5GS mobile identity IEI | | | | | | | | octet 1 |
| Length of 5GS mobile identity contents | | | | | | | | octet 2  octet 3 |
| 0  spare | 0  spare | 0  spare | 0  spare | MAURI | Type of identity | | | octet 4 |
| MAC address | | | | | | | | octet 5  octet 10 |

figure 9.11.3.4.7 5GS mobile identity information element for type of identity "MAC address"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 5GS mobile identity IEI | | | | | | | | octet 1 |
| Length of 5GS mobile identity contents | | | | | | | | octet 2  octet 3 |
| 0  spare | 0  spare | 0  spare | 0  spare | 0  spare | Type of identity | | | octet 4 |
| EUI-64 | | | | | | | | octet 5  octet 12 |

figure 9.11.3.4.8 5GS mobile identity information element for type of identity "EUI-64"

table 9.11.3.4.1 5GS mobile identity information element

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Type of identity (octet 4)  Bits | | | | | | | | | |
| 3 | 2 | 1 |  | | | | | | |
| 0 | 0 | 0 | No identity (see NOTE 1) | | | | | | |
| 0 | 0 | 1 | SUCI | | | | | | |
| 0 | 1 | 0 | 5G-GUTI | | | | | | |
| 0 | 1 | 1 | IMEI | | | | | | |
| 1 | 0 | 0 | 5G-S-TMSI | | | | | | |
| 1 | 0 | 1 | IMEISV | | | | | | |
| 1 | 1 | 0 | MAC address | | | | | | |
| 1 | 1 | 1 | EUI-64 | | | | | | |
| All other values are reserved. | | | | | | | | | |
|  | | | | | | | | | |
| Odd/even indication (octet 4)  Bit | | | | | | | | | |
| 4 |  |  |  | | | | | | |
| 0 |  |  | even number of identity digits | | | | | | |
| 1 |  |  | odd number of identity digits | | | | | | |
|  | | | | | | | | | |
| For the 5G-GUTI, then bits 5 to 8 of octet 4 are coded as "1111", octet 5 through 7 contain the MCC and MNC values as specified below, octet 8 through 10 contain the AMF Region ID, the AMF Set ID and the AMF Pointer values and octet 11 through 14 contain the 5G-TMSI as defined in 3GPP TS 23.003 [4]. | | | | | | | | | |
| MCC, Mobile country code (octet 5, octet 6 bits 1 to 4)  The MCC field is coded as in ITU-T Recommendation E.212 [42], annex A. | | | | | | | | | |
| MNC, Mobile network code (octet 6 bits 5 to 8, octet 7)  The coding of this field is the responsibility of each administration but BCD coding shall be used. The MNC shall consist of 2 or 3 digits. If a network operator decides to use only two digits in the MNC, bits 5 to 8 of octet 6 shall be coded as "1111".  The MCC and MNC digits are coded as octets 6 to 8 of the Temporary mobile group identity IE in figure 10.5.154 of 3GPP TS 24.008 [12]. | | | | | | | | | |
|  | | | | | | | | | |
| AMF Region ID (octet 8)  This field contains the binary encoding of the AMF Region ID. Bit 8 of octet 7 is the most significant bit and bit 1 of octet 7 is the least significant bit.  AMF Set ID (octet 9, octet 10 bits 7 to 8)  This field contains the binary encoding of the AMF Set ID. Bit 8 of octet 9 is the most significant bit and bit 7 of octet 10 is the least significant bit.  AMF Pointer (octet 10 bits 1 to 6)  This field contains the binary encoding of the AMF Pointer. Bit 6 of octet 9 is the most significant bit and bit 1 of octet 9 is the least significant bit.  5G-TMSI (octet 11 to 14)  Bit 8 of octet 11 is the most significant bit and bit 1 of octet 14 is the least significant bit. | | | | | | | | | |
|  | | | | | | | | | |
| Identity digit (octet 4 bits 5 to 8, octet 5 etc.) | | | | | | | | | |
| For the IMEI, Identity digit field is coded using BCD coding. If the number of identity digits is even then bits 5 to 8 of the last octet shall be filled with an end mark coded as "1111". The format of the IMEI is described in 3GPP TS 23.003 [4]. | | | | | | | | | |
|  | | | | | | | | | |
| For the IMEISV, Identity digit field is coded using BCD coding. Bits 5 to 8 of the last octet shall be filled with an end mark coded as "1111". The format of the IMEISV is described in 3GPP TS 23.003 [4]. | | | | | | | | | |
|  | | | | | | | | | |
| For the SUCI, bit 8 of octet 4 is spare and shall be coded as zero. Bits 5-7 of octet 4 contain the SUPI format and are coded as shown below. | | | | | | | | | |
| SUPI format (octet 4, bits 5-7)  Bits | | | | | | | | | |
| 7 | 6 | 5 |  |  | | | | | |
| 0 | 0 | 0 |  | IMSI | | | | | |
| 0 | 0 | 1 |  | Network specific identifier | | | | | |
| 0 | 1 | 0 |  | GCI | | | | | |
| 0 | 1 | 1 |  | GLI | | | | | |
| All other values are interpreted as IMSI by this version of the protocol. | | | | | | | | | |
|  | | | | | | | | | |
| For the SUCI with SUPI format "IMSI", octets 5 through 7 contain the MCC and MNC values as specified below. For subsequent fields, bit 8 of octet 8 is the most significant bit and bit 1 of the last octet the least significant bit. The required fields for the SUCI are as defined in 3GPP TS 23.003 [4]. | | | | | | | | | |
| MCC, Mobile country code (octet 5, octet 6 bits 1 to 4)  The MCC field is coded as in ITU-T Recommendation E.212 [42], annex A. | | | | | | | | | |
| MNC, Mobile network code (octet 6 bits 5 to 8, octet 7)  The coding of this field is the responsibility of each administration but BCD coding shall be used. The MNC shall consist of 2 or 3 digits. If a network operator decides to use only two digits in the MNC, bits 5 to 8 of octet 6 shall be coded as "1111".  The MCC and MNC digits are coded as octets 6 to 8 of the Temporary mobile group identity IE in figure 10.5.154 of 3GPP TS 24.008 [12]. | | | | | | | | | |
|  | | | | | | | | | |
| Routing indicator (octets 8-9)  Routing Indicator shall consist of 1 to 4 digits. The coding of this field is the responsibility of home network operator but BCD coding shall be used. If a network operator decides to assign less than 4 digits to Routing Indicator, the remaining digits shall be coded as "1111" to fill the 4 digits coding of Routing Indicator (see NOTE 2). If no Routing Indicator is configured in the USIM or the ME, the UE shall code bits 1 to 4 of octet 8 of the Routing Indicator as "0000" and the remaining digits as "1111". | | | | | | | | | |
|  | | | | | | | | | |
| Protection scheme identifier (octet 10 bits 1 to 4) | | | | | | | | | |
| Bits | | | | | | | | | |
|  | | | | | | | | | |
| 4 | 3 | 2 | 1 |  | | | | | |
| 0 | 0 | 0 | 0 | Null scheme | | | | | |
| 0 | 0 | 0 | 1 | ECIES scheme profile A | | | | | |
| 0 | 0 | 1 | 0 | ECIES scheme profile B | | | | | |
| 0 | 0 | 1 | 1 |  | | | | | |
| to | | | | Reserved | | | | | |
| 1 | 0 | 1 | 1 |  | | | | | |
| 1 | 1 | 0 | 0 |  | | | | | |
| to | | | | Operator-specific protection scheme | | | | | |
| 1 | 1 | 1 | 1 |  | | | | | |
|  | | | | | | | | | |
| Bits 5-8 of octet 10 are spare and shall be coded as zero. | | | | | | | | | |
|  | | | | | | | | | |
| Home network public key identifier (octet 11) | | | | | | | | | |
| The Home network public key identifier (PKI) field is coded as defined in 3GPP TS 23.003 [4]. Home network public key identifier shall be coded as "00000000" when Protection scheme identifier is set to "0000" (i.e. Null scheme). | | | | | | | | | |
| Bits | | | | | | | | | |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |  |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  | Home network PKI value 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |  |  |
| to | | | | | | | |  | Home network PKI value (1-254) |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |  |  |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  | Reserved |
|  | | | | | | | | | |
|  | | | | | | | | | |
| Scheme output (octets 12 to x)  The Scheme output field consists of a string of characters with a variable length or hexadecimal digits as specified in 3GPP TS 23.003 [4]. If Protection scheme identifier is set to "0000" (i.e. Null scheme), then the Scheme output consists of the MSIN and is coded using BCD coding with each digit of the MSIN coded over 4 bits. If the MSIN includes an odd number of digits, bits 5 to 8 of octet x shall be coded as "1111". If Protection scheme identifier is not "0000" (i.e. ECIES scheme profile A, ECIES scheme profile B or Operator-specific protection scheme), then Scheme output is coded as hexadecimal digits. | | | | | | | | | |
|  | | | | | | | | | |
| For the SUCI with SUPI format set to "Network specific identifier", the SUCI NAI field contains an NAI constructed as specified in subclause 28.7.3 of 3GPP TS 23.003 [4] and encoded as UTF-8 string. | | | | | | | | | |
|  | | | | | | | | | |
| For the SUCI with SUPI format set to "GCI", the SUCI NAI field contains an NAI constructed as specified in subclause 28.15.5 of 3GPP TS 23.003 [4] and encoded as UTF-8 string. | | | | | | | | | |
|  | | | | | | | | | |
| For the SUCI with SUPI format set to "GLI", the SUCI NAI field contains an NAI constructed as specified in subclause 28.16.5 of 3GPP TS 23.003 [4] and encoded as UTF-8 string. | | | | | | | | | |
|  | | | | | | | | | |
| For the 5G-S-TMSI, bits 5 to 8 of octet 4 are coded as "1111". The coding of the 5G-S-TMSI is left open for each administration. | | | | | | | | | |
|  | | | | | | | | | |
| AMF Set ID (octet 5, octet 6 bits 7 to 8)  This field contains the binary encoding of the AMF Set ID. Bit 8 of octet 5 is the most significant bit and bit 7 of octet 6 is the least significant bit.  AMF Pointer (octet 6 bits 1 to 6)  This field contains the binary encoding of the AMF Pointer. Bit 6 of octet 6 is the most significant bit and bit 1 of octet 6 is the least significant bit.  5G-TMSI (octet 7 to 10)  Bit 8 of octet 7 is the most significant bit and bit 1 of octet 10 is the least significant bit. | | | | | | | | | |
| For Type of identity "No identity", the length of mobile identity contents parameter shall be set to 1 and the bits 4-8 of octet 4 are spare and shall be coded as zero. | | | | | | | | | |
| MAC address usage restriction indication (MAURI) (octet 4 bit 4) | | | | | | | | | |
| Bit | | | | | | | | | |
| 4 |  |  |  |  | | | | | |
| 0 |  |  |  | No restrictions | | | | | |
| 1 |  |  |  | MAC address is not usable as an equipment identifier | | | | | |
| MAC address (octets 5 to 10)  This field contains the MAC address as defined in subclause 8 of IEEE Std 802 [43].  Bit 8 of octet 5 is the most significant bit and bit 1 of octet 10 is the least significant bit. | | | | | | | | | |
| EUI-64 (octets 5 to 12)  This field contains an EUI-64 as defined in [48].  Bit 8 of octet 5 is the most significant bit and bit 1 of octet 12 is the least significant bit. | | | | | | | | | |
| NOTE 1: This can be used when the requested identity is not available at the UE during the identification procedure.  NOTE 2: For a 3-digit Routing Indicator, e.g "567", bits 1 to 4 of octet 8 are coded as "0101", bits 5 to 8 of octet 8 are coded as "0110", bits 1 to 4 of octet 9 are coded as "0111", bits 5 to 8 of octet 9 are coded as "1111". | | | | | | | | | |

#### 9.11.3.5 5GS network feature support

the purpose of the 5GS network feature support information element is to indicate whether certain features are supported by the network

the 5GS network feature support information element is coded as shown in figure 9.11.3.5.1 and table 9.11.3.5.1

the 5GS network feature support is a type 4 information element with a minimum length of 3 octets and a maximum length of 6 octets

if

- the length of 5GS network feature support contents field is set to one then the UE shall interpret this as a receipt of an information element with all bits of octet 4 octet 5 and octet 6 coded as zero

- the length of 5GS network feature support contents field is set to two the UE shall interpret this as a receipt of an information element with all bits of octet 5 and octet 6 coded as zero

- the length of 5GS network feature support contents field is set to three the UE shall interpret this as a receipt of an information element with all bits of octet 6 coded as zero

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 5GS network feature support IEI | | | | | | | | octet 1 |
| Length of 5GS network feature support contents | | | | | | | | octet 2 |
| MPSI | IWK N26 | EMF | | EMC | | IMS- VoPS-N3GPP | IMS- VoPS-3GPP | octet 3 |
| 5G-UP CIoT | 5G-IPHC-CP CIoT | N3 data | 5G-CP CIoT | RestrictEC | | MCSI | EMCN3 | octet 4\* |
| UN-PER | PR | RPR | PIV | NCR | 5G-EHC-CP CIoT | ATS-IND | 5G-LCS | octet 5\* |
| 0  spare | 0  spare | 0  spare | 0  spare | RSLP | SUPL | LCS-UPP | NAPS | octet 6\* |

figure 9.11.3.5.1 5GS network feature support information element

table 9.11.3.5.1 5GS network feature support information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IMS voice over PS session over 3GPP access indicator (IMS-VoPS-3GPP) (octet 3, bit 1) | | | | |
| This bit indicates the support of IMS voice over PS session over 3GPP access (see NOTE 1). | | | | |
| Bit | | | | |
| 1 |  |  |  |  |
| 0 |  |  |  | IMS voice over PS session not supported over 3GPP access |
| 1 |  |  |  | IMS voice over PS session supported over 3GPP access |
|  | | | | |
| IMS voice over PS session over non-3GPP access indicator (IMS-VoPS-N3GPP) (octet 3, bit 2) | | | | |
| This bit indicates the support of IMS voice over PS session over non-3GPP access. | | | | |
| Bit | | | | |
| 2 |  |  |  |  |
| 0 |  |  |  | IMS voice over PS session not supported over non-3GPP access |
| 1 |  |  |  | IMS voice over PS session supported over non-3GPP access |
|  | | | | |
| Emergency service support indicator for 3GPP access (EMC) (octet 3, bit 3 and bit 4) | | | | |
| These bits indicate the support of emergency services in 5GS for 3GPP access (see NOTE 1). | | | | |
| Bits | | | | |
| 4 | 3 |  |  |  |
| 0 | 0 |  |  | Emergency services not supported |
| 0 | 1 |  |  | Emergency services supported in NR connected to 5GCN only |
| 1 | 0 |  |  | Emergency services supported in E-UTRA connected to 5GCN only |
| 1 | 1 |  |  | Emergency services supported in NR connected to 5GCN and E-UTRA connected to 5GCN |
|  | | | | |
| Emergency services fallback indicator for 3GPP access (EMF) (octet 3, bit 5 and bit 6) | | | | |
| These bits indicate the support of emergency services fallback for 3GPP access (see NOTE 1). | | | | |
| Bits | | | | |
| 6 | 5 |  |  |  |
| 0 | 0 |  |  | Emergency services fallback not supported |
| 0 | 1 |  |  | Emergency services fallback supported in NR connected to 5GCN only |
| 1 | 0 |  |  | Emergency services fallback supported in E-UTRA connected to 5GCN only |
| 1 | 1 |  |  | Emergency services fallback supported in NR connected to 5GCN and E-UTRA connected to 5GCN |
|  | | | | |
| Interworking without N26 interface indicator (IWK N26) (octet 3, bit 7) | | | | |
| This bit indicates whether interworking without N26 interface is supported. | | | | |
| Bit | | | | |
| 7 |  |  |  |  |
| 0 |  |  |  | Interworking without N26 interface not supported |
| 1 |  |  |  | Interworking without N26 interface supported |
|  | | | | |
| MPS indicator (MPSI) (octet 3, bit 8) | | | | |
| This bit indicates the validity of MPS. | | | | |
| Bit | | | | |
| 8 |  |  |  |  |
| 0 |  |  |  | Access identity 1 not valid |
| 1 |  |  |  | Access identity 1 valid |
|  | | | | |
| Emergency service support for non-3GPP access indicator (EMCN3) (octet 4, bit 1) | | | | |
| This bit indicates the support of emergency services in 5GS for non-3GPP access. | | | | |
| Bit (see NOTE 2) | | | | |
| 1 |  |  |  |  |
| 0 |  |  |  | Emergency services not supported over non-3GPP access |
| 1 |  |  |  | Emergency services supported over non-3GPP access |
|  |  |  |  |  |
| MCS indicator (MCSI) (octet 4, bit 2) | | | | |
| This bit indicates the validity of MCS. | | | | |
| Bit | | | | |
| 2 |  |  |  |  |
| 0 |  |  |  | Access identity 2 not valid |
| 1 |  |  |  | Access identity 2 valid |
|  | | | | |
| Restriction on enhanced coverage (RestrictEC) (octet 4, bit 3 and bit 4)  These bits indicate enhanced coverage restricted information. | | | | |
| In WB-N1 mode these bits are set as follows:  Bits | | | | |
| 4 | 3 |  |  |  |
| 0 | 0 |  |  | Both CE mode A and CE mode B are not restricted |
| 0 | 1 |  |  | Both CE mode A and CE mode B are restricted |
| 1 | 0 |  |  | CE mode B is restricted |
| 1 | 1 |  |  | Reserved |
| In NB-N1 mode these bits are set as follows | | | | |
| Bits | | | | |
| 4 | 3 |  |  |  |
| 0 | 0 |  |  | Use of enhanced coverage is not restricted |
| 0 | 1 |  |  | Use of enhanced coverage is restricted |
| 1 | 0 |  |  | Reserved |
| 1 | 1 |  |  | Reserved |
|  | | | | |
| Control plane CIoT 5GS optimization (5G-CP CIoT) (octet 4, bit 5) | | | | |
| This bit indicates the capability for control plane CIoT 5GS optimization. | | | | |
| Bit | | | | |
| **5** | | | | |
| 0 |  |  |  | Control plane CIoT 5GS optimization not supported |
| 1 |  |  |  | Control plane CIoT 5GS optimization supported |
|  | | | | |
| N3 data transfer (N3 data) (octet 4, bit 6) | | | | |
| This bit indicates the capability for N3 data transfer. | | | | |
| Bit | | | | |
| **6** | | | | |
| 0 |  |  |  | N3 data transfer supported |
| 1 |  |  |  | N3 data transfer not supported |
|  | | | | |
| IP header compression for control plane CIoT 5GS optimization (5G-IPHC-CP CIoT) (octet 4, bit 7) | | | | |
| This bit indicates the capability for IP header compression for control plane CIoT 5GS optimization. | | | | |
| Bit | | | | |
| 7 | | | | |
| 0 |  |  |  | IP header compression for control plane CIoT 5GS optimization not supported |
| 1 |  |  |  | IP header compression for control plane CIoT 5GS optimization supported |
|  | | | | |
| User plane CIoT 5GS optimization (5G-UP CIoT) (octet 4, bit 8) | | | | |
| This bit indicates the capability for user plane CIoT 5GS optimization. | | | | |
| Bit | | | | |
| **8** | | | | |
| 0 |  |  |  | User plane CIoT 5GS optimization not supported |
| 1 |  |  |  | User plane CIoT 5GS optimization supported |
|  | | | | |
| Location Services indicator in 5GC (5G-LCS) (octet 5, bit 1) | | | | |
| Bit | | | | |
| **1** | | | | |
| 0 |  |  |  | Location services via 5GC not supported |
| 1 |  |  |  | Location services via 5GC supported |
|  | | | | |
| ATSSS support indicator (ATS-IND) (octet 5, bit 2) | | | | |
| This bit indicates the network support for ATSSS. | | | | |
| Bit | | | | |
| **2** | | | | |
| 0 |  |  |  | ATSSS not supported |
| 1 |  |  |  | ATSSS supported |
|  | | | | |
|  | | | | |
| Ethernet header compression for control plane CIoT 5GS optimization (5G-EHC-CP CIoT) (octet 5, bit 3) | | | | |
| This bit indicates the capability for Ethernet header compression for control plane CIoT 5GS optimization | | | | |
| Bit | | | | |
| **3** | | | | |
| 0 |  |  |  | Ethernet header compression for control plane CIoT 5GS optimization not supported |
| 1 |  |  |  | Ethernet header compression for control plane CIoT 5GS optimization supported |
|  |  |  |  |  |
|  | | | | |
| N1 NAS signalling connection release (NCR) (octet 5, bit 4) | | | | |
| This bit indicates whether N1 NAS signalling connection release is supported. | | | | |
| Bit | | | | |
| **4** | | | | |
| 0 |  |  |  | N1-NAS signalling connection release not supported |
| 1 |  |  |  | N1-NAS signalling connection release supported |
|  | | | | |
| Paging indication for voice services (PIV) (octet 5, bit 5) | | | | |
| This bit indicates whether paging indication for voice services is supported. | | | | |
| Bit | | | | |
| **5** | | | | |
| 0 |  |  |  | paging indication for voice services not supported |
| 1 |  |  |  | paging indication for voice services supported |
|  | | | | |
| Reject paging request (RPR) (octet 5, bit 6) | | | | |
| This bit indicates whether reject paging request is supported. | | | | |
| Bit | | | | |
| **6** | | | | |
| 0 |  |  |  | reject paging request not supported |
| 1 |  |  |  | reject paging request supported |
|  | | | | |
| Paging restriction (PR) (octet 5, bit 7) | | | | |
| This bit indicates whether paging restriction is supported. | | | | |
| Bit | | | | |
| **7** | | | | |
| 0 |  |  |  | paging restriction not supported |
| 1 |  |  |  | paging restriction supported |
|  | | | | |
|  | | | | |
| UN-PER (octet 5, bit 8) | | | | |
| This bit indicates the capability to support Unavailability period | | | | |
| Bit | | | | |
| 8 | | | | |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | | 0 |  |  |  | unavailability period not supported | | 1 |  |  |  | unavailability period supported | | | | | |
|  | | | | |
|  | | | | |
| Non-3GPP access path switching (NAPS) (octet 6, bit 1) | | | | |
| This bit indicates whether non-3GPP access path switching is supported. | | | | |
| Bit | | | | |
| **1** | | | | |
| 0 |  |  |  | non-3GPP access path switching not supported |
| 1 |  |  |  | non-3GPP access path switching supported |
|  | | | | |
|  | | | | |
| LCS-UPP user plane positioning (LCS-UPP) (octet 6, bit 2) | | | | |
| This bit indicates the capability to support LCS-UPP user plane positioning (see 3GPP TS 23.273 [6B]). | | | | |
| Bit | | | | |
| **2** | | | | |
| 0 |  |  |  | User plane positioning using LCS-UPP not supported |
| 1 |  |  |  | User plane positioning using LCS-UPP supported |
|  | | | | |
|  | | | | |
| SUPL user plane positioning (SUPL) (octet 6, bit 3) | | | | |
| This bit indicates the capability to support SUPL user plane positioning (see 3GPP TS 38.305 [67] and 3GPP TS 23.271 [68]). | | | | |
| Bit | | | | |
| **3** | | | | |
| 0 |  |  |  | User plane positioning using SUPL not supported |
| 1 |  |  |  | User plane positioning using SUPL supported |
|  | | | | |
| Ranging and sidelink positioning support (RSLP) (octet 6, bit 4) | | | | |
| This bit indicates the capability to support ranging and sidelink positioning. | | | | |
| Bit | | | | |
| **4** | | | | |
| 0 |  |  |  | Ranging and sidelink positioning not supported |
| 1 |  |  |  | Ranging and sidelink positioning supported |
|  | | | | |
| Bits 5 to 8 of octet 6 are spare and shall be coded as zero. | | | | |
|  | | | | |
| NOTE 1: For a registration procedure over non-3GPP access, bit 1 of octet 3 and bits 3 to 7 of octet 3 are ignored.  NOTE 2: For a registration procedure over 3GPP access, bit 2 of octet 3 and bit 1 of octet 4 are ignored. | | | | |

#### 9.11.3.6 5GS registration result

the purpose of the 5GS registration result information element is to specify the result of a registration procedure

the 5GS registration result information element is coded as shown in figure 9.11.3.6.1 and table 9.11.3.6.1

the 5GS registration result is a type 4 information element with a length of 3 octets

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | | 7 | | 6 | | 5 | | 4 | | 3 | 2 | 1 | |  | |
| 5GS registration result IEI | | | | | | | | | | | | | | octet 1 | |
| Length of 5GS registration result contents | | | | | | | | | | | | | | octet 2 | |
| 0  Spare | | Disaster roaming registration result value | | Emergency registered | | NSSAA Performed | | SMS allowed | | 5GS registration result value | | | | octet 3 | |

figure 9.11.3.6.1 5GS registration result information element

table 9.11.3.6.1 5GS registration result information element

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 5GS registration result value (octet 3, bits 1 to 3) (NOTE) | | | | | |
| Bits | | | | | |
| 3 | | 2 | 1 |  |  |
| 0 | | 0 | 1 |  | 3GPP access |
| 0 | | 1 | 0 |  | Non-3GPP access |
| 0 | | 1 | 1 |  | 3GPP access and non-3GPP access |
| 1 | | 1 | 1 |  | reserved |
|  | | | | | |
| All other values are unused and shall be treated as "3GPP access", if received by the UE. | | | | | |
|  | | | | | |
| SMS over NAS transport allowed (SMS allowed) (octet 3, bit 4) (NOTE) | | | | | |
| Bit | | | | | |
| 4 | |  |  |  |  |
| 0 | |  |  |  | SMS over NAS not allowed |
| 1 | |  |  |  | SMS over NAS allowed |
|  | | | | | | |
| Network slice-specific authentication and authorization is to be performed (NSSAA to be performed) (octet 3, bit 5) (NOTE) | | | | | | |
| Bit | | | | | | |
| 5 | |  |  |  |  | |
| 0 | |  |  |  | Network slice-specific authentication and authorization is not to be performed | |
| 1 | |  |  |  | Network slice-specific authentication and authorization is to be performed | |
|  | | | | | |
| Emergency registered (octet 3, bit 6) | | | | | | |
| Bit | | | | | | |
| 6 | |  |  |  |  | |
| 0 | |  |  |  | Not registered for emergency services | |
| 1 | |  |  |  | Registered for emergency services | |
|  | | | | | | |
| Disaster roaming registration result value (octet 3, bit 7) (NOTE) | | | | | | |
| Bit | | | | | | |
| 7 | |  |  |  |  | |
| 0 | |  |  |  | No additional information | |
| 1 | |  |  |  | Request for registration for disaster roaming service accepted as registration not for disaster roaming service | |
|  | | | | | |
| Bit 8 of octet 3 is spare and shall be coded as zero. | | | | | |
| NOTE: All bits other than bit 6 in octet 3 shall be ignored by the UE when the 5GS registration result IE is received in the CONFIGURATION UPDATE COMMAND message | | | | | |

#### 9.11.3.7 5GS registration type

the purpose of the 5GS registration type information element is to indicate the type of the requested registration

the 5GS registration type information element is coded as shown in figure 9.11.3.7.1 and table 9.11.3.7.1

the 5GS registration type is a type 1 information element with a length of 1 octet

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 5GS registration type IEI | | | | FOR | 5GS registration type value | | | octet 1 |

figure 9.11.3.7.1 5GS registration type information element

table 9.11.3.7.1 5GS registration type information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 5GS registration type value (octet 1, bits 1 to 3) | | | | |
| Bits | | | | |
| 3 | 2 | 1 |  |  |
| 0 | 0 | 1 |  | initial registration |
| 0 | 1 | 0 |  | mobility registration updating |
| 0 | 1 | 1 |  | periodic registration updating |
| 1 | 0 | 0 |  | emergency registration |
| 1 | 0 | 1 |  | SNPN onboarding registration |
| 1 | 1 | 0 |  | disaster roaming mobility registration updating |
| 1 | 1 | 1 |  | disaster roaming initial registration |
|  | | | | |
| All other values are unused and shall be interpreted as "initial registration", if received by the network. | | | | |
|  | | | | |
| Follow-on request bit (FOR) (octet 1, bit 4) | | | | |
| Bit | | | | |
| 4 |  |  |  |  |
| 0 |  |  |  | No follow-on request pending |
| 1 |  |  |  | Follow-on request pending |

#### 9.11.3.8 5GS tracking area identity

the purpose of the 5GS tracking area identity information element is to provide an unambiguous identification of tracking areas within the area covered by the 5GS

the 5GS tracking area identity information element is coded as shown in figure 9.11.3.8.1 and table 9.11.3.8.1

the 5GS tracking area identity is a type 3 information element with a length of 7 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 5GS tracking area identity IEI | | | | | | | | octet 1 |
| MCC digit 2 | | | | MCC digit 1 | | | | octet 2 |
| MNC digit 3 | | | | MCC digit 3 | | | | octet 3 |
| MNC digit 2 | | | | MNC digit 1 | | | | octet 4 |
| TAC | | | | | | | | octet 5 |
| TAC (continued) | | | | | | | | octet 6 |
| TAC (continued) | | | | | | | | octet 7 |

figure 9.11.3.8.1 5GS tracking area identity information element

table 9.11.3.8.1 5GS tracking area identity information element

|  |
| --- |
| MCC, Mobile country code (octets 2 and 3)  The MCC field is coded as in ITU-T Recommendation E212 [42], annex A.  If the TAI is deleted the MCC and MNC shall take the value from the deleted TAI.  In abnormal cases, the MCC stored in the UE can contain elements not in the set {0, 1 ... 9}. In such cases the UE should transmit the stored values using full hexadecimal encoding. When receiving such an MCC, the network shall treat the TAI as deleted.  MNC, Mobile network code (octet 3 bits 5 to 8, octet 4)  The coding of this field is the responsibility of each administration, but BCD coding shall be used. The MNC shall consist of 2 or 3 digits. For PCS 1900 for NA, Federal regulation mandates that a 3-digit MNC shall be used. However, a network operator may decide to use only two digits in the MNC in the TAI over the radio interface. In this case, bits 5 to 8 of octet 3 shall be coded as "1111". Mobile equipment shall accept a TAI coded in such a way.  In abnormal cases, the MNC stored in the UE can have:  - digit 1 or 2 not in the set {0, 1 ... 9}, or  - digit 3 not in the set {0, 1 ... 9, F} hex.  In such cases the UE shall transmit the stored values using full hexadecimal encoding. When receiving such an MNC, the network shall treat the TAI as deleted.  The same handling shall apply for the network, if a 3-digit MNC is sent by the UE to a network using only a 2-digit MNC.  TAC, Tracking area code (octets 5 to 7)  In the TAC field bit 8 of octet 5 is the most significant bit and bit 1 of octet 7 the least significant bit.  The coding of the tracking area code is the responsibility of each administration except that two values are used to mark the TAC, and hence the TAI, as deleted. Coding using full hexadecimal representation may be used. The tracking area code consists of 3 octets.  If a TAI has to be deleted, then all bits of the tracking area code shall be set to one with the exception of the least significant bit which shall be set to zero. If a USIM is inserted in a mobile equipment with the tracking area code containing all zeros, then the mobile equipment shall recognise this TAC as part of a deleted TAI. |

#### 9.11.3.9 5GS tracking area identity list

the purpose of the 5GS tracking area identity list information element is to transfer a list of tracking areas from the network to the UE

the coding of the information element allows combining different types of lists the lists of type "00" and "01" allow a more compact encoding when the different TAIs are sharing the PLMN identity

the 5GS tracking area identity list information element is coded as shown in figure 9.11.3.8.1 figure 9.11.3.8.2 figure 9.11.3.9.3 figure 9.11.3.9.4 and table 9.11.3.9.1

the 5GS tracking area identity list is a type 4 information element with a minimum length of 9 octets and a maximum length of 114 octets the list can contain a maximum of 16 different tracking area identities

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 5GS tracking area identity list IEI | | | | | | | | octet 1 |
| Length of 5GS tracking area identity list contents | | | | | | | | octet 2 |
| Partial tracking area identity list 1 | | | | | | | | octet 3  octet i |
| Partial tracking area identity list 2 | | | | | | | | octet i+1\*  octet l\* |
| … | | | | | | | | octet l+1\*  octet m\* |
| Partial tracking area identity list p | | | | | | | | octet m+1\*  octet n\* |

figure 9.11.3.9.1 5GS tracking area identity list information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 0  Spare | Type of list | | Number of elements | | | | | octet 1 |
| MCC digit 2 | | | | MCC digit 1 | | | | octet 2 |
| MNC digit 3 | | | | MCC digit 3 | | | | octet 3 |
| MNC digit 2 | | | | MNC digit 1 | | | | octet 4 |
| TAC 1 | | | | | | | | octet 5 |
| TAC 1 (continued) | | | | | | | | octet 6 |
| TAC 1 (continued) | | | | | | | | octet 7 |
| … | | | | | | | | … |
| … | | | | | | | | … |
| TAC k | | | | | | | | octet 3k+2\* |
| TAC k (continued) | | | | | | | | octet 3k+3\* |
| TAC k (continued) | | | | | | | | octet 3k+4\* |

figure 9.11.3.9.2 partial tracking area identity list – type of list = "00"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 0  Spare | Type of list | | Number of elements | | | | | octet 1 |
| MCC digit 2 | | | | MCC digit 1 | | | | octet 2 |
| MNC digit 3 | | | | MCC digit 3 | | | | octet 3 |
| MNC digit 2 | | | | MNC digit 1 | | | | octet 4 |
| TAC 1 | | | | | | | | octet 5 |
| TAC 1 (continued) | | | | | | | | octet 6 |
| TAC 1 (continued) | | | | | | | | octet 7 |

figure 9.11.3.9.3 partial tracking area identity list – type of list = "01"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 0  Spare | Type of list | | Number of elements | | | | | octet 1 |
| MCC digit 2 | | | | MCC digit 1 | | | | octet 2 |
| MNC digit 3 | | | | MCC digit 3 | | | | octet 3 |
| MNC digit 2 | | | | MNC digit 1 | | | | octet 4 |
| TAC 1 | | | | | | | | octet 5 |
| TAC 1 (continued) | | | | | | | | octet 6 |
| TAC 1 (continued) | | | | | | | | octet 7 |
| MCC digit 2 | | | | MCC digit 1 | | | | octet 8\* |
| MNC digit 3 | | | | MCC digit 3 | | | | octet 9\* |
| MNC digit 2 | | | | MNC digit 1 | | | | octet 10\* |
| TAC 2 | | | | | | | | octet 11\* |
| TAC 2 (continued) | | | | | | | | octet 12\* |
| TAC 2 (continued) | | | | | | | | octet 13\* |
| … | | | | | | | |  |
| … | | | | | | | |  |
| MCC digit 2 | | | | MCC digit 1 | | | | octet 6k-4\* |
| MNC digit 3 | | | | MCC digit 3 | | | | octet 6k-3\* |
| MNC digit 2 | | | | MNC digit 1 | | | | octet 6k-2\* |
| TAC k | | | | | | | | octet 6k-1\* |
| TAC k (continued) | | | | | | | | octet 6k\* |
| TAC k (continued) | | | | | | | | octet 6k+1\* |

figure 9.11.3.9.4 partial tracking area identity list – type of list = "10"

table 9.11.3.9.1 tracking area identity list information element

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Value part of the Tracking area identity list information element (octets 3 to n) | | | | | |
|  | | | | | |
| The value part of the Tracking area identity list information element consists of one or several partial tracking area identity lists. The length of each partial tracking area identity list can be determined from the 'type of list' field and the 'number of elements' field in the first octet of the partial tracking area identity list. | | | | | |
| The UE shall store the complete list received. If more than 16 TAIs are included in this information element, the UE shall store the first 16 TAIs and ignore the remaining octets of the information element. | | | | | |
|  | | | | | |
|  | | | | | |
| Partial tracking area identity list: | | | | | |
|  | | | | | |
| Type of list (octet 1) | | | | | |
| Bits | | | | | |
| 7 | 6 |  | | | |
| 0 | 0 | list of TACs belonging to one PLMN or SNPN, with non-consecutive TAC values | | | |
| 0 | 1 | list of TACs belonging to one PLMN or SNPN, with consecutive TAC values | | | |
| 1 | 0 | list of TAIs belonging to different PLMNs (see NOTE) | | | |
|  | | | | | |
| All other values are reserved. | | | | | |
|  | | | | | |
| Number of elements (octet 1) | | | | | |
| Bits | | | | | |
| 5 | 4 | 3 | 2 | 1 |  |
| 0 | 0 | 0 | 0 | 0 | 1 element |
| 0 | 0 | 0 | 0 | 1 | 2 elements |
| 0 | 0 | 0 | 1 | 0 | 3 elements |
| … | | | | |  |
| 0 | 1 | 1 | 0 | 1 | 14 elements |
| 0 | 1 | 1 | 1 | 0 | 15 elements |
| 0 | 1 | 1 | 1 | 1 | 16 elements |
|  | | | | | |
| All other values are unused and shall be interpreted as 16, if received by the UE. | | | | | |
|  | | | | | |
| Bit 8 of octet 1 is spare and shall be coded as zero. | | | | | |
|  | | | | | |
|  | | | | | |
| For type of list = "00" and number of elements = k: | | | | | |
|  | | | | | |
| octet 2 to 4 contain the MCC+MNC, and | | | | | |
| for j = 1, …, k: | | | | | |
| octets 3j+2 to 3j+4 contain the TAC of the j-th TAI belonging to the partial list, | | | | | |
|  | | | | | |
| For type of list = "01" and number of elements = k: | | | | | |
|  | | | | | |
| octet 2 to 4 contain the MCC+MNC, and | | | | | |
| octets 5 to 7 contain the TAC of the first TAI belonging to the partial list. | | | | | |
| The TAC values of the other k-1 TAIs are TAC+1, TAC+2, …, TAC+k-1. | | | | | |
|  | | | | | |
| For type of list = "10" and number of elements = k: | | | | | |
|  | | | | | |
| for j = 1, …, k. | | | | | |
| octets 6j-4 to 6j-2 contain the MCC+MNC, and | | | | | |
| octets 6j-1 to 6j+1 contain the TAC of the j-th TAI belonging to the partial list. | | | | | |
|  | | | | | |
|  | | | | | |
| MCC, Mobile country code | | | | | |
|  | | | | | |
| The MCC field is coded as in ITU-T Recommendation E.212 [42], annex A. | | | | | |
|  | | | | | |
| MNC, Mobile network code | | | | | |
|  | | | | | |
| The coding of this field is the responsibility of each administration but BCD coding shall be used. The MNC shall consist of 2 or 3 digits. If a network operator decides to use only two digits in the MNC, MNC digit 3 shall be coded as "1111". | | | | | |
|  | | | | | |
| TAC, Tracking area code | | | | | |
|  | | | | | |
| In the TAC field bit 8 of the first octet is the most significant bit and bit 1 of third octet the least significant bit. | | | | | |
| The coding of the tracking area code is the responsibility of each administration. Coding using full hexadecimal representation may be used. The tracking area code consists of 3 octets. | | | | | |
|  | | | | | |
| NOTE: If the "list of TAIs belonging to different PLMNs" is used, the PLMNs included in the list need to be present in the list of "equivalent PLMNs". This type of list is not applicable in an SNPN. | | | | | |

#### 9.11.3.9A 5GS update type

the purpose of the 5GS update type IE is to allow the UE to provide additional information to the network when performing a registration procedure

the 5GS update type information element is coded as shown in figure 9.11.3.9A.1 and table 9.11.3.9A.1

the 5GS update type is a type 4 information element with a length of 3 octects

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | | 7 | | 6 | 5 | | 4 | 3 | | 2 | | 1 | |  | |
| 5GS update type IEI | | | | | | | | | | | | | | octet 1 | |
| Length of 5GS update type | | | | | | | | | | | | | | octet 2 | |
| 0  Spare | | 0  Spare | | EPS- PNB-CIoT | | | 5GS-PNB-CIoT | | | NG-RAN-RCU | | SMS requested | | octet 3 | |

figure 9.11.3.9A.1 5GS update type information element

table 9.11.3.9A.1 5GS update type information element

|  |  |  |
| --- | --- | --- |
| SMS over NAS transport requested (SMS requested) (octet 3, bit 1) | | |
| Bit | | |
| 1 |  |  |
| 0 |  | SMS over NAS not supported |
| 1 |  | SMS over NAS supported |
|  | | |
| NG-RAN Radio Capability Update (NG-RAN-RCU) (octet 3, bit 2) | | |
| Bit | | |
| 2 |  |  |
| 0 |  | UE radio capability update not needed |
| 1 |  | UE radio capability update needed |
| For a list of RATs for which a radio capability update can be triggered by means of this indication see subclause 5.5.1.3.2, case n). | | |
| 5GS Preferred CIoT network behaviour (5GS PNB-CIoT) (octet 3, bits 3 and 4) | | |
|  | | |
| Bits | | |
| 4 | 3 |  |
| 0 | 0 | no additional information |
| 0 | 1 | control plane CIoT 5GS optimization |
| 1 | 0 | user plane CIoT 5GS optimization |
| 1 | 1 | reserved |
|  | | |
| EPS Preferred CIoT network behaviour (EPS-PNB-CIoT) (octet 3, bits 5 and 6) | | |
|  | | |
| Bits   |  |  |  | | --- | --- | --- | | 6 | 5 |  | | | |
| |  |  |  | | --- | --- | --- | | 0 | 0 | no additional information | | 0 | 1 | control plane CIoT EPS optimization | | 1 | 0 | user plane CIoT EPS optimization | | 1 | 1 | reserved | | | |
|  | | |
|  | | |
| Bits 7 to 8 of octet 3 are spare and shall be coded as zero. | | |

#### 9.11.3.10 ABBA

the purpose of the ABBA information element is to enable the bidding down protection of security features

the ABBA information element is coded as shown in figure 9.11.3.10.1 and table 9.11.3.10.1

the ABBA is a type 4 information element with a minimum length of 4 octets and maximum length of 257 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| ABBA IEI | | | | | | | | octet 1 |
| Length of ABBA contents | | | | | | | | octet 2 |
| ABBA contents | | | | | | | | octet 3  octet n |

figure 9.11.3.10.1 ABBA information element

table 9.11.3.10.1 ABBA information element

|  |
| --- |
| ABBA contents (octet 3-n):  indicate set of security features defined for 5GS as described in 3GPP TS 33.501 [24]. |
| NOTE 1: If the UE receives the ABBA IE with a length that is set to a value of 2 and with a value of 0000H, the UE shall use the length and the contents of the ABBA IE as received from the network.  NOTE 2: If the UE receives the ABBA IE with a length that is set to a value larger than 2 or with a value that is different from 0000H, the UE shall use the length and the contents of the ABBA IE as received from the network. |

#### 9.11.3.11 void

#### 9.11.3.12 additional 5G security information

the purpose of the additional 5G security information information element is to provide the UE with additional security parameters (e.g horizontal derivation parameter) or to request the UE to retransmit an initial NAS message during a security mode control procedure as defined in 3GPP TS 33.501 [24] the UE uses these parameters for completion of security mode control procedure

the additional 5G security information information element is coded as shown in figure 9.11.3.12.1 and table 9.11.3.12.1

the additional 5G security information is a type 4 information element with a length of 3 octets

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | | 7 | | 6 | | 5 | | 4 | | 3 | | 2 | | 1 | |  | |
| Additional 5G security information IEI | | | | | | | | | | | | | | | | octet 1 | |
| Length of Additional 5G security information contents | | | | | | | | | | | | | | | | octet 2 | |
| 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | RINMR | | HDP | | octet 3 | |

figure 9.11.3.12.1 additional 5G security information information element

table 9.11.3.12.1 additional 5G security information information element

|  |  |  |
| --- | --- | --- |
| Horizontal derivation parameter (HDP) (octet 3, bit 1) | | |
| 0 |  | KAMF derivation is not required |
| 1 |  | KAMF derivation is required |
|  | | |
| Retransmission of initial NAS message request (octet 3, bit 2) | | |
| 0 |  | Retransmission of the initial NAS message not requested |
| 1 |  | Retransmission of the initial NAS message requested |
|  | | |
| Bits 3 to 8 of octet 3 are spare and shall be coded as zero. | | |

#### 9.11.3.12A additional information requested

the purpose of the additional information requested information element is to enable the UE to request ciphering keys for deciphering of ciphered broadcast assistance data

the additional information requested information element is coded as shown in figure 9.11.3.12A.1 and table 9.11.3.12A.1

the additional information requested is a type 4 information element with a length of 3 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Additional information requested IEI | | | | | | | | octet 1 |
| Length of additional information requested contents | | | | | | | | octet 2 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | CipherKey | octet 3 |
| Spare | | | | | | |

figure 9.11.3.12A.1 additional information requested information element

table 9.11.3.12A.1 additional information requested information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Ciphering keys for ciphered broadcast assistance data (CipherKey) (octet 3, bit 1) | | | | |
| Bit | | | | |
| 1 |  |  |  |  |
| 0 |  |  |  | ciphering keys for ciphered broadcast assistance data not requested |
| 1 |  |  |  | ciphering keys for ciphered broadcast assistance data requested |
|  | | | | |
| Bits 8 to 2 of octet 3 are spare and shall be coded as zero. | | | | |

#### 9.11.3.13 allowed PDU session status

the purpose of the allowed PDU session status information element is to indicate to the network user-plane resources of PDU sessions associated with non-3GPP access that are allowed to be re-established over 3GPP access or if there is no PDU session(s) for which the UE allows the user-plane resources to be re-established over 3GPP access

NOTE allowed PDU session status IE is not applicable for MA PDU session(s) in this release of specification

the allowed PDU session status information element is coded as shown in figure 9.11.3.13.1 and table 9.11.3.13.1

the allowed PDU session status is a type 4 information element with minimum length of 4 octets and maximum length of 34 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Allowed PDU session status IEI | | | | | | | | octet 1 |
| Length of Allowed PDU session status contents | | | | | | | | octet 2 |
| PSI  (7) | PSI  (6) | PSI  (5) | PSI  (4) | PSI  (3) | PSI  (2) | PSI  (1) | PSI  (0) | octet 3 |
| PSI  (15) | PSI  (14) | PSI  (13) | PSI  (12) | PSI  (11) | PSI  (10) | PSI  (9) | PSI  (8) | octet 4 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
| Spare | | | | | | | | octet 5\* -34\* |

figure 9.11.3.13.1 allowed PDU session status information element

table 9.11.3.13.1 allowed PDU session status information element

|  |
| --- |
| PSI(x) shall be coded as follows:  PSI(0):  Bit 1 octet 3 is spare and shall be coded as zero.  PSI(1) – PSI(15):  0 indicates that the user-plane resources of corresponding PDU session is not allowed to be re-established over 3GPP access.  1 indicates that the user-plane resources of corresponding PDU session can be re-established over 3GPP access.  If there is no PDU session for which the user-plane resources can be re-established over 3GPP access, all bits in PSI(1) – PSI(15) shall be coded as zero.  All bits in octet 5 to 34 are spare and shall be coded as zero, if the respective octet is included in the information element. |

#### 9.11.3.14 authentication failure parameter

see subclause 10.5.3.2.2 in 3GPP TS 24.008 [12]

#### 9.11.3.15 authentication parameter AUTN

see subclause 10.5.3.1.1 in 3GPP TS 24.008 [12]

#### 9.11.3.16 authentication parameter RAND

see subclause 10.5.3.1 in 3GPP TS 24.008 [12]

#### 9.11.3.17 authentication response parameter

see subclause 9.9.3.4 in 3GPP TS 24.301 [15]

#### 9.11.3.18 configuration update indication

the purpose of the configuration update indication information element is to indicate the additional information associated with the generic UE configuration update procedure

the configuration update indication information element is coded as shown in figure 9.11.3.18.1 and table 9.11.3.18.1

the configuration update indication is a type 1 information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Configuration update indication IEI | | | | 0  Spare | 0  Spare | RED | ACK | octet 1 |

figure 9.11.3.18.1 configuration update indication

table 9.11.3.18.1 configuration update indication

|  |  |
| --- | --- |
| Acknowledgement (ACK) (octet 1, bit 1) | |
| Bit | |
| 1 |  |
| 0 | acknowledgement not requested |
| 1 | acknowledgement requested |
|  | |
| Registration requested (RED) (octet 1, bit 2) | |
| Bit | |
| 2 |  |
| 0 | registration not requested |
| 1 | registration requested |
|  | |
| Bits 3 and 4 are spare and shall be coded as zero, | |

#### 9.11.3.18A CAG information list

the purpose of the CAG information list information element is to provide "CAG information list" or to delete the "CAG information list" at the UE

the CAG information list information element is coded as shown in figures 9.11.3.18A.1 and 9.11.3.18A.2 and table 9.11.3.18A.1

the CAG information list is a type 6 information element with a minimum length of 3 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| CAG information list IEI | | | | | | | | octet 1 |
| Length of CAG information list contents | | | | | | | | octet 2  octet 3 |
| Entry 1 | | | | | | | | octet 4\*  octet a\* |
| Entry 2 | | | | | | | | octet a+1\*  octet b\* |
| … | | | | | | | | octet b+1\*  octet g\* |
| Entry n | | | | | | | | octet g+1\*  octet h\* |

figure 9.11.3.18A.1 CAG information list information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of entry contents | | | | | | | | octet q |
| MCC digit 2 | | | | MCC digit 1 | | | | octet q+1 |
| MNC digit 3 | | | | MCC digit 3 | | | | octet q+2 |
| MNC digit 2 | | | | MNC digit 1 | | | | octet q+3 |
| 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | CAG  only | octet q+4 |
| CAG-ID 1 | | | | | | | | octet q+5\*  octet q+8\* |
| CAG-ID 2 | | | | | | | | octet q+9\*  octet q+12\* |
| … | | | | | | | | octet q+13\*  octet q+4m\* |
| CAG-ID m | | | | | | | | octet q+4m+1\*  octet q+4m+4\* |

figure 9.11.3.18A.2 entry n

table 9.11.3.18A.1 CAG information list information element

|  |  |
| --- | --- |
| MCC, Mobile country code (octet q+1 and bits 1 to 4 octet q+2)  The MCC field is coded as in ITU-T Recommendation E.212 [42], annex A. | |
|  | |
| MNC, Mobile network code (bits 5 to 8 of octet q+2 and octet q+3)  The coding of this field is the responsibility of each administration, but BCD coding shall be used. The MNC shall consist of 2 or 3 digits. If a network operator decides to use only two digits in the MNC, bits 5 to 8 of octet q+2 shall be coded as "1111". | |
|  | |
| The MCC and MNC digits are coded as octets 6 to 8 of the Temporary mobile group identity IE in figure 10.5.154 of 3GPP TS 24.008 [12]. | |
|  | |
| Indication that the UE is only allowed to access 5GS via CAG cells (CAGonly) (bit 1 of octet q+4) | |
| Bit | |
| 1 |  |
| 0 | "Indication that the UE is only allowed to access 5GS via CAG cells" is not set (i.e., the UE is allowed to access 5GS via non-CAG cells) |
| 1 | "Indication that the UE is only allowed to access 5GS via CAG cells" is set (i.e., the UE is not allowed to access 5GS via non-CAG cells) |
|  | |
| CAG-ID m (octet q+4m+1 to octet q+4m+4)  This field contains the 32 bit CAG-ID. The coding of the CAG-ID is defined as the CAG-Identifier in 3GPP TS 23.003 [4].  NOTE 1: The Length of CAG information list contents shall be 0 if no subscription data for CAG information list exists.  NOTE 2: The Length of entry contents shall be 4 if there is no allowed CAG-ID for the PLMN.  NOTE 3: Bit 2 in octet q+4 may be set to 1 in the USIM (see 3GPP TS 31.102 [22]).  NOTE 4: For a given PLMN ID, there shall be up to one Entry containing the MCC value and the MNC value of the PLMN ID. | |

#### 9.11.3.18B CIoT small data container

this information element is used to encapsulate the CIoT user data SMS or location services message with a size that is not more than 254 octets between the UE and the AMF when the UE is using control plane CIoT 5GS optimization the CIoT small data container information element is coded as shown in figure 9.11.3.18B.1 figure 9.11.3.18B.2 figure 9.11.3.18B.3 figure 9.11.3.18B.4 and table 9.11.3.18B.1

the CIoT small data container is a type 4 information element with a minimum length of 4 octets and a maximum length of 257 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| CIoT small data container IEI | | | | | | | | octet 1 |
| Length of CIoT small data container contents | | | | | | | | octet 2 |
|  | | | | | | | | octet 3 |
| CIoT small data container contents | | | | | | | |  |
|  | | | | | | | | octet 257 |

figure 9.11.3.18B.1 CIoT small data container information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Data type | | | DDX | | PDU session identity | | | octet 3 |
| Data contents | | | | | | | | octet 4  octet 257 |

figure 9.11.3.18B.2 CIoT small data container contents for data type "Control plane user data"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Data type | | | DDX | | 0  Spare | 0  Spare | 0  Spare | octet 3 |
| Length of additional information | | | | | | | | octet 4 |
| Additional information | | | | | | | | octet 5\*  octet m\* |
| Data contents | | | | | | | | octet m+1  octet n |

figure 9.11.3.18B.3 CIoT small data container contents for data type "Location services message container"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Data type | | |  | | Spare | | | octet 3 |
| Data contents | | | | | | | | octet 4  octet n |

figure 9.11.3.18B.4 CIoT small data container contents for data type "SMS"

table 9.11.3.18B.1 CIoT small data container information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| CIoT small data container contents (octet 3 to octet 257) | | | | |
|  | | | | |
| These octets include user data to be delivered between UE and AMF. | | | | |
|  | | | | |
| Data type (octet 3, bits 6 to 8)  Bits | | | | |
| 8 | 7 | 6 |  |  |
| 0 | 0 | 0 |  | Control plane user data |
| 0 | 0 | 1 |  | SMS |
| 0 | 1 | 0 |  | Location services message container |
|  | | | | |
| All other values are spare. If received they shall be ignored. | | | | |
|  | | | | |
| When the Data type is "Control plane user data ", the PDU session identity and Downlink data expected (DDX) fields are encoded as follows: | | | | |
|  | | | | |
| PDU session identity (octet 3, bits 1 to 4)  Bit | | | | |
| 3 | 2 | 1 |  |  |
| 0 | 0 | 0 |  | No PDU session identity assigned |
| 0 | 0 | 1 |  | PDU session identity value 1 |
| 0 | 1 | 0 |  | PDU session identity value 2 |
| 0 | 1 | 1 |  | PDU session identity value 3 |
| 1 | 0 | 0 |  | PDU session identity value 4 |
| 1 | 0 | 1 |  | PDU session identity value 5 |
| 1 | 1 | 0 |  | PDU session identity value 6 |
| 1 | 1 | 1 |  | PDU session identity value 7 |
|  | | | | |
|  | | | | |
| Downlink data expected (DDX) (octet 3, bits 5 to 6) | | | | |
| Bits | | | | |
| 5 | 4 |  | | |
| 0 | 0 | No information available | | |
| 0 | 1 | No further uplink and no further downlink data transmission subsequent to the uplink data transmission is expected | | |
| 1 | 0 | Only a single downlink data transmission and no further uplink data transmission subsequent to the uplink data transmission is expected | | |
| 1 | 1 | reserved | | |
|  | | | | |
| NOTE: The DDX field is only used in the UE to network direction. | | | | |
|  | | | | |
| Data contents (octet 4 to octet 257)  This field contains the control plane user data. | | | | |
|  | | | | |
| When the Data type is "SMS", Bits 1 to 5 of octet 3 are spare and shall be coded as zero. | | | | |
| Data contents (octet 4 to octet 257)  This field contains an SMS message.  When the Data type is "Location services message container":  Downlink data expected (DDX) (octet 3, bits 5 to 4)  This field is encoded as described above for the case when the Data type is "Control plane user data".  Bits 3 to 1 of octet 3 are spare and shall be encoded as zero.  Length of Additional information (octet 4) (see NOTE)  Indicates the length, in octets, of the Additional information field.  Additional information (octets 5 to m)  Contains additional information if provided by the upper layer location services application.  Data contents (octets m+1 to n)  Contains the location services message payload. | | | | |
|  | | | | |
| NOTE: The Length of Additional information shall be set to zero if the upper layer location service application does not provide routing information. | | | | |

#### 9.11.3.18C ciphering key data

the purpose of the ciphering key data information element is to transfer a list of ciphering data sets from the network to the UE for deciphering of ciphered assistance data

the ciphering key data information element is coded as shown in figure 9.11.3.18C.1 figure 9.11.3.18C.2 and table 9.11.3.18C.1

the ciphering key data is a type 6 information element with a minimum length of 34 octets and a maximum length of 2675 octets the list can contain a maximum of 16 ciphering data sets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Ciphering key data IEI | | | | | | | | octet 1 |
| Length of ciphering key data contents | | | | | | | | octet 2  octet 3 |
| Ciphering data set 1 | | | | | | | | octet 4  octet i |
| Ciphering data set 2 | | | | | | | | octet i+1\*  octet l\* |
| … | | | | | | | | octet l+1\*  octet m\* |
| Ciphering data set p | | | | | | | | octet m+1\*  octet n\* |

figure 9.11.3.18C.1 ciphering key data information element

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | | 7 | | 6 | | 5 | | 4 | | 3 | | 2 | | 1 | |  | |
| Ciphering set ID | | | | | | | | | | | | | | | | octet 1  octet 2 | |
| Ciphering key | | | | | | | | | | | | | | | | octet 3  octet 18 | |
| 0 | | 0 | | 0 | | c0 length | | | | | | | | | | octet 19 | |
| Spare | | | | | |
| c0 | | | | | | | | | | | | | | | | octet 20  octet k | |
| 0 | | 0 | | 0 | | 0 | | E-UTRA posSIB length | | | | | | | | octet k+1 | |
| Spare | | | | | | | |  | |
| PosSIBType1-1 | | PosSIBType1-2 | | PosSIBType1-3 | | PosSIBType1-4 | | PosSIBType1-5 | | PosSIBType1-6 | | PosSIBType1-7 | | PosSIBType1-8 | | octet k+2  octet k+3 | |
| PosSIBType2-1 | | PosSIBType2-2 | | PosSIBType2-3 | | PosSIBType2-4 | | PosSIBType2-5 | | PosSIBType2-6 | | PosSIBType2-7 | | PosSIBType2-8 | |
| PosSIBType2-9 | | PosSIBType2-10 | | PosSIBType2-11 | | PosSIBType2-12 | | PosSIBType2-13 | | PosSIBType2-14 | | PosSIBType2-15 | | PosSIBType2-16 | |
| PosSIBType2-17 | | PosSIBType2-18 | | PosSIBType2-19 | | PosSIBType2-20 | | PosSIBType2-21 | | PosSIBType2-22 | | PosSIBType2-23 | | PosSIBType2-24 | |
| PosSIBType2-25 | | PosSIBType3-1 | | PosSIBType4-1 | | PosSIBType5-1 | | PosSIBType1-9 | | PosSIBType1-10e | | 0  Spare | | 0  Spare | | octet p | |
| 0 | | 0 | | 0 | | 0 | | NR posSIB length | | | | | | | | octet p+1 | |
| Spare | | | | | | | |  | |
| PosSIBType1-1 | | PosSIBType1-2 | | PosSIBType1-3 | | PosSIBType1-4 | | PosSIBType1-5 | | PosSIBType1-6 | | PosSIBType1-7 | | PosSIBType1-8 | | octet p+2  octet p+3 | |
| PosSIBType2-1 | | PosSIBType2-2 | | PosSIBType2-3 | | PosSIBType2-4 | | PosSIBType2-5 | | PosSIBType2-6 | | PosSIBType2-7 | | PosSIBType2-8 | |
| PosSIBType2-9 | | PosSIBType2-10 | | PosSIBType2-11 | | PosSIBType2-12 | | PosSIBType2-13 | | PosSIBType2-14 | | PosSIBType2-15 | | PosSIBType2-16 | |
| PosSIBType2-17 | | PosSIBType2-18 | | PosSIBType2-19 | | PosSIBType2-20 | | PosSIBType2-21 | | PosSIBType2-22 | | PosSIBType2-23 | | PosSIBType3-1 | |
| PosSIBType4-1 | | PosSIBType5-1 | | PosSIBType6-1 | | PosSIBType6-2 | | PosSIBType6-3 | | PosSIBType6-4 | | PosSIBType6-5 | | PosSIBType6-6 | |
| PosSIBType1-9 | | PosSIBType1-10 | | PosSIBType2-24 | | PosSIBType2-25 | | 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | octet q | |
| Validity start time | | | | | | | | | | | | | | | | octet q+1  octet q+5 | |
| Validity duration | | | | | | | | | | | | | | | | octet q+6  octet q+7 | |
| TAIs list | | | | | | | | | | | | | | | | octet q+8  octet r | |

figure 9.11.3.18C.2 ciphering data set

table 9.11.3.18C.1 ciphering key data information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Value part of the Ciphering key data information element (octets 4 to n) | | | | |
|  | | | | |
| The value part of the Ciphering key data information element consists of one or several ciphering data sets. | | | | |
| The UE shall store the complete list received. If more than 16 ciphering data sets are included in this information element, the UE shall store the first 16 ciphering data sets and ignore the remaining octets of the information element. | | | | |
|  | | | | |
|  | | | | |
| Ciphering data set: | | | | |
|  | | | | |
| Ciphering set ID (octets 1 to 2) | | | | |
|  | | | | |
| This field contains the binary encoding of the ID identifying the ciphering set. | | | | |
|  | | | | |
| Ciphering key (octets 3 to octet 18) | | | | |
|  | | | | |
| This field contains the 128 bit ciphering key. | | | | |
|  | | | | |
| c0 length (octet 19, bits 5 to 1)  This field contains the binary encoding of the length, in octets, of the c0 counter. The maximum value for the length of the c0 counter is 16 octets. | | | | |
|  | | | | |
| Bits 8 to 6 of octect 19 are spare and shall be coded as zero. | | | | |
|  | | | | |
|  | | | | |
| c0 (octets 20 to k) | | | | |
|  | | | | |
| This field contains the binary encoding of the c0 counter. | | | | |
|  | | | | |
|  | | | | |
| E-UTRA posSIB length (octet k+1, bits 4 to 1)  This field contains the length in octets of the E -UTRA Positioning SIB types. A length of zero means E -UTRA Positioning SIB types are not included (see NOTE).  E-UTRA Positioning SIB types for which the ciphering data set is applicable (octets k+2 to p). Unassigned bits shall be ignored by a UE. Non-included bits shall be assumed to be zero by a UE. | | | | |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 1-1 (octet k+2, bit 8) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 1-1 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 1-1 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 1-2 (octet k+2, bit 7) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 1-2 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 1-2 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 1-3 (octet k+2, bit 6) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 1-3 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 1-3 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 1-4 (octet k+2, bit 5) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 1-4 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 1-4 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 1-5 (octet k+2, bit 4) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 1-5 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 1-5 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 1-6 (octet k+2, bit 3) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 1-6 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 1-6 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 1-7 (octet k+2, bit 2) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 1-7 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 1-7 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 1-8 (octet k+2, bit 1) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 1-8 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 1-8 |
|  | | | | |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-1 (octet k+3, bit 8) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-1 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-1 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-2 (octet k+3, bit 7) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-2 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-2 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-3 (octet k+3, bit 6) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-3 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-3 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-4 (octet k+3, bit 5) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-4 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-4 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-5 (octet k+3, bit 4) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-5 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-5 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-6 (octet k+3, bit 3) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-6 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-6 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-7 (octet k+3, bit 2) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-7 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-7 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-8 (octet k+3, bit 1) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-8 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-8 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-9 (octet k+4, bit 8) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-9 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-9 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-10 (octet k+4, bit 7) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-10 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-10 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-11 (octet k+4, bit 6) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-11 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-11 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-12 (octet k+4, bit 5) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-12 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-12 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-13 (octet k+4, bit 4) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-13 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-13 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-14 (octet k+4, bit 3) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-14 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-14 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-15 (octet k+4, bit 2) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-15 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-15 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-16 (octet k+4, bit 1) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-16 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-16 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-17 (octet k+5, bit 8) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-17 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-17 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-18 (octet k+5, bit 7) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-18 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-18 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-19 (octet k+5, bit 6) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-19 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-19 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-20 (octet k+5, bit 5) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-20 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-20 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-21 (octet k+5, bit 4) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-21 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-21 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-22 (octet k+5, bit 3) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-22 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-22 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-23 (octet k+5, bit 2) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-23 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-23 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-24 (octet k+5, bit 1) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-24 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-24 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-25 (octet k+6, bit 8) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-25 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-25 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 3-1 (octet k+6, bit 7) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 3-1 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 3-1 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 4-1 (octet k+6, bit 6) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 4-1 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 4-1 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 5-1 (octet k+6, bit 5) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 5-1 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 5-1 |
| Ciphering data set applicable for positioning SIB type 1-9 (octet k+6, bit 4) | | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 1-9 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 1-9 |
| Ciphering data set applicable for positioning SIB type 1-10 (octet k+6, bit 3) | | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 1-10 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 1-10 |
|  | | | | |
| Any unassigned bits shall be coded as zero. | | | | |
|  | | | | |
|  | | | | |
| NR posSIB length (octet p+1, bits 4 to 1)  This field contains the length in octets of the NR Positioning SIB types. A length of zero means NR Positioning SIB types are not included (see NOTE).  NR Positioning SIB types for which the ciphering data set is applicable (octets p+2 to q). Unassigned bits shall be ignored. Non-included bits shall be assumed to be zero. | | | | |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 1-1 (octet p+2, bit 8) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 1-1 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 1-1 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 1-2 (octet p+2, bit 7) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 1-2 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 1-2 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 1-3 (octet p+2, bit 6) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 1-3 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 1-3 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 1-4 (octet p+2, bit 5) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 1-4 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 1-4 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 1-5 (octet p+2, bit 4) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 1-5 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 1-5 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 1-6 (octet p+2, bit 3) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 1-6 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 1-6 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 1-7 (octet p+2, bit 2) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 1-7 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 1-7 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 1-8 (octet p+2, bit 1) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 1-8 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 1-8 |
|  | | | | |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-1 (octet p+3, bit 8) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-1 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-1 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-2 (octet p+3, bit 7) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-2 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-2 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-3 (octet p+3, bit 6) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-3 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-3 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-4 (octet p+3, bit 5) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-4 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-4 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-5 (octet p+3, bit 4) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-5 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-5 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-6 (octet p+3, bit 3) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-6 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-6 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-7 (octet p+3, bit 2) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-7 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-7 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-8 (octet p+3, bit 1) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-8 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-8 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-9 (octet p+4, bit 8) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-9 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-9 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-10 (octet p+4, bit 7) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-10 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-10 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-11 (octet p+4, bit 6) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-11 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-11 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-12 (octet p+4, bit 5) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-12 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-12 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-13 (octet p+4, bit 4) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-13 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-13 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-14 (octet p+4, bit 3) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-14 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-14 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-15 (octet p+4, bit 2) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-15 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-15 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-16 (octet p+4, bit 1) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-16 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-16 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-17 (octet p+5, bit 8) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-17 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-17 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-18 (octet p+5, bit 7) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-18 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-18 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-19 (octet p+5, bit 6) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-19 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-19 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-20 (octet p+5, bit 5) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-20 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-20 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-21 (octet p+5, bit 4) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-21 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-21 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-22 (octet p+5, bit 3) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-22 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-22 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 2-23 (octet p+5, bit 2) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-23 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-23 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 3-1 (octet p+5, bit 1) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 3-1 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 3-1 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 4-1 (octet p+6, bit 8) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 4-1 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 4-1 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 5-1 (octet p+6, bit 7) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 5-1 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 5-1 |
|  | | | | |
| Ciphering data set applicable for positioning SIB type 6-1 (octet p+6, bit 6) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 6-1 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 6-1 |
| Ciphering data set applicable for positioning SIB type 6-2 (octet p+6, bit 5) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 6-2 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 6-3 |
| Ciphering data set applicable for positioning SIB type 6-3 (octet p+6, bit 4) | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 6-3 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 6-3 |
| Ciphering data set applicable for positioning SIB type 6-4 (octet p+6, bit 3) | | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 6-4 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 6-4 |
| Ciphering data set applicable for positioning SIB type 6-5 (octet p+6, bit 2) | | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 6-5 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 6-5 |
| Ciphering data set applicable for positioning SIB type 6-6 (octet p+6, bit 1) | | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 6-6 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 6-6 |
| Ciphering data set applicable for positioning SIB type 1-9 (octet p+7, bit 8) | | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 1-9 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 1-9 |
| Ciphering data set applicable for positioning SIB type 1-10 (octet p+7, bit 7) | | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 1-10 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 1-10 |
| Ciphering data set applicable for positioning SIB type 2-24 (octet p+7, bit 6) | | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-24 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-24 |
| Ciphering data set applicable for positioning SIB type 2-25 (octet p+7, bit 5) | | | | | |
| 0 |  |  |  | Ciphering data set not applicable to positioning SIB type 2-25 |
| 1 |  |  |  | Ciphering data set applicable to positioning SIB type 2-25 |
|  | | | | |
| Any unassigned bits shall be coded as zero. | | | | |
|  | | | | |
|  | | | | |
| Validity start time (octets q+1 to q+5) | | | | |
|  | | | | |
| This field contains the UTC time when the ciphering data set becomes valid, encoded as octets 2 to 6 of the Time zone and time IE specified in 3GPP TS 24.008 [12]. | | | | |
|  | | | | |
|  | | | | |
| Validity duration (octets q+6 to q+7) | | | | |
|  | | | | |
| This field contains the duration for which the ciphering data set is valid after the validity start time, in units of minutes. | | | | |
|  | | | | |
|  | | | | |
| TAIs list (octets q+8 to r) | | | | |
|  | | | | |
| This field contains the list of tracking areas for which the ciphering data set is applicable, encoded as octets 2 to n of the Tracking area identity list IE as specified in subclause 9.11.3.9. If the TAIs list is empty (as indicated by a zero length), the ciphering data set is applicable to the entire serving PLMN.  NOTE: The ciphering data set is always applicable to at least one of the E -UTRA Positioning SIB types or the NR Positioning SIB types. | | | | |

#### 9.11.3.18D control plane service type

the purpose of the control plane service type information element is to specify the purpose of the CONTROL PLANE SERVICE REQUEST message

the control plane service type information element is coded as shown in figure 9.11.3.18D.1 and table 9.11.3.18D.1

the control plane service type is a type 1 information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Control plane service type  IEI | | | | 0  Spare | Control plane service type  value | | | octet 1 |

figure 9.9.3.18D.1 control plane service type information element

table 9.9.3.18D.1 control plane service type information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Control plane service type value (octet 1, bit 1 to 3) | | | | |
|  | | | | |
| Bits | | | | |
| 3 | 2 | 1 |  |  |
| 0 | 0 | 0 |  | mobile originating request |
| 0 | 0 | 1 |  | mobile terminating request |
| 0 | 1 | 0 |  | emergency services |
| 0 | 1 | 1 |  | emergency services fallback |
| 1 | 0 | 0 |  |  |
|  | to |  |  | unused; shall be interpreted as " mobile originating request", if received by the network. |
| 1 | 1 | 1 |  |  |
|  | | | | |
|  | | | | |

#### 9.11.3.19 daylight saving time

see subclause 10.5.3.12 in 3GPP TS 24.008 [12]

#### 9.11.3.20 De-registration type

the purpose of the De-registration type information element is to indicate the type of de-registration

the De-registration type information element is coded as shown in figure 9.11.3.20.1 and table 9.11.3.20.1

the De-registration type is a type 1 information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| De-registration type  IEI | | | | Switch  off | Re-registration required | Access type | | octet 1 |

figure 9.11.3.20.1 deregistration type information element

table 9.11.3.20.1 deregistration type information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Switch off (octet 1, bit 4) | | | | |
| In the UE to network direction: | | | | |
| Bit | | | | |
| 4 |  |  |  |  |
| 0 |  |  |  | Normal de-registration |
| 1 |  |  |  | Switch off |
|  | | | | |
| In the network to UE direction bit 4 is spare. The network shall set this bit to zero. | | | | |
|  | | | | |
| Re-registration required (octet 1, bit 3) | | | | |
|  | | | | |
| In the network to UE direction: | | | | |
| Bit | | | | |
| 3 |  |  |  |  |
| 0 |  |  |  | re-registration not required |
| 1 |  |  |  | re-registration required |
|  | | | | |
| In the UE to network direction bit 3 is spare. The UE shall set this bit to zero. | | | | |
|  | | | | |
| Access type (octet 1,bit 2, bit 1) | | | | |
| Bit | | | | |
| 2 | 1 |  |  |  |
| 0 | 1 |  |  | 3GPP access |
| 1 | 0 |  |  | Non-3GPP access |
| 1 | 1 |  |  | 3GPP access and non-3GPP access |
|  | | | | |
| All other values are reserved. | | | | |

#### 9.11.3.21 void

#### 9.11.3.22 void

#### 9.11.3.23 emergency number list

see subclause 10.5.3.13 in 3GPP TS 24.008 [12]

#### 9.11.3.23A EPS bearer context status

see subclause 9.9.2.1 in 3GPP TS 24.301 [15]

#### 9.11.3.24 EPS NAS message container

the purpose of the EPS NAS message container information element is to transport an EPS NAS message as specified in 3GPP TS 24.301 [15]

the EPS NAS message container information element is coded as shown in figure 9.11.3.24.1 and table 9.11.3.24.1

the EPS NAS message container is a type 6 information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| EPS NAS message container IEI | | | | | | | | octet 1 |
| Length of EPS NAS message container contents | | | | | | | | octet 2  octet 3 |
| EPS NAS message container | | | | | | | | octet 4  octet n |

figure 9.11.3.24.1 EPS NAS message container information element

table 9.11.3.24.1 EPS NAS message container information element

|  |
| --- |
| EPS NAS message container (octet 4 to n) |
| An EPS NAS message as specified in 3GPP TS 24.301 [15]. |

#### 9.11.3.25 EPS NAS security algorithms

see subclause 9.9.3.23 in 3GPP TS 24.301 [15]

#### 9.11.3.26 extended emergency number list

see subclause 9.9.3.37A in 3GPP TS 24.301 [15]

#### 9.11.3.26A extended DRX parameters

see subclause 10.5.5.32 in 3GPP TS 24.008 [12]

#### 9.11.3.27 void

#### 9.11.3.28 IMEISV request

see subclause 10.5.5.10 in 3GPP TS 24.008 [12]

#### 9.11.3.29 LADN indication

the purpose of the LADN indication information element is to request the network for LADN information for specific LADN DNN(s) or to indicate a request for LADN information

the LADN indication information element is coded as shown in figure 9.11.3.29.1 and table 9.11.3.29.1

the LADN indication is a type 6 information element with a minimum length of 3 octets and a maximum length of 811 octets

the LADN indication information element can contain a minimum of 0 and a maximum of 8 different LADN DNN values

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| LADN indication IEI | | | | | | | | octet 1 |
| Length of LADN indication contents | | | | | | | | octet 2  octet 3 |
| LADN DNN value 1 | | | | | | | | octet 4\*  octet a\* |
| LADN DNN value 2 | | | | | | | | octet a+1\*  octet b\* |
| … | | | | | | | | octet b+1\*  octet g\* |
| LADN DNN value n | | | | | | | | octet g+1\*  octet h\* |

figure 9.11.3.29.1 LADN indication information element

table 9.11.3.29.1 LADN indication information element

|  |
| --- |
| Value part of the LADN indication information element (octet 4 to h):  The value part of the LADN indication information element consists of zero or more LADN DNN values. If the LADN indication information element conveys more than 8 LADN DNN values in this information element, the network shall consider the first 8 LADN DNN values and ignore the remaining octets of the information element.  LADN DNN value:  LADN DNN value is coded as the length and value part of DNN information element as specified in subclause 9.11.2.1B starting with the second octet. |

#### 9.11.3.30 LADN information

the purpose of the LADN information information element is to provide the UE with the LADN service area for each available LADN in the current registration area or to delete the LADN information at the UE

the LADN information information element is coded as shown in figure 9.11.3.30.1 figure 9.11.3.30.2 and table 9.11.3.30.1

the LADN information is a type 6 information element with a minimum length of 3 octets and a maximum length of 1715 octets

the LADN information information element can contain a minimum of 0 and a maximum of 8 different LADNs each including a DNN and a 5GS tracking area identity list

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| LADN information IEI | | | | | | | | octet 1 |
| Length of LADN information contents | | | | | | | | octet 2  octet 3 |
| LADN 1 | | | | | | | | octet 4  octet a |
| LADN 2 | | | | | | | | octet a+1\*  octet b\* |
| … | | | | | | | | octet b+1\*  octet g\* |
| LADN n | | | | | | | | octet g+1\*  octet h\* |

figure 9.11.3.30.1 LADN information information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of DNN value | | | | | | | | octet 4 |
| DNN value | | | | | | | | octet 5  octet m |
| 5GS tracking area identity list | | | | | | | | octet m+1  octet a |

figure 9.11.3.30.2 LADN

table 9.11.3.30.1 LADN information information element

|  |
| --- |
| Value part of the LADN information information element (octet 4 to octet h)  The value part of the LADN information information element consists of one or several LADNs. Each LADN (e.g. octet 4 to octet a) consists one DNN value and one 5GS tracking area identity list. The length of each LADN is determined by the length of DNN value field and the length of 5GS tracking area identity list field.  The UE shall store the complete list as received. If more than 8 LADNs are included in this information element, the UE shall store the first 8 LADNs and ignore the remaining octets of the information element.  DNN value (octet 5 to octet m):  DNN value field is coded as DNN value part of DNN information element as specified in subclause 9.11.2.1B starting with the third octet. |
| 5GS tracking area identity list (octet m+1 to octet a): |
| 5GS tracking area identity list field is coded as the length and the value part of the 5GS Tracking area identity list information element as specified in subclause 9.11.3.9 starting with the second octet. |

#### 9.11.3.31 MICO indication

the purpose of the MICO indication information element is to indicate the use of MICO mode or the re-negotiation of MICO mode

the MICO indication information element is coded as shown in figure 9.11.3.31.1 and table 9.11.3.31.1

the MICO indication is a type 1 information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| MICO indication IEI | | | | 0  Spare | 0  Spare | SPRTI | RAAI | octet 1 |

figure 9.11.3.31.1 MICO indication

table 9.11.3.31.1 MICO indication

|  |  |
| --- | --- |
| Registration Area Allocation Indication (RAAI) (octet 1, bit 1) | |
|  | |
| In the network to UE direction: | |
| Bit | |
| 1 |  | |
| 0 | all PLMN registration area not allocated |
| 1 | all PLMN registration area allocated |
| In the UE to network direction bit 1 is spare. The UE shall set this bit to zero. | |
| Strictly Periodic Registration Timer Indication (SPRTI) (octet 1, bit 2) | |
|  | |
| In the network to UE and the UE to network direction: | |
| Bit | |
| 2 |  | |
| 0 | strictly periodic registration timer not supported |
| 1 | strictly periodic registration timer supported |
|  | |
| Bits 3 and 4 are spare and shall be coded as zero.  NOTE: In the network to UE direction in the CONFIGURATION UPDATE COMMAND message, bits 1 and 2 shall be coded as zero. | |

#### 9.11.3.31A MA PDU session information

the purpose of the MA PDU session information information element is to convey the MA-related information for the PDU session

the MA PDU session information information element is coded as shown in figure 9.11.3.31A.1 and table 9.11.3.31A.1

the MA PDU session information is a type 1 information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| MA PDU session information IEI | | | | MA PDU session information value | | | | octet 1 |

figure 9.11.3.31A.1 MA PDU session information information element

table 9.11.3.31A.1 MA PDU session information information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| MA PDU session information value (octet 1, bit 1 to bit 4) | | | | |
|  | | | | |
| Bits | | | | |
| 4 | 3 | 2 | 1 |  |
| 0 | 0 | 0 | 0 | No additional information |
| 0 | 0 | 0 | 1 | MA PDU session network upgrade is allowed |
| All other values are spare. If received they shall be ignored. | | | | |

#### 9.11.3.31B mapped NSSAI

the purpose of the mapped NSSAI information element is to transfer S-NSSAI(s) applicable in the HPLMN to the visited PLMN

the mapped NSSAI information element is coded as shown in figure 9.11.3.31B.1 figure 9.11.3.31B.2 and table 9.11.3.31B.1

the mapped NSSAI is a type 4 information element with a minimum length of 4 octets and a maximum length of 42 octets

NOTE 1 the total number of S-NSSAI values in a requested mapped NSSAI cannot exceed eight

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Mapped NSSAI IEI | | | | | | | | octet 1 |
| Length of Mapped NSSAI contents | | | | | | | | octet 2 |
| Mapped S-NSSAI content 1 | | | | | | | | octet 3  octet m |
| Mapped S-NSSAI content 2 | | | | | | | | octet m+1\*  octet n\* |
| … | | | | | | | | octet n+1\*  octet u\* |
| Mapped S-NSSAI content n | | | | | | | | octet u+1\*  octet v\* |

figure 9.11.3.31B.1 mapped NSSAI information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of Mapped S-NSSAI content | | | | | | | | octet 3 |
| Mapped HPLMN SST | | | | | | | | octet 4 |
| Mapped HPLMN SD | | | | | | | | octet 5\*  octet 7\* |

figure 9.11.3.31B.2 mapped S-NSSAI content

table 9.11.3.31B.1 mapped NSSAI information element

|  |
| --- |
| Value part of the Mapped NSSAI information element (octet 3 to v)  The value part of the Mapped NSSAI information element consists of one or more mapped S-NSSAI contents.  Mapped S-NSSAI content:  Length of S-NSSAI contents (octet 3)  Mapped HPLMN Slice/service type (SST) (octet 4)  This field contains the 8 bit SST value of an S-NSSAI in the S-NSSAI(s) of the HPLMN to which the SST value is mapped. The coding of the SST value part is defined in 3GPP TS 23.003 [4].  NOTE 1: Octet 4 (i.e. mapped HPLMN SST) shall always be included.  Mapped HPLMN Slice differentiator (SD) (octet 5 to octet 7)  This field contains a 24-bit SD value of an S-NSSAI in the S-NSSAI(s) of the HPLMN to which the SD value is mapped. The coding of the SD value part is defined in 3GPP TS 23.003 [4].  NOTE 2: If the octet 5 is included, then octet 6 and octet 7 shall be included. |

#### 9.11.3.31C mobile station classmark 2

see subclause 10.5.1.6 in 3GPP TS 24.008 [12]

#### 9.11.3.32 NAS key set identifier

the NAS key set identifier is allocated by the network

the NAS key set identifier information element is coded as shown in figure 9.11.3.32.1 and table 9.11.3.32.1

the NAS key set identifier is a type 1 information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| NAS key set identifier IEI | | | | TSC | NAS key set identifier | | | octet 1 |

figure 9.11.3.32.1 NAS key set identifier information element

table 9.11.3.32.1 NAS key set identifier information element

|  |  |  |  |
| --- | --- | --- | --- |
| Type of security context flag (TSC) (octet 1) | | | |
|  | | | |
| Bit | | | |
| 4 |  |  |  |
| 0 |  |  | native security context (for KSIAMF) |
| 1 |  |  | mapped security context (for KSIASME) |
|  | | | |
| TSC does not apply for NAS key set identifier value "111". | | | |
|  | | | |
| NAS key set identifier (octet 1) | | | |
|  | | | |
| Bits | | | |
| 3 | 2 | 1 |  |
| 0 | 0 | 0 |  |
| through | | | possible values for the NAS key set identifier |
| 1 | 1 | 0 |  |
|  |  |  |  |
| 1 | 1 | 1 | no key is available (UE to network); |
|  |  |  | reserved (network to UE) |

#### 9.11.3.33 NAS message container

the purpose of the NAS message container IE is to encapsulate a plain 5GS NAS REGISTRATION REQUEST DEREGISTRATION REQUEST or SERVICE REQUEST message or to encapsulate non-cleartext IEs of a CONTROL PLANE SERVICE REQUEST message

the NAS message container information element is coded as shown in figure 9.11.3.33.1 and table 9.11.3.33.1

the NAS message container is a type 6 information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| NAS message container IEI | | | | | | | | octet 1 |
| Length of NAS message container contents | | | | | | | | octet 2 |
|  | | | | | | | | octet 3 |
|  | | | | | | | | octet 4 |
| NAS message container contents | | | | | | | |  |
|  | | | | | | | | octet n |

figure 9.11.3.33.1 NAS message container information element

table 9.11.3.33.1 NAS message container information element

|  |
| --- |
| NAS message container contents (octet 4 to octet n); Max value of 65535 octets |
|  |
| This IE can contain a REGISTRATION REQUEST message as defined in subclause 5.5.1, DEREGISTRATION REQUEST message as defined in subclause 5.5.2.2.1, or a SERVICE REQUEST message as defined in subclause 5.6.1, or non-cleartext IEs of a CONTROL PLANE SERVICE REQUEST message as defined in subclause 5.6.1. |

#### 9.11.3.34 NAS security algorithms

the purpose of the NAS security algorithms information element is to indicate the 5G algorithms to be used for ciphering and integrity protection

the NAS security algorithms information element is coded as shown in figure 9.11.3.34.1 and table 9.11.3.34.1

the NAS security algorithms is a type 3 information element with a length of 2 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| NAS security algorithms IEI | | | | | | | | octet 1 |
| Type of ciphering algorithm | | | | Type of integrity protection algorithm | | | | octet 2 |

figure 9.11.3.34.1 NAS security algorithms information element

table 9.11.3.34.1 NAS security algorithms information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Type of integrity protection algorithm (octet 2, bit 1 to 3) | | | | |
| Bits | | | | |
| 4 | 3 | 2 | 1 |  |
| 0 | 0 | 0 | 0 | 5G integrity algorithm 5G-IA0 (null integrity protection algorithm) |
| 0 | 0 | 0 | 1 | 5G integrity algorithm 128-5G-IA1 |
| 0 | 0 | 1 | 0 | 5G integrity algorithm 128-5G-IA2 |
| 0 | 0 | 1 | 1 | 5G integrity algorithm 128-5G-IA3 |
| 0 | 1 | 0 | 0 | 5G integrity algorithm 5G-IA4 |
| 0 | 1 | 0 | 1 | 5G integrity algorithm 5G-IA5 |
| 0 | 1 | 1 | 0 | 5G integrity algorithm 5G-IA6 |
| 0 | 1 | 1 | 1 | 5G integrity algorithm 5G-IA7 |
|  | | | | |
| All other values are reserved. | | | | |
|  | | | | |
| Type of ciphering algorithm (octet 2, bit 5 to 7) | | | | |
| Bits | | | | |
| 8 | 7 | 6 | 5 |  |
| 0 | 0 | 0 | 0 | 5G encryption algorithm 5G-EA0 (null ciphering algorithm) |
| 0 | 0 | 0 | 1 | 5G encryption algorithm 128-5G-EA1 |
| 0 | 0 | 1 | 0 | 5G encryption algorithm 128-5G-EA2 |
| 0 | 0 | 1 | 1 | 5G encryption algorithm 128-5G-EA3 |
| 0 | 1 | 0 | 0 | 5G encryption algorithm 5G-EA4 |
| 0 | 1 | 0 | 1 | 5G encryption algorithm 5G-EA5 |
| 0 | 1 | 1 | 0 | 5G encryption algorithm 5G-EA6 |
| 0 | 1 | 1 | 1 | 5G encryption algorithm 5G-EA7 |
|  | | | | |
| All other values are reserved. | | | | |

#### 9.11.3.35 network name

see subclause 10.5.3.5a in 3GPP TS 24.008 [12]

#### 9.11.3.36 network slicing indication

the purpose of the network slicing indication information element is to indicate additional information associated with network slicing in the generic UE configuration update procedure and the registration procedure other than the user's configured NSSAI allowed NSSAI pending NSSAI and rejected NSSAI information

the network slicing indication information element is coded as shown in figure 9.11.3.36.1 and table 9.11.3.36.1

the network slicing indication is a type 1 information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Network slicing indication IEI | | | | 0  Spare | 0  Spare | DCNI | NSSCI | octet 1 |

figure 9.11.3.36.1 network slicing indication

table 9.11.3.36.1 network slicing indication

|  |  |
| --- | --- |
| Network slicing subscription change indication (NSSCI) (octet 1, bit 1) | |
| Bit | |
| 1 |  |
| 0 | Network slicing subscription not changed |
| 1 | Network slicing subscription changed |
|  | |
| Default configured NSSAI indication (DCNI) (octet 1, bit 2) | |
| Bit | |
| 2 |  |
| 0 | Requested NSSAI not created from default configured NSSAI |
| 1 | Requested NSSAI created from default configured NSSAI |
|  | |
| In the UE to network direction bit 1 is spare. The UE shall set this bit to zero.  In the network to UE direction bit 2 is spare. The network shall set this bit to zero.  Bits 3 and 4 are spare and shall be coded as zero. | |

#### 9.11.3.36A Non-3GPP NW provided policies

see subclause 10.5.5.37 in 3GPP TS 24.008 [12]

#### 9.11.3.37 NSSAI

the purpose of the NSSAI information element is to identify a collection of S-NSSAIs

the NSSAI information element is coded as shown in figure 9.11.3.37.1 and table 9.11.3.37.1

the NSSAI is a type 4 information element with a minimum length of 4 octets and a maximum length of 146 octets

NOTE more than one S-NSSAIs in an NSSAI can have the same SST values and optionally same SD values which are associated with different mapped HPLMN SST values and optionally mapped HPLMN SD values

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| NSSAI IEI | | | | | | | | octet 1 |
| Length of NSSAI contents | | | | | | | | octet 2 |
| S-NSSAI value 1 | | | | | | | | octet 3  octet m |
| S-NSSAI value 2 | | | | | | | | octet m+1\*  octet n\* |
| … | | | | | | | | octet n+1\*  octet u\* |
| S-NSSAI value n | | | | | | | | octet u+1\*  octet v\* |

figure 9.11.3.37.1 NSSAI information element

table 9.11.3.37.1 NSSAI information element

|  |
| --- |
| Value part of the NSSAI information element (octet 3 to v)  The value part of the NSSAI information element consists of one or more S-NSSAI values. Each S-NSSAI value consists of one S-NSSAI and optionally one mapped S-NSSAI.  The recipient of this information element shall store the complete list received (NOTE 1, NOTE 2, NOTE 3). If the NSSAI information element conveys an allowed NSSAI and more than 8 S-NSSAI values are included in this information element, the UE shall store the first 8 S-NSSAI values and ignore the remaining octets of the information element.  If the NSSAI information element conveys a configured NSSAI (including the default configured NSSAI) or pending NSSAI and more than 16 S-NSSAI values are included in this information element, the UE shall store the first 16 S-NSSAI values and ignore the remaining octets of the information element.  S-NSSAI value:  S-NSSAI value is coded as the length and value part of S-NSSAI information element as specified in subclause 9.11.2.8 starting with the second octet. |
| NOTE 1: The total number of S-NSSAI values in a requested NSSAI shall not exceed eight.  NOTE 2: The number of S-NSSAI values in an allowed NSSAI shall not exceed eight.  NOTE 3: The number of S-NSSAI values in a configured NSSAI (including the default configured NSSAI) or pending NSSAI shall not exceed sixteen. |

#### 9.11.3.37A NSSAI inclusion mode

the purpose of the NSSAI inclusion mode information element is to indicate the NSSAI inclusion mode in which the UE shall operate

the NSSAI inclusion mode is a type 1 information element

the NSSAI inclusion mode information element is coded as shown in figure 9.11.3.37A.1 and table 9.11.3.37A.1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| NSSAI inclusion mode  IEI | | | | 0  spare | 0  spare | NSSAI inclusion mode | | octet 1 |

figure 9.11.3.37A.1 NSSAI inclusion mode information element

table 9.11.3.37A.1 NSSAI inclusion mode information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NSSAI inclusion mode (octet 1, bit 1 to bit 2) | | | | |
|  | | | | |
| Bits | | | | |
| 2 | 1 |  |  |  |
| 0 | 0 |  |  | NSSAI inclusion mode A |
| 0 | 1 |  |  | NSSAI inclusion mode B |
| 1 | 0 |  |  | NSSAI inclusion mode C |
| 1 | 1 |  |  | NSSAI inclusion mode D |

#### 9.11.3.38 Operator-defined access category definitions

the purpose of the Operator-defined access category definitions information element is to provide the UE with the operator-defined access category definitions or to delete the operator-defined access category definitions at the UE

the Operator-defined access category definitions information element is coded as shown in figure 9.11.3.38.1 figure 9.11.3.38.2 and table 9.11.3.38.1

the Operator-defined access category definitions is a type 6 information element with a minimum length of 3 octets and maximum length of 8323 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Operator-defined access category definitions IEI | | | | | | | | octet 1 |
| Length of operator-defined access category definitions contents | | | | | | | | octet 2  octet 3 |
| Operator-defined access category definition 1 | | | | | | | | octet 4\*  octet a\* |
| Operator-defined access category definition 2 | | | | | | | | octet a+1\*  octet b\* |
| … | | | | | | | | octet b+1\*  octet g\* |
| Operator-defined access category definition n | | | | | | | | octet g+1\*  octet h\* |

figure 9.11.3.38.1 Operator-defined access category definitions information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of operator-defined access category definition contents | | | | | | | | octet 4 |
| Precedence value | | | | | | | | octet 5 |
| PSAC | 0  Spare | 0  Spare | Operator-defined access category number | | | | | octet 6 |
| Length of criteria | | | | | | | | octet 7 |
| Criteria | | | | | | | | octet 8  octet a-1 |
| 0  Spare | 0  Spare | 0  Spare | Standardized access category | | | | | octet a\* |

figure 9.11.3.38.2 Operator-defined access category definition

table 9.11.3.38.1 Operator-defined access category definitions information element

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Value part of the Operator-defined access category definitions information element (octet 4 to h)  The value part of the Operator-defined access category definitions information element consists of zero or no more than 32 operator-defined access category definition fields. Each operator-defined access category definition field is coded as described in figure 9.11.3.38.2. The length of each operator-defined access category definition field is determined by the length of operator-defined access category definition contents field. | | | | | | | | | |
| Operator-defined access category definition (octet 4 to octet a): | | | | | | | | | |
| Length of operator-defined access category definition contents (octet 4)  Length of operator-defined access category definition contents indicates binary coded length of the operator-defined access category definition value field (octet 5 to octet a).  Precedence value (octet 5) | | | | | | | | | |
| Bits | | | | | | | | | |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |  |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  | Precedence value 0 |
| to | | | | | | | |  |  |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  | Precedence value 255 |
|  | | | | | | | | | |
| Operator-defined access category number (bits 5 to 1 of octet 6) | | | | | | | | | |
| Bits | | | | | | | | | |
| 5 | 4 | 3 | 2 | 1 |  | | |  | |
| 0 | 0 | 0 | 0 | 0 |  | | | Access category number 32 | |
| to | | | | |  | | |  | |
| 1 | 1 | 1 | 1 | 1 |  | | | Access category number 63 | |
|  | | | | | | | | | |
| Presence of standardized access category (PSAC) (bit 8 of octet 6) | | | | | | | | | |
| PSAC field indicates whether the standardized access category field is present or absent. | | | | | | | | | |
| Bit | | | | | | | | | |
| 8 |  |  | | | | | | | |
| 0 | | Standardized access category field is not included | | | | | | | |
| 1 | | Standardized access category field is included | | | | | | | |
|  | | | | | | | | | |
| Length of criteria (octet 7) | | | | | | | | | |
| Length of criteria field indicates binary coded length of the criteria field. | | | | | | | | | |
|  | | | | | | | | | |
| Criteria (octets 8 to octet a-1) | | | | | | | | | |
| The criteria field contains one or more criteria components fields. Each criteria component field shall be encoded as a sequence of a one octet criteria type field and zero or more octets criteria value field. The criteria type field shall be transmitted first. | | | | | | | | | |
|  | | | | | | | | | |
| Criteria type | | | | | | | | | |
| Bits | | | | | | | | | |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |  |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  | DNN type |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |  | OS id + OS App Id type |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |  | S-NSSAI type |
| All other values are reserved. | | | | | | | | | |
|  | | | | | | | | | |
| For "DNN type", the criteria value field shall be encoded as a sequence of one octet DNN length-value pair count field and one or more DNN length-value pair fields. The DNN length-value pair count field indicates the number of included DNN length-value pair fields. Each DNN length-value pair field is coded as a sequence of one octet DNN value length field and a DNN value field. The DNN value length field indicates the length in octets of the DNN value field. The DNN value field contains an APN as specified in 3GPP TS 23.003 [4]. | | | | | | | | | |
|  | | | | | | | | | |
| For "OS Id + OS App Id type", the criteria value field shall be encoded as a sequence of one octet app id value count field and one or more app id value fields. The app id value count field indicates the number of included app id value fields. Each app id value field is coded as a sequence of a sixteen octet OS id value field, one octet OS app id value length field and an OS app id value field. The OS app id value length field indicates the length in octets of the OS app id value field. The OS id value field contains a Universally Unique IDentifier (UUID) as specified in IETF RFC 4122 [35A]. The OS app id value field contains an OS specific application identifier. Coding of the OS app id value field is outside the scope of the present document. | | | | | | | | | |
|  | | | | | | | | | |
| For "S-NSSAI type", the criteria value field shall be encoded as a sequence of one octet S-NSSAI length-value pair count field and one or more S-NSSAI length-value value fields. The S-NSSAI length-value pair count field indicates the number of included S-NSSAI length-value pair fields. Each S-NSSAI length-value pair field is coded as a sequence of one octet S-NSSAI value length field and an S-NSSAI value field. The S-NSSAI value length field indicates the length in octets of the S-NSSAI value field. The S-NSSAI value field contains one octet SST field optionally followed by three octets SD field. The SST field contains a SST. The SD field contains an SD. SST and SD are specified in 3GPP TS 23.003 [4]. | | | | | | | | | |
|  | | | | | | | | | |
| Standardized access category (bits 5 to 1 of octet a) | | | | | | | | | |
| Standardized access category field indicates the access category number of the standardized access category that is used in combination with the access identities to determine the establishment cause. | | | | | | | | | |
| Bits | | | | | | | | | |
| 5 | 4 | 3 | 2 | 1 |  | | |  | |
| 0 | 0 | 0 | 0 | 0 |  | | | Access category number 0 | |
| to | | | | |  | | |  | |
| 0 | 0 | 1 | 1 | 1 |  | | | Access category number 7 | |
| 0 | 1 | 0 | 0 | 1 |  | | | Access category number 9 | |
| 0 | 1 | 0 | 1 | 0 |  | | | Access category number 10 | |
| All other values are reserved. | | | | | | | | | |

#### 9.11.3.39 payload container

the purpose of the payload container information element is to transport one or multiple payloads if multiple payloads are transported the associated information of each payload are also transported together with the payload

the payload container information element is coded as shown in figure 9.11.3.39.1 figure 9.11.3.39.1A figure 9.11.3.39.1B figure 9.11.3.39.2 figure 9.11.3.39.3 figure 9.11.3.39.4 and table 9.11.3.39.1

the payload container information element is a type 6 information element with a minimum length of 4 octets and a maximum length of 65538 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Payload container IEI | | | | | | | | octet 1 |
| Length of payload container contents | | | | | | | | octet 2 |
|  | | | | | | | | octet 3 |
|  | | | | | | | | octet 4 |
| Payload container contents | | | | | | | |  |
|  | | | | | | | | octet n |

figure 9.11.3.39.1 payload container information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Number of event notification indicators | | | | | | | | octet 4 |
| Event notification indicator 1 | | | | | | | | octet 5  octet j |
| Event notification indicator 2 | | | | | | | | octet j+1\*  octet k\* |
| … | | | | | | | | octet k+1\*  …  octet l\* |
| Event notification indicator n | | | | | | | | octet l+1\*  octet m\* |

figure 9.11.3.39.1A payload container contents with payload container type "Event notification"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Type of event notification indicator n | | | | | | | | octet l+1 |
| Length of event notification indicator n | | | | | | | | octet l+2 |
| Value of event notification indicator n | | | | | | | | octet l+3\*  octet m\* |

figure 9.11.3.39.1B even notification indicator n

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Number of entries | | | | | | | | octet 4 |
| Payload container entry 1 | | | | | | | | octet 5  octet x2 |
| Payload container entry 2 | | | | | | | | octet x2+1  octet x3 |
| …… | | | | | | | | … |
| Payload container entry i | | | | | | | | octet xi +1  octet n |

figure 9.11.3.39.2 payload container contents with payload container type "Multiple payloads"

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | | 4 | 3 | 2 | 1 |  |
| Length of Payload container entry | | | | | | | | | octet xi +1  octet xi +2 |
| Number of optional IEs | | | | Payload container type | | | | | octet xi +3 |
| Optional IE 1 | | | | | | | | | octet xi +4  octet y2 |
| Optional IE 2 | | | | | | | | | octet y2+1  octet y3 |
| … | | | | | | | | |  |
| Optional IE j | | | | | | | | | octet yj+1  octet z |
| Payload container entry contents | | | | | | | | | octet z+1  octet n |

figure 9.11.3.39.3 payload container entry

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Type of optional IE | | | | | | | | octet xi +4 |
| Length of optional IE | | | | | | | | octet xi +5 |
| Value of optional IE | | | | | | | | octet xi +6  octet y2 |

figure 9.11.3.39.4 optional IE

table 9.11.3.39.1 payload container information element

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Payload container contents (octet 4 to octet n); max value of 65535 octets | | | | | | | | | |
| If the payload container type is set to "N1 SM information" and is included in the UL NAS TRANSPORT or DL NAS TRANSPORT message, the payload container contents contain a 5GSM message as defined in subclause 8.3.  If the payload container type is set to "SOR transparent container" and is included in the DL NAS TRANSPORT message, the payload container contents are coded the same way as the contents of the SOR transparent container IE (see subclause 9.11.3.51) for SOR data type is set to value "0" except that the first three octets are not included.  If the payload container type is set to "SOR transparent container" and is included in the UL NAS TRANSPORT message, the payload container contents are coded the same way as the contents of the SOR transparent container IE (see subclause 9.11.3.51) for SOR data type is set to value "1" except that the first three octets are not included.  If the payload container type is set to "UE policy container" and is included in the DL NAS TRANSPORT, UL NAS TRANSPORT or REGISTRATION REQUEST message, the payload container contents are coded as defined in subclause Annex D.  If the payload container type is set to "UE parameters update transparent container" and is included in the DL NAS TRANSPORT message, the payload container contents are coded the same way as the contents of the UE parameters update transparent container IE (see subclause 9.11.3.53A) for UE parameters update data type is set to value "0" except that the first three octets are not included.  If the payload container type is set to "UE parameters update transparent container" and is included in the UL NAS TRANSPORT message, the payload container contents are coded the same way as the contents of the UE parameters update transparent container IE (see subclause 9.11.3.53A) for UE parameters update data type is set to value "1" except that the first three octets are not included.  If the payload container type is set to "SMS" and is included in the UL NAS TRANSPORT or DL NAS TRANSPORT message, the payload container contents contain an SMS message (i.e. CP-DATA, CP-ACK or CP-ERROR) as defined in subclause 7.2 in 3GPP TS 24.011 [13].  If the payload container type is set to "CIoT user data container" and is included in the UL NAS TRANSPORT, DL NAS TRANSPORT or CONTROL PLANE SERVICE REQUEST message, the payload container contents are coded the same way as the contents of the user data container IE (see subclause 9.9.4.24 in 3GPP TS 24.301 [15]) except that the first three octets are not included.  If the payload container type is set to "SMS" and is included in the CONTROL PLANE SERVICE REQUEST message, the payload container contents are coded the same way as the contents of the NAS message container IE (see subclause 9.9.3.22 in 3GPP TS 24.301 [15]) except that the first two octets are not included.  If the payload container type is set to "Location services message container" and is included in the UL NAS TRANSPORT, DL NAS TRANSPORT or CONTROL PLANE SERVICE REQUEST message, the payload container contents include location services message payload.  If the payload container type is set to "LTE Positioning Protocol (LPP) message container" and is included in the UL NAS TRANSPORT or DL NAS TRANSPORT message, the payload container contents include LPP message payload.  If the payload container type is set to "SLPP message container" and is included in the UL NAS TRANSPORT or DL NAS TRANSPORT message, the payload container contents include SLPP message payload.  If the payload container type is set to "Service-level-AA container" and is included in the UL NAS TRANSPORT or DL NAS TRANSPORT message, the payload container contents are coded the same way as the contents of service-level-AA container (see subclause 9.11.2.10).  If the payload container type is set to "Event notification", the payload container contents include one or more event notification indicators. | | | | | | | | | |
| Type of event notification indicator n (octet l+1)  Bits | | | | | | | | | |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |  |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  | "SRVCC handover cancelled, IMS session re-establishment required" indicator |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |  |  |
| to | | | | | | | |  | Unused, shall be ignored if received by the UE |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  |  |
|  | | | | | | | | | |
| If the type of an event notification indicator is set to "SRVCC handover cancelled, IMS session re-establishment required" indicator, the value of the event notification indicator shall not be included. | | | | | | | | | |
|  | | | | | | | | | |
| If the payload container type is set to "UPP-CMI container" and is included in the UL NAS TRANSPORT or DL NAS TRANSPORT message, the payload container contents include UPP-CMI messages as specified in 3GPP TS 24.572 [64]. | | | | | | | | | |
| If the payload container type is set to "Multiple payloads", the number of entries field represents the total number of payload container entries, and the payload container entry contents field is coded as a list of payload container entry according to figure 9.11.3.39.2, with each payload container entry is coded according to figure 9.11.3.39.3 and figure 9.11.3.39.4. | | | | | | | | | |
|  | | | | | | | | | |
| The coding of Payload container contents is dependent on the particular application. | | | | | | | | | |
|  | | | | | | | | | |
| Payload container entry  For each payload container entry, the payload container type field represents the payload container type value as described in subclause 9.11.3.40, the coding of payload container contents field is dependent on the particular application, and the number of optional IEs field represents the total number of optional IEs associated with the payload container entry contents field in the payload container entry. The error handlings for optional IEs specified in subclauses 7.6.3 and 7.7.1 shall apply to the optional IEs included in the payload container entry.  The receiving entity shall ignore Optional IEs with type of optinal IE parameter field containing an unknown IEI. | | | | | | | | | |
| Optional IEs  Type of optional IE (octet xi +4)  This field contains the IEI of the optional IE.  Length of optional IE (octet xi+5)  This field indicates binary coded length of the value of the optional IE entry.  Value of optional IE (octet xi+6 to octet y2)  This field contains the value of the optional IE entry with the value part of the referred information element based on following optional IE reference. If the Request type is included, the value part of the Request type shall be encoded in the bits 1 to 4 and bits 5 to 8 shall be coded as zero. If the Release assistance indication is included, the value part of the Release assistance indication shall be encoded in the bits 1 to 4 and bits 5 to 8 shall be coded as zero. If the MA PDU session information is included, the value part of the MA PDU session information shall be encoded in the bits 1 to 4 and bits 5 to 8 shall be coded as zero. | | | | | | | | | |
| IEI | | Optional IE name | | | | | | | Optional IE reference |
| 12 | | PDU session ID | | | | | | | PDU session identity 2 (see subclause 9.11.3.41) |
| 24 | | Additional information | | | | | | | Additional information (see subclause 9.11.2.1) |
| 58 | | 5GMM cause | | | | | | | 5GMM cause (see subclause 9.11.3.2) |
| 37 | | Back-off timer value | | | | | | | GPRS timer 3 (see subclause 9.11.2.5) |
| 59 | | Old PDU session ID | | | | | | | PDU session identity 2 (see subclause 9.11.3.41) |
| 80 | | Request type | | | | | | | Request type (see subclause 9.11.3.47) |
| 22 | | S-NSSAI | | | | | | | S-NSSAI (see subclause 9.11.2.8) |
| 25 | | DNN | | | | | | | DNN (see subclause 9.11.2.1B) |
| F0 | | Release assistance indication | | | | | | | Release assistance indication (see subclause 9.11.3.46A) |
| A0 | | MA PDU session information | | | | | | | MA PDU session information (see subclause 9.11.3.31A) |

#### 9.11.3.40 payload container type

the purpose of the payload container type information element indicates type of payload included in the payload container information element

the payload container type information element is coded as shown in figure 9.11.3.40.1 and table 9.11.3.40.1

the payload container type information element is a type 1 information element

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | | 3 | 2 | 1 |  | |
| Payload container type  IEI | | | | | Payload container type value | | | | | octet 1 | |

figure 9.11.3.40.1 payload container type information element

table 9.11.3.40.1 payload container type information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Payload container type value (octet 1) | | | | |
| Bits | | | | |
| 4 | 3 | 2 | 1 |  |
| 0 | 0 | 0 | 1 | N1 SM information |
| 0 | 0 | 1 | 0 | SMS |
| 0 | 0 | 1 | 1 | LTE Positioning Protocol (LPP) message container |
| 0 | 1 | 0 | 0 | SOR transparent container |
| 0 | 1 | 0 | 1 | UE policy container |
| 0 | 1 | 1 | 0 | UE parameters update transparent container |
| 0 | 1 | 1 | 1 | Location services message container (see 3GPP TS 23.273 [6B]) |
| 1 | 0 | 0 | 0 | CIoT user data container |
| 1 | 0 | 0 | 1 | Service-level-AA container |
| 1 | 0 | 1 | 0 | Event notification |
| 1 | 0 | 1 | 1 | UPP-CMI container |
| 1 | 1 | 0 | 0 | SLPP message container |
| 1 | 1 | 1 | 1 | Multiple payloads |
|  | | | | |
| All other values are reserved. | | | | |
|  | | | | |
| NOTE: The value "Multiple payloads" is only used when the Payload container contents in figure 9.11.3.39.1 contains multiple payloads as shown in figure 9.11.3.39.2. | | | | |

#### 9.11.3.41 PDU session identity 2

the purpose of the PDU session identity 2 information element is to indicate the identity of a PDU session in a 5GMM message

the PDU session identity 2 information element is coded as shown in figure 9.11.3.41.1 and table 9.11.3.41.1

the PDU session identity 2 is a type 3 information element with a length of 2 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| PDU session identity 2 IEI | | | | | | | | octet 1 |
| PDU session identity 2 value | | | | | | | | octet 2 |

figure 9.11.3.41.1 PDU session identity 2 information element

table 9.11.3.41.1 PDU session identity 2 information element

|  |
| --- |
| PDU session identity 2 value (octet 2)  The coding of the PDU session identity 2 value is identical to the coding of the PDU session identity value as defined in 3GPP TS 24.007 [11] . |

#### 9.11.3.42 PDU session reactivation result

the purpose of the PDU session reactivation result information element is to indicate the result of establishments of user-plane resources of PDU sessions

the PDU session reactivation result information element is coded as shown in figure 9.11.3.42.1 and table 9.11.3.42.1

the PDU session reactivation result is a type 4 information element with minimum length of 4 octets and maximum length of 34 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| PDU session reactivation result IEI | | | | | | | | octet 1 |
| Length of PDU session reactivation result | | | | | | | | octet 2 |
| PSI  (7) | PSI  (6) | PSI  (5) | PSI  (4) | PSI  (3) | PSI  (2) | PSI  (1) | PSI  (0) | octet 3 |
| PSI  (15) | PSI  (14) | PSI  (13) | PSI  (12) | PSI  (11) | PSI  (10) | PSI  (9) | PSI  (8) | octet 4 |
| |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | Spare | | | | | | | | | | | | | | | | octet 5\* -34\* |

figure 9.11.3.42.1 PDU session reactivation result information element

table 9.11.3.42.1 PDU session reactivation result information element

|  |
| --- |
| PSI(x) shall be coded as follows:  PSI(0):  Bit 1 of octet 3 is spare and shall be coded as zero.  PSI(1) – PSI(15):  0 indicates establishment of user-plane resources of the PDU session was not requested in the Uplink data status IE or establishment of user-plane resources of the PDU session was not allowed in the Allowed PDU session status IE or establishment of user-plane resource of the PDU session is successful.  1 indicates either establishment of user-plane resources of the PDU session was requested in the Uplink data status IE but establishment of user-plane resource of the PDU session is not successful or indicates establishment of user-plane resources of the PDU session was allowed in the Allowed PDU session status IE but establishment of user-plane resource of the PDU session is either not performed or not successful.  All bits in octet 5 to 34 are spare and shall be coded as zero, if the respective octet is included in the information element. |

#### 9.11.3.43 PDU session reactivation result error cause

the purpose of the PDU session reactivation result error cause information element is to indicate error causes for PDU session ID(s) where there was a failure to establish the user-plane resources

the PDU session reactivation result error cause information element is coded as shown in figure 9.11.3.43.1 and table 9.11.3.43.1

the PDU session reactivation result error cause is a type 6 information element with a minimum length of 5 octets and a maximum length of 515 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| PDU session reactivation result error cause IEI | | | | | | | | octet 1 |
| Length of PDU session reactivation result error cause | | | | | | | | octet 2 |
|  | | | | | | | | octet 3 |
| PDU session ID | | | | | | | | octet 4 |
| cause value | | | | | | | | octet 5 |
|  | | | | | | | |  |
| …. | | | | | | | |  |
|  | | | | | | | |  |
| PDU session ID | | | | | | | | octet 514\* |
| cause value | | | | | | | | octet 515\* |

figure 9.11.3.43.1 PDU session reactivation result error cause information element

table 9.11.3.43.1 PDU session reactivation result error cause information element

|  |
| --- |
| PDU session ID is coded same as PDU session ID IE (see subclause 9.4).  The cause value is coded same as second octet of 5GMM cause information element (see subclause 9.11.3.2). |

#### 9.11.3.44 PDU session status

the purpose of the PDU session status information element is to indicate the state of each PDU session that can be identified by a PDU session identity

the PDU session status information element is coded as shown in figure 9.11.3.44.1 and table 9.11.3.44.1

the PDU session status information element is a type 4 information element with minimum length of 4 octets and a maximum length of 34 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| PDU session status IEI | | | | | | | | octet 1 |
| Length of PDU session status contents | | | | | | | | octet 2 |
| PSI  (7) | PSI  (6) | PSI  (5) | PSI  (4) | PSI  (3) | PSI  (2) | PSI  (1) | PSI  (0) | octet 3 |
| PSI  (15) | PSI  (14) | PSI  (13) | PSI  (12) | PSI  (11) | PSI  (10) | PSI  (9) | PSI  (8) | octet 4 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | octet 5\*- |
| spare | | | | | | | | 34\* |

figure 9.11.3.44.1 PDU session status information element

table 9.11.3.44.1 PDU session status information element

|  |
| --- |
| PSI(x) shall be coded as follows:  PSI(0):  Bit 1 of octet 3 is spare and shall be coded as zero.  PSI(1) – PSI(15):  0 indicates that the 5GSM state of the corresponding PDU session is PDU SESSION INACTIVE.  1 indicates that the 5GSM state of the corresponding PDU session is not PDU SESSION INACTIVE  All bits in octet 5 to 34 are spare and shall be coded as zero, if the respective octet is included in the information element. |

#### 9.11.3.45 PLMN list

see subclause 10.5.1.13 in 3GPP TS 24.008 [12]

#### 9.11.3.46 rejected NSSAI

the purpose of the rejected NSSAI information element is to identify a collection of rejected S-NSSAIs

the rejected NSSAI information element is coded as shown in figure 9.11.3.46.1 figure 9.11.3.46.2 and table 9.11.3.46.1

the rejected NSSAI is a type 4 information element with a minimum length of 4 octets and a maximum length of 42 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Rejected NSSAI IEI | | | | | | | | octet 1 |
| Length of Rejected NSSAI contents | | | | | | | | octet 2 |
| Rejected S-NSSAI 1 | | | | | | | | octet 3  octet m |
| Rejected S-NSSAI 2 | | | | | | | | octet m+1\*  octet n\* |
| … | | | | | | | | octet n+1\*  octet u\* |
| Rejected S-NSSAI n | | | | | | | | octet u+1\*  octet v\* |

figure 9.11.3.46.1 rejected NSSAI information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of rejected S-NSSAI | | | | Cause value | | | | octet 3 |
| SST | | | | | | | | octet 4 |
| SD | | | | | | | | octet 5\*  octet 7\* |

figure 9.11.3.46.2 rejected S-NSSAI

table 9.11.3.46.1 rejected NSSAI information element

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Value part of the Rejected NSSAI information element (octet 3 to v) | | | | | |
|  | | | | | |
| The value part of the Rejected NSSAI information element consists of one or more rejected S-NSSAIs. Each rejected S-NSSAI consists of one S-NSSAI and an associated cause value. The length of each rejected S-NSSAI can be determined by the 'length of rejected S-NSSAI' field in the first octet of the rejected S-NSSAI. | | | | | |
| The UE shall store the complete list received (NOTE 0). If more than 8 rejected S-NSSAIs are included in this information element, the UE shall store the first 8 rejected S-NSSAIs and ignore the remaining octets of the information element. | | | | | |
|  | | | | | |
| Rejected S-NSSAI: | | | | | |
|  | | | | | |
| Cause value (octet 3) | | | | | |
| Bits | | | | | |
| 4 | 3 | 2 | 1 |  |  |
| 0 | 0 | 0 | 0 |  | S-NSSAI not available in the current PLMN or SNPN |
| 0 | 0 | 0 | 1 |  | S-NSSAI not available in the current registration area |
| 0 | 0 | 1 | 0 |  | S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization |
| All other values are reserved. | | | | | |
|  | | | | | |
| Slice/service type (SST) (octet 4) | | | | | |
| This field contains the 8 bit SST value. The coding of the SST value part is defined in 3GPP TS 23.003 [4]. (NOTE 2) | | | | | |
|  | | | | | |
| Slice differentiator (SD) (octet 5 to octet 7) | | | | | |
| This field contains the 24 bit SD value. The coding of the SD value part is defined in 3GPP TS 23.003 [4]. (NOTE 3) | | | | | |
| NOTE 0: The number of rejected S-NSSAI(s) shall not exceed eight.  NOTE 1: If octet 5 is included, then octet 6 and octet 7 shall be included.  NOTE 2: If the Cause value is "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization", this field shall contain the 8 bit SST value of an S-NSSAI in the S-NSSAI(s) of the HPLMN.  NOTE 3: If the Cause value is "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization", this field, if included, shall contain the 24 bit SD value of an S-NSSAI in the S-NSSAI(s) of the HPLMN. | | | | | |

#### 9.11.3.46A release assistance indication

see subclause 9.9.4.25 in 3GPP TS 24.301 [15]

#### 9.11.3.47 request type

the purpose of the request type information element is to indicate the type of the 5GSM message

the request type information element is coded as shown in figure 9.11.3.47.1 and table 9.11.3.47.1

the request type is a type 1 information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Request type IEI | | | | 0  spare | Request type value | | | octet 1 |

figure 9.11.3.47.1 request type information element

table 9.11.3.47.1 request type information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Request type value (octet 1, bit 1 to bit 4) | | | | |
|  | | | | |
| Bits | | | | |
| 3 | 2 | 1 |  |  |
| 0 | 0 | 1 |  | initial request |
| 0 | 1 | 0 |  | existing PDU session |
| 0 | 1 | 1 |  | initial emergency request |
| 1 | 0 | 0 |  | existing emergency PDU session |
| 1 | 0 | 1 |  | modification request |
| 1 | 1 | 0 |  | MA PDU request (NOTE) |
| 1 | 1 | 1 |  | reserved |
| All other values are unused and shall be interpreted as "initial request", if received by the network. | | | | |
| NOTE: This value shall be interpreted as "initial request", if received by a network not supporting MA PDU sessions. | | | | |

#### 9.11.3.48 S1 UE network capability

see subclause 9.9.3.34 in 3GPP TS 24.301 [15]

#### 9.11.3.48A S1 UE security capability

see subclause 9.9.3.36 in 3GPP TS 24.301 [15]

#### 9.11.3.49 service area list

the purpose of the service area list information element is to transfer a list of allowed tracking areas for an allowed area or a list of non-allowed tracking areas for a non-allowed area from the network to the UE

the coding of the information element allows combining different types of lists the lists of type "00" and "01" allow a more compact encoding when the different TAIs are sharing the PLMN identity the lists of type "11" indicate all TAIs of the PLMNs in the registration area are allowed area

the service area list information element is coded as shown in figure 9.11.3.49.1 figure 9.11.3.49.2 figure 9.11.3.49.3 figure 9.11.3.49.4 figure 9.11.3.49.5 and table 9.11.3.49.1

the service area list is a type 4 information element with a minimum length of 6 octets and a maximum length of 114 octets the list can contain a maximum of 16 different tracking area identities

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Service area list IEI | | | | | | | | octet 1 |
| Length of service area list contents | | | | | | | | octet 2 |
| Partial service area list 1 | | | | | | | | octet 3  octet i |
| Partial service area list 2 | | | | | | | | octet i+1\*  octet l\* |
| … | | | | | | | | octet l+1\*  octet m\* |
| Partial service area list p | | | | | | | | octet m+1\*  octet n\* |

figure 9.11.3.49.1 service area list information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Allowed type | Type of list | | Number of elements | | | | | octet 1 |
| MCC digit 2 | | | | MCC digit 1 | | | | octet 2 |
| MNC digit 3 | | | | MCC digit 3 | | | | octet 3 |
| MNC digit 2 | | | | MNC digit 1 | | | | octet 4 |
| TAC 1 | | | | | | | | octet 5 |
| TAC 1 (continued) | | | | | | | | octet 6 |
| TAC 1 (continued) | | | | | | | | octet 7 |
| … | | | | | | | | … |
| TAC k | | | | | | | | octet 3k+2\* |
| TAC k (continued) | | | | | | | | octet 3k+3\* |
| TAC k (continued) | | | | | | | | octet 3k+4\* |

figure 9.11.3.49.2 partial service area list – type of list = "00"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Allowed type | Type of list | | Number of elements | | | | | octet 1 |
| MCC digit 2 | | | | MCC digit 1 | | | | octet 2 |
| MNC digit 3 | | | | MCC digit 3 | | | | octet 3 |
| MNC digit 2 | | | | MNC digit 1 | | | | octet 4 |
| TAC 1 | | | | | | | | octet 5 |
| TAC 1 (continued) | | | | | | | | octet 6 |
| TAC 1 (continued) | | | | | | | | octet 7 |

figure 9.11.3.49.3 partial service area list – type of list = "01"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Allowed type | Type of list | | Number of elements | | | | | octet 1 |
| MCC digit 2 | | | | MCC digit 1 | | | | octet 2 |
| MNC digit 3 | | | | MCC digit 3 | | | | octet 3 |
| MNC digit 2 | | | | MNC digit 1 | | | | octet 4 |
| TAC 1 | | | | | | | | octet 5 |
| TAC 1 (continued) | | | | | | | | octet 6 |
| TAC 1 (continued) | | | | | | | | octet 7 |
| MCC digit 2 | | | | MCC digit 1 | | | | octet 8\* |
| MNC digit 3 | | | | MCC digit 3 | | | | octet 9\* |
| MNC digit 2 | | | | MNC digit 1 | | | | octet 10\* |
| TAC 2 | | | | | | | | octet 11\* |
| TAC 2 (continued) | | | | | | | | octet 12\* |
| TAC 2 (continued) | | | | | | | | octet 13\* |
| … | | | | | | | |  |
| MCC digit 2 | | | | MCC digit 1 | | | | octet 6k-4\* |
| MNC digit 3 | | | | MCC digit 3 | | | | octet 6k-3\* |
| MNC digit 2 | | | | MNC digit 1 | | | | octet 6k-2\* |
| TAC k | | | | | | | | octet 6k\*-1 |
| TAC k (continued) | | | | | | | | octet 6k\* |
| TAC k (continued) | | | | | | | | octet 6k+1\* |

figure 9.11.3.49.4 partial service area list – type of list = "10"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Allowed type | Type of list | | Number of elements | | | | | octet 1 |
| MCC digit 2 | | | | MCC digit 1 | | | | octet 2 |
| MNC digit 3 | | | | MCC digit 3 | | | | octet 3 |
| MNC digit 2 | | | | MNC digit 1 | | | | octet 4 |

figure 9.11.3.49.5 partial service area list – type of list = "11"

table 9.11.3.49.1 service area list information element

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Value part of the Service area list information element (octets 3 to n) | | | | | |
|  | | | | | |
| The value part of the Service area list information element consists of one or several partial service area lists. The length of each partial service area list can be determined from the 'type of list' field and the 'number of elements' field in the first octet of the partial service area list. | | | | | |
| The "Allowed type" fields in all the partial service area lists shall have the same value. For allowed type "0", TAIs contained in all partial service area lists are in the allowed area. For allowed type "1", TAIs contained in all partial service area lists are in the non-allowed area.  The UE shall store the complete list received. If more than 16 TAIs are included in this information element, the UE shall store the first 16 TAIs and ignore the remaining octets of the information element. | | | | | |
|  | | | | | |
|  | | | | | |
| Partial service area list: | | | | | |
|  | | | | | |
| Allowed type (octet 1) | | | | | |
| Bit | | | | | |
| 8 |  |  | | | |
| 0 |  | TAIs in the list are in the allowed area | | | |
| 1 |  | TAIs in the list are in the non-allowed area | | | |
|  | | | | | |
| Type of list (octet 1) | | | | | |
| Bits | | | | | |
| 7 | 6 |  | | | |
| 0 | 0 | list of TACs belonging to one PLMN, with non-consecutive TAC values | | | |
| 0 | 1 | list of TACs belonging to one PLMN, with consecutive TAC values | | | |
| 1 | 0 | list of TAIs belonging to different PLMNs (see NOTE) | | | |
| 1 | 1 | All TAIs belonging to the PLMNs in the registration area are in the allowed area | | | |
|  | | | | | |
| Number of elements (octet 1) | | | | | |
| Bits | | | | | |
| 5 | 4 | 3 | 2 | 1 |  |
| 0 | 0 | 0 | 0 | 0 | 1 element |
| 0 | 0 | 0 | 0 | 1 | 2 elements |
| 0 | 0 | 0 | 1 | 0 | 3 elements |
| to | | | | |  |
| 0 | 1 | 1 | 0 | 1 | 14 elements |
| 0 | 1 | 1 | 1 | 0 | 15 elements |
| 0 | 1 | 1 | 1 | 1 | 16 elements |
|  | | | | | |
| All other values are unused and shall be interpreted as 16, if received by the UE. | | | | | |
|  | | | | | |
| For type of list = "00" and number of elements = k: | | | | | |
|  | | | | | |
| octets 2 to 4 contain the MCC+MNC, and | | | | | |
| for j = 1, …, k: | | | | | |
| octets 3j+2 to 3j+4 contain the TAC of the j-th TAI belonging to the partial list, | | | | | |
|  | | | | | |
| For type of list = "01" and number of elements = k: | | | | | |
|  | | | | | |
| octets 2 to 4 contain the MCC+MNC, and | | | | | |
| octets 5 to 7 contain the TAC of the first TAI belonging to the partial list. | | | | | |
| The TAC values of the other k-1 TAIs are TAC+1, TAC+2, …, TAC+k-1. | | | | | |
|  | | | | | |
| For type of list = "10" and number of elements = k: | | | | | |
|  | | | | | |
| for j = 1, …, k. | | | | | |
| octets 6j-4 to 6j-2 contain the MCC+MNC, and | | | | | |
| octets 6j-1 to 6j+1 contain the TAC of the j-th TAI belonging to the partial list. | | | | | |
|  | | | | | |
| For type of list = "11": | | | | | |
|  | | | | | |
| Allowed type shall be coded as "0" and number of elements shall be ignored, and octets 2 to 4 containing the MCC+MNC can be ignored.  If allowed type is coded as "1", it shall be interpreted as "0". | | | | | |
| MCC, Mobile country code  The MCC field is coded as in ITU-T Recommendation E.212 [42], annex A. | | | | | |
|  | | | | | |
| MNC, Mobile network code | | | | | |
|  | | | | | |
| The coding of this field is the responsibility of each administration but BCD coding shall be used. The MNC shall consist of 2 or 3 digits. If a network operator decides to use only two digits in the MNC, MNC digit 3 shall be coded as "1111". | | | | | |
|  | | | | | |
| TAC, Tracking area code | | | | | |
|  | | | | | |
| In the TAC field bit 8 of the first octet is the most significant bit and bit 1 of the third octet the least significant bit. | | | | | |
| The coding of the tracking area code is the responsibility of each administration. Coding using full hexadecimal representation may be used. The tracking area code consists of 3 octets. | | | | | |
| NOTE: If the "list of TAIs belonging to different PLMNs" is used, the PLMNs included in the list need to be present in the list of equivalent PLMNs. This type is not applicable in an SNPN. | | | | | |

#### 9.11.3.50 service type

the purpose of the service type information element is to specify the purpose of the service request procedure

the service type is a type 1 information element

the service type information element is coded as shown in figure 9.11.3.50.1 and table 9.11.3.50.1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Service type  IEI | | | | Service type value | | | | octet 1 |

figure 9.11.3.50.1 service type information element

table 9.11.3.50.1 service type information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Service type value (octet 1) | | | | |
|  | | | | |
| Service type value | | | | |
| Bits | | | | |
| 4 | 3 | 2 | 1 |  |
| 0 | 0 | 0 | 0 | signalling |
| 0 | 0 | 0 | 1 | data |
| 0 | 0 | 1 | 0 | mobile terminated services |
| 0 | 0 | 1 | 1 | emergency services |
| 0 | 1 | 0 | 0 | emergency services fallback |
| 0 | 1 | 0 | 1 | high priority access |
| 0 | 1 | 1 | 0 | elevated signalling |
| 0 | 1 | 1 | 1 | unused; shall be interpreted as "signalling", if received by the network |
| 1 | 0 | 0 | 0 | unused; shall be interpreted as "signalling", if received by the network |
| 1 | 0 | 0 | 1 | unused; shall be interpreted as "data", if received by the network |
| 1 | 0 | 1 | 0 | unused; shall be interpreted as "data", if received by the network |
| 1 | 0 | 1 | 1 | unused; shall be interpreted as "data", if received by the network |
|  | | | | |
| All other values are reserved. | | | | |

#### 9.11.3.50A SMS indication

the purpose of the SMS indication information element is to indicate that the ability for the UE to use SMS over NAS has changed

the SMS indication information element is coded as shown in figure 9.11.3.50A.1 and table 9.11.3.50A.1

the SMS indication is a type 1 information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| SMS indication IEI | | | | 0  Spare | 0  Spare | 0  Spare | SAI | octet 1 |

figure 9.11.3.50A.1 SMS indication

table 9.11.3.50A.1 SMS indication

|  |  |
| --- | --- |
| SMS availability indication (SAI) (octet 1) | |
|  | |
| Bit | |
| 1 |  |
| 0 | SMS over NAS not available |
| 1 | SMS over NAS available |
|  |  |
| Bits 2, 3 and 4 are spare and shall be coded as zero, | |

#### 9.11.3.51 SOR transparent container

the purpose of the SOR transparent container information element in the REGISTRATION ACCEPT message is to provide the list of preferred PLMN/access technology combinations (or HPLMN indication that 'no change of the "Operator controlled PLMN selector with access Technology" list stored in the UE is needed and thus no list of preferred PLMN/access technology combinations is provided') or a secured packet (see 3GPP TS 23.122 [5] annex C) and optional indication of an acknowledgement request SOR-CMCI request the storage of the received SOR-CMCI in the ME SOR-SNPN-SI (or subscribed SNPN or HPLMN indication that 'no change of the SOR-SNPN-SI stored in the UE is needed and thus no SOR-SNPN-SI is provided') and SOR-SNPN-SI-LS the purpose of the SOR transparent container information element in the REGISTRATION COMPLETE message is to indicate the UE acknowledgement of successful reception of the SOR transparent container IE in the REGISTRATION ACCEPT message as well as to indicate the ME support of SOR-CMCI the ME support of SOR-SNPN-SI and the ME support of SOR-SNPN-SI-LS

NOTE 1 when used in NAS transport procedure the contents of the SOR transparent container information element in the payload container IE of the DL NAS TRANSPORT message are used to provide the list of preferred PLMN/access technology combinations and optional indication of an acknowledgement request SOR-CMCI request the storage of the received SOR-CMCI in the ME SOR-SNPN-SI and SOR-SNPN-SI-LS the contents of the SOR transparent container information element in the payload container IE of the UL NAS TRANSPORT message are used to indicate the UE acknowledgement of successful reception of the SOR transparent container IE in the DL NAS TRANSPORT message as well as to indicate the ME support of SOR-CMCI the ME support of SOR-SNPN-SI and the ME support of SOR-SNPN-SI-LS

NOTE 2 the "Operator controlled signal threshold per access technology" content to update the USIM file EFOCST (see 3GPP TS 31.102 [22]) can be included in the secured packet of the SOR transparent container

the SOR transparent container information element is coded as shown in figure 9.11.3.51.1 figure 9.11.3.51.2 figure 9.11.3.51.3 figure 9.11.3.51.4 figure 9.11.3.51.5 figure 9.11.3.51.6 figure 9.11.3.51.7 figure 9.11.3.51.8 figure 9.11.3.51.9 figure 9.11.3.51.9A figure 9.11.3.51.10 figure 9.11.3.51.11 figure 9.11.3.51.11A figure 9.11.3.51.11B figure 9.11.3.51.11C figure 9.11.3.51.11D figure 9.11.3.51.11E figure 9.11.3.51.11F figure 9.11.3.51.11G figure 9.11.3.51.11H figure 9.11.3.51.11I figure 9.11.3.51.12 figure 9.11.3.51.13 table 9.11.3.51.1 table 9.11.3.51.2 table 9.11.3.51.3 table 9.11.3.51.4 table 9.11.3.51.4A table 9.11.3.51.5 and table 9.11.3.51.6

the SOR transparent container is a type 6 information element with a minimum length of 20 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| SOR transparent container IEI | | | | | | | | octet 1 |
| Length of SOR transparent container contents | | | | | | | | octet 2  octet 3 |
| SOR header | | | | | | | | octet 4 |
| SOR-MAC-IAUSF | | | | | | | | octet 5-20 |
| CounterSOR | | | | | | | | octet 21-22 |
| Secured packet | | | | | | | | octet 23\* - n\* |

figure 9.11.3.51.1 SOR transparent container information element for list type with value "0" and SOR data type with value "0"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| SOR transparent container IEI | | | | | | | | octet 1 |
| Length of SOR transparent container contents | | | | | | | | octet 2  octet 3 |
| SOR header | | | | | | | | octet 4 |
| SOR-MAC-IAUSF | | | | | | | | octet 5-20 |
| CounterSOR | | | | | | | | octet 21-22 |
| PLMN ID and access technology list | | | | | | | | octet 23\*-m\* |

figure 9.11.3.51.2 SOR transparent container information element for list type with value "1" SOR data type with value "0" and additional parameters with value "0"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| SOR transparent container IEI | | | | | | | | octet 1 |
| Length of SOR transparent container contents | | | | | | | | octet 2  octet 3 |
| SOR header | | | | | | | | octet 4 |
| SOR-MAC-IAUSF | | | | | | | | octet 5  octet 20 |
| CounterSOR | | | | | | | | octet 21  octet 22 |
| Length of PLMN ID and access technology list | | | | | | | | octet 23\* |
| PLMN ID and access technology list | | | | | | | | octet 24\*  octet m\* |
| 0  Spare | 0  Spare | 0  Spare | 0  Spare | SSSLI | SSSI | SSCMI | SI | octet o |
| SOR-CMCI | | | | | | | | octet (o+1)\*  octet p\* |
| SOR-SNPN-SI | | | | | | | | octet (p+1)\*  octet u\* |
| SOR-SNPN-SI-LS | | | | | | | | octet (u+1)\*  octet v\* |

figure 9.11.3.51.2A SOR transparent container information element for list type with value "1" SOR data type with value "0" additional parameters with value "1"

|  |  |
| --- | --- |
| PLMN ID 1 | octet 23\*- 25\* |
| access technology identifier 1 | octet 26\*- 27\* |
| … |  |
| PLMN ID n | octet (18+5\*n)\*-(20+5\*n)\* |
| access technology identifier n | octet (21+5\*n)\*-(22+5\*n)\* |

figure 9.11.3.51.3 PLMN ID and access technology list (m=22+5\*n)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| SOR transparent container IEI | | | | | | | | octet 1 |
| Length of SOR transparent container contents | | | | | | | | octet 2  octet 3 |
| SOR header | | | | | | | | octet 4 |
| SOR-MAC-IUE | | | | | | | | octet 5 - 20 |

figure 9.11.3.51.4 SOR transparent container information element for SOR data type with value "1"

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | | 7 | | 6 | | 5 | | 4 | | 3 | | 2 | | 1 | |  | |
| 0  Spare | | 0  Spare | | 0  Spare | | AP | | ACK | | List type | | List indication | | SOR data type | | octet 4 | |

figure 9.11.3.51.5 SOR header for SOR data type with value "0"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 0  Spare | 0  Spare | 0  Spare | 0  Spare | MSSSNPNSILS | MSSNPNSI | MSSI | SOR data type | octet 4 |

figure 9.11.3.51.6 SOR header for SOR data type with value "1"

table 9.11.3.51.1 SOR transparent container information element

|  |  |
| --- | --- |
| SOR-MAC-IAUSF (see NOTE 1), SOR-MAC-IUE (see NOTE 2) and CounterSOR (see NOTE 1) are coded as specified in 3GPP TS 33.501 [24]. | |
|  | |
| SOR data type (octet 4, bit 1) | |
| 0 | The SOR transparent container carries steering of roaming information. |
| 1 | The SOR transparent container carries acknowledgement of successful reception of the steering of roaming information. |
|  | |
| List indication (octet 4, bit 2) (see NOTE 1 and NOTE 5) | |
| 0 | HPLMN indication that 'no change of the "Operator Controlled PLMN Selector with Access Technology" list stored in the UE is needed and thus no list of preferred PLMN/access technology combinations is provided' |
| 1 | list of preferred PLMN/access technology combinations is provided |
|  | |
| List type (octet 4, bit 3) (see NOTE 1) | |
| 0 | The list type is a secured packet. |
| 1 | The list type is a "PLMN ID and access technology list". |
|  |  |
| Acknowledgement (ACK) value (octet 4, bit 4) (see NOTE 1) | |
| 0 | acknowledgement not requested |
| 1 | acknowledgement requested |
|  | |
| Additional parameters (AP) value (octet 4, bit 5) | |
| Bit | |
| **5** | |
| 0 | Additional parameters not included |
| 1 | Additional parameters included (see NOTE 3) |
|  | |
| If the SOR data type is set to value "0", the list type bit is set to value "1", and the additional parameters bit is set to value "1" then:  - the octet o is present.  - if the list indication bit is set to "0" then the PLMN ID and access technology list field and the length of PLMN ID and access technology list field are absent.  - if the list indication bit is set to "1" then the PLMN ID and access technology list field and the length of PLMN ID and access technology list field are present. | |
|  | |
| The secure packet is coded as specified in 3GPP TS 31.115 [22B]. (see NOTE 1) | |
|  | |
| The PLMN ID and access technology list consists of PLMN ID and access technology identifier and are coded as specified in 3GPP TS 31.102 [22] subclause 4.2.5. The PLMN ID and access technology identifier are provided in decreasing order of priority, i.e. PLMN ID 1 indicates highest priority and PLMN ID n indicates lowest priority. The PLMN ID and access technology list contains at minimum zero and at maximum 16 (decimal) PLMN IDs and access technology identifiers. (see NOTE 1) | |
| ME support of SOR-CMCI indicator (MSSI) value (octet 4, bit 2) (see NOTE 2, NOTE 4) | |
| 0 | SOR-CMCI not supported by the ME |
| 1 | SOR-CMCI supported by the ME |
| ME support of SOR-SNPN-SI indicator (MSSNPNSI) value (octet 4, bit 3) (see NOTE 2, NOTE 6) | |
| 0 | SOR-SNPN-SI not supported by the ME |
| 1 | SOR-SNPN-SI supported by the ME |
|  | |
| MS support of SOR-SNPN-SI-LS indicator (MSSNPNSILS) value (octet 4, bit 4) (see NOTE 2) | |
| Bit | |
| **4** | |
| 0 | SOR-SNPN-SI-LS not supported by the ME |
| 1 | SOR-SNPN-SI-LS supported by the ME |
| SOR-CMCI indicator (SI) value (octet o, bit 1)  Bit | |
| **1** | |
| 0 | SOR-CMCI absent |
| 1 | SOR-CMCI present |
|  |  |
| If the SOR-CMCI indicator bit is set to "SOR-CMCI present", the SOR-CMCI field is present. If the SI bit is set to "SOR-CMCI absent", the SOR-CMCI field is absent. | |
|  | |
| Store SOR-CMCI in ME indicator (SSCMI) value (octet o, bit 2)  Bit | |
| **2** | |
| 0 | Do not store SOR-CMCI in ME |
| 1 | Store SOR-CMCI in ME |
|  | |
| SOR-CMCI (octet o+1 to octet p)  The SOR-CMCI field is coded according to figure 9.11.3.51.7 and table 9.11.3.51.2. | |
|  | |
| SOR-SNPN-SI indicator (SSSI) value (octet o, bit 3)  Bit | |
| **3** | |
| 0 | subscribed SNPN or HPLMN indication that 'no change of the SOR-SNPN-SI stored in the UE is needed and thus no SOR-SNPN-SI is provided' |
| 1 | SOR-SNPN-SI present |
|  | |
| If the SSSI bit is set to "SOR-SNPN-SI present", the SOR-SNPN-SI field is present. If the SSSI bit is set to "subscribed SNPN or HPLMN indication that 'no change of the SOR-SNPN-SI stored in the UE is needed and thus no SOR-SNPN-SI is provided'", the SOR-SNPN-SI is absent. | |
|  | |
| SOR-SNPN-SI-LS indicator (SSSLI) value (octet o, bit 4)  Bit | |
| **4** | |
| 0 | SOR-SNPN-SI-LS absent |
| 1 | SOR-SNPN-SI-LS present |
|  | |
| If the SSSLI bit is set to "SOR-SNPN-SI-LS present", the SOR-SNPN-SI-LS field is present. If the SSSLI bit is set to "SOR-SNPN-SI-LS absent", the SOR-SNPN-SI-LS is absent. | |
|  | |
| NOTE 1: This bit or field applies for SOR header with SOR data type with value "0".  NOTE 2: This bit or field applies for SOR header with SOR data type with value "1".  NOTE 3: Additional parameters can be set to value "1" only when the ME supports SOR-CMCI, SOR-SNPN-SI or SOR-SNPN-SI-LS, and the list type bit is set to value "1". The ME supporting SOR-SNPN-SI-LS supports SOR-SNPN-SI as specified in 3GPP TS 23.122 [5].  NOTE 4: The "SOR-CMCI supported by the ME" is not set by a UE compliant to an earlier release of the specification.  NOTE 5: This bit or field applies for SOR header with list type with value "1".  NOTE 6: The "SOR-SNPN-SI supported by the ME" may only be set by a UE which supports access to an SNPN using credentials from a credentials holder and which is not operating in SNPN access operation mode. | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of SOR-CMCI contents | | | | | | | | octet (o+1)  octet (o+2) |
| SOR-CMCI rule 1 | | | | | | | | octet (o+3)\*  octet q\* |
| SOR-CMCI rule 2 | | | | | | | | octet (q+1)\*  octet r\* |
| ... | | | | | | | | octet (r+1)\*  octet s\* |
| SOR-CMCI rule n | | | | | | | | octet (s+1)\*  octet p\* |

figure 9.11.3.51.7 SOR-CMCI

table 9.11.3.51.2 SOR-CMCI

|  |
| --- |
| SOR-CMCI rule:  The SOR-CMCI rule is coded according to figure 9.11.3.51.8 and table 9.11.3.51.3. |
|  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of SOR-CMCI rule contents | | | | | | | | octet q+1  octet q+2 |
| Tsor-cm timer value | | | | | | | | octet q+3 |
| Criterion type | | | | | | | | octet q+4 |
| Criterion value | | | | | | | | octet (q+5)\*  octet r\* |

figure 9.11.3.51.8 SOR-CMCI rule

table 9.11.3.51.3 SOR-CMCI rule

|  |
| --- |
| Tsor-cm timer value  The Tsor-cm timer value field is coded according to octet 2 of the GPRS timer information element as specified in 3GPP TS 24.008 [12] subclause 10.5.7.3 and indicates the Tsor-cm timer value. When the unit field of the Tsor-cm timer value field indicates that the timer is deactivated, the receiving entity shall consider that Tsor-cm timer value is set to the infinity value. |
|  |
| Criterion type |
| Bits  **8 7 6 5 4 3 2 1**  0 0 0 0 0 0 0 1 DNN  0 0 0 0 0 0 1 0 S-NSSAI SST  0 0 0 0 0 0 1 1 S-NSSAI SST and SD  0 0 0 0 0 1 0 0 IMS registration related signalling  0 0 0 0 0 1 0 1 MMTEL voice call  0 0 0 0 0 1 1 0 MMTEL video call  0 0 0 0 0 1 1 1 SMS over NAS or SMSoIP  0 0 0 0 1 0 0 0 SOR security check not successful  1 1 1 1 1 1 1 1 match all  All other values are spare. |
|  |
| The receiving entity shall ignore SOR-CMCI rule with criterion of criterion type set to a spare value. |
|  |
| For "DNN", the criterion value field shall be encoded as a DNN length-value pair field.  For "S-NSSAI SST", the criterion value field shall be encoded as one octet SST field.  For "S-NSSAI SST and SD", the criterion value field shall be encoded as a sequence of one octet SST field and three octets SD field. The SST field shall be transmitted first.  The DNN length-value pair field shall be encoded as a sequence of one octet DNN value length field and a DNN value field. The DNN value length field shall be transmitted first. The DNN value length field indicates the length in octets of the DNN value field. The DNN value field contains an APN as specified in 3GPP TS 23.003 [4].  The SST field contains SST of HPLMN's S-NSSAI.  The SD field contains SD of HPLMN's S-NSSAI.  For "match all", "SOR security check not successful", "IMS registration related signalling", "MMTEL voice call", "MMTEL video call", and "SMS over NAS or SMSoIP", the criterion value field is zero octets long. |
|  |
| If the length of SOR-CMCI rule contents field indicates a length bigger than indicated in figure 9.11.3.51.8, receiving entity shll ignore any superfluous octets located at the end of the SOR-CMCI rule.  The UE applies SOR-CMCI rules as described in 3GPP TS 23.122 [5] annex C. |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of SOR-SNPN-SI contents | | | | | | | | octet (p+1)  octet (p+2) |
| 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | CLGI | CLSI | octet (p+3) |
| CH controlled prioritized list of preferred SNPNs | | | | | | | | octet (p+4)\*  octet t\* |
| CH controlled prioritized list of GINs | | | | | | | | octet (t+1)\*  octet u\* |

figure 9.11.3.51.9 SOR-SNPN-SI

table 9.11.3.51.4 SOR-SNPN-SI

|  |  |
| --- | --- |
| CH controlled prioritized list of preferred SNPNs indicator (CLSI) value (octet p+3, bit 1)  Bit | |
| **1** | |
| 0 | CH controlled prioritized list of preferred SNPNs absent |
| 1 | CH controlled prioritized list of preferred SNPNs present |
|  | |
| If the CLSI bit is set to "CH controlled prioritized list of preferred SNPNs present", the CH controlled prioritized list of preferred SNPNs field is present. If the CLSI bit is set to "CH controlled prioritized list of preferred SNPNs absent", the CH controlled prioritized list of preferred SNPNs field is absent. | |
|  | |
| CH controlled prioritized list of GINs indicator (CLGI) value (octet p+3, bit 2)  Bit | |
| **2** | |
| 0 | CH controlled prioritized list of GINs absent |
| 1 | CH controlled prioritized list of GINs present |
|  | |
| If the CLGI bit is set to "CH controlled prioritized list of GINs present", the CH controlled prioritized list of GINs field is present. If the CLGI bit is set to "CH controlled prioritized list of GINs absent", the CH controlled prioritized list of GINs field is absent. | |
|  | |
| If the length of SOR-SNPN-SI contents field indicates a length bigger than indicated in figure 9.11.3.51.9, receiving entity shall ignore any superfluous octets located at the end of the SOR-SNPN-SI. | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of SOR-SNPN-SI-LS contents | | | | | | | | octet (u+1)  octet (u+2) |
| 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | CLGLSI | CLSLSI | octet (u+3) |
| CH controlled prioritized list of preferred SNPNs for access for localized services in SNPN | | | | | | | | octet (w+1)\*  octet x\* |
| CH controlled prioritized list of preferred GINs for access for localized services in SNPN | | | | | | | | octet (x+1)\*  octet v\* |

figure 9.11.3.51.9A SOR-SNPN-SI-LS

table 9.11.3.51.4A SOR-SNPN-SI-LS

|  |  |
| --- | --- |
| CH controlled prioritized list of preferred SNPNs for access for localized services in SNPN indicator (CLSLSI) value (octet u+3, bit 1)  Bit | |
| **1** | |
| 0 | CH controlled prioritized list of preferred SNPNs for access for localized services in SNPN absent |
| 1 | CH controlled prioritized list of preferred SNPNs for access for localized services in SNPN present |
|  | |
| If the CLSLSI bit is set to " CH controlled prioritized list of preferred SNPNs for access for localized services in SNPN present", the CH controlled prioritized list of preferred SNPNs for access for localized services in SNPN field is present. If the CLSLSI bit is set to " CH controlled prioritized list of preferred SNPNs for access for localized services in SNPN absent", the CH controlled prioritized list of preferred SNPNs for access for localized services in SNPN field is absent. | |
|  | |
| CH controlled prioritized list of preferred GINs for access for localized services in SNPN indicator (CLGLSI) value (octet u+3, bit 2)  Bit | |
| **2** | |
| 0 | CH controlled prioritized list of preferred GINs for access for localized services in SNPN absent |
| 1 | CH controlled prioritized list of preferred GINs for access for localized services in SNPN present |
|  | |
| If the CLGLSI bit is set to " CH controlled prioritized list of preferred GINs for access for localized services in SNPN present", the CH controlled prioritized list of preferred GINs for access for localized services in SNPN field is present. If the CLGLSI bit is set to " CH controlled prioritized list of preferred GINs for access for localized services in SNPN absent", the CH controlled prioritized list of preferred GINs for access for localized services in SNPN field is absent. | |
|  | |
| If the length of SOR-SNPN-SI-LS contents field indicates a length bigger than indicated in figure 9.11.3.51.9A, receiving entity shall ignore any superfluous octets located at the end of the SOR-SNPN-SI. | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of CH controlled prioritized list of preferred SNPNs contents | | | | | | | | octet p+4  octet p+5 |
| SNPN identity 1 | | | | | | | | octet (p+6)\*  octet (p+14)\* |
| SNPN identity 2 | | | | | | | | octet (p+15)\*  octet (p+23)\* |
| ... | | | | | | | | octet (p+24)\*  octet (p+n\*9-2)\* |
| SNPN identity n | | | | | | | | octet (p+n\*9-3)\*  octet (p+n\*9+5)\* = octet t\* |

figure 9.11.3.51.10 CH controlled prioritized list of preferred SNPNs

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of CH controlled prioritized list of preferred SNPNs for access for localized services in SNPN contents | | | | | | | | octet u+1  octet u+2 |
| SNPN info 1 | | | | | | | | octet (u+3)\*  octet u1\* |
| SNPN info 2 | | | | | | | | octet (u1+1)\*  octet u2\* |
| ... | | | | | | | | octet (u2+1)\*  octet u3\* |
| SNPN info n | | | | | | | | octet (u3+1)\*  octet v\* |

figure 9.11.3.51.10A CH controlled prioritized list of preferred SNPNs for access for localized services in SNPN

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | | 7 | | 6 | | 5 | | 4 | | 3 | | 2 | | 1 | |  | |
| Length of SNPN info | | | | | | | | | | | | | | | | octet u+3  octet u+4 | |
| 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | LVII | | LAII | | Time Ind | | octet u+5 | |
| SNPN identity | | | | | | | | | | | | | | | | octet (u+6)\*  octet (u+14)\* | |
| Time validity information | | | | | | | | | | | | | | | | octet (u+15)\*  octet s\* | |
| Location assistance information | | | | | | | | | | | | | | | | octet (s+1)\*  octet q\* | |
| Location validity information | | | | | | | | | | | | | | | | octet (q+1)\*  octet u1\* | |

figure 9.11.3.51.10B SNPN info

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| MCC digit 2 | | | | MCC digit 1 | | | | octet p+15 |
| MNC digit 3 | | | | MCC digit 3 | | | | octet p+16 |
| MNC digit 2 | | | | MNC digit 1 | | | | octet p+17 |
| 0  Spare | 0  Spare | 0  Spare | 0  Spare | NID assignment mode | | | | octet p+18 |
| NID value digit 2 | | | | NID value digit 1 | | | | octet p+19 |
| NID value digit 4 | | | | NID value digit 3 | | | | octet p+20 |
| NID value digit 6 | | | | NID value digit 5 | | | | octet p+21 |
| NID value digit 8 | | | | NID value digit 7 | | | | octet p+22 |
| NID value digit 10 | | | | NID value digit 9 | | | | octet p+23 |

figure 9.11.3.51.11 SNPN identity

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Number of time periods | | | | | | | | octet (p+18) or (t+15) |
| Time period 1 | | | | | | | | octet (p+19) or (t+16)  octet (p+34) or (t+31) |
| Time period 2 | | | | | | | | octet (p+35)\* or (t+32)\*  octet (p+50)\* or (t+47)\* |
| ... | | | | | | | | octet (p+51)\* or (t+48)\*  octet (p+2+o\*16)\* or (t-1+o\*16)\* |
| Time period o | | | | | | | | octet (p+3+o\*16)\* or (t+o\*16)  octet (p+18+o\*16)\* or (t+15+o\*16) = octet s\* |

figure 9.11.3.51.11A time validity information

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | | 7 | | 6 | | 5 | | 4 | | 3 | | 2 | | 1 | |  | |
| 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | TAISI | | TAIPI | | GADI | | octet (s+1) | |
| Geographical area descriptions | | | | | | | | | | | | | | | | octet (s+2)\*  octet s3\* | |
| Tracking area information of PLMNs | | | | | | | | | | | | | | | | octet (s3+1)\*  octet s4\* | |
| Tracking area information of SNPNs | | | | | | | | | | | | | | | | octet (s4+1)\*  octet s5\* = octet q\* | |

figure 9.11.3.51.11B location assistance information

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  | |
| Number of geographical area descriptions | | | | | | | | | octet (s+2) | |
| Type of shape 1 | | | | | | | | | octet (s+3) | |
| Shape description 1 | | | | | | | | | octet (s+4)  octet s1 | |
| … | | | | | | | | | octet (s1+1)\*  octet s2\* | |
| Type of shape n | | | | | | | | | octet (s2+1)\* | |
| Shape description n | | | | | | | | | octet (s2+2)\*  octet s3\* | |

figure 9.11.3.51.11C geographical area descriptions

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  | |
| Number of tracking area information of PLMNs | | | | | | | | | octet s3+1 | |
| Tracking area information of PLMN 1 | | | | | | | | | octet (s3+2)  octet s8 | |
| Tracking area information of PLMN 2 | | | | | | | | | octet (s8+1)\*  octet s9\* | |
| ... | | | | | | | | | octet (s9+1)\*  octet s10\* | |
| Tracking area information of PLMN n | | | | | | | | | octet (s10+1)\*  octet s4\* | |

figure 9.11.3.51.11D tracking area information of PLMNs

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  | |
| MCC digit 2 | | | | | MCC digit 1 | | | | octet s8+1 | |
| MNC digit 3 | | | | | MCC digit 3 | | | | octet s8+2 | |
| MNC digit 2 | | | | | MNC digit 1 | | | | octet s8+3 | |
| TAC list | | | | | | | | | octet s8+4  octet s9 | |

figure 9.11.3.51.11E tracking area information of PLMN

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  | |
| Number of TACs | | | | | | | | | octet s14 = octet s8+4 or octet s11+10 | |
| TAC 1 | | | | | | | | | octet s14+1  octet s14+3 | |
| TAC 2 | | | | | | | | | octet (s14+4)\*  octet (s14+6)\* | |
| ... | | | | | | | | |  | |
| TAC m | | | | | | | | | octet (s14+m\*3-2)\*  octet (s14+m\*3)\* = octet s9 or octet s12 | |

figure 9.11.3.51.11F TAC list

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  | |
| Number of tracking area information of SNPNs | | | | | | | | | octet s4+1 | |
| Tracking area information of SNPN 1 | | | | | | | | | octet (s4+2)  octet s11 | |
| Tracking area information of SNPN 2 | | | | | | | | | octet (s11+1)\*  octet s12\* | |
| ... | | | | | | | | | octet (s12+1)\*  octet s13\* | |
| Tracking area information of SNPN n | | | | | | | | | octet (s13+1)\*  octet s5\* | |

figure 9.11.3.51.11G tracking area information of SNPNs

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  | |
| SNPN identity | | | | | | | | | octet s11+1  octet s11+9 | |
| TAC list | | | | | | | | | octet s11+10  octet s12 | |

figure 9.11.3.51.11H tracking area information of SNPN

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | | 7 | | 6 | | 5 | | 4 | | 3 | | 2 | | 1 | |  | |
| 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | TACI | | octet (q+1) | |
| TAC list | | | | | | | | | | | | | | | | octet (q+2)\*  octet u1\* | |

figure 9.11.3.51.11I location validity information

table 9.11.3.51.5 CH controlled prioritized list of preferred SNPNs and CH controlled prioritized list of preferred SNPNs for access for localized services in SNPN

|  |  |  |
| --- | --- | --- |
| Mobile country code (MCC):  The MCC field is coded as in ITU-T Recommendation E.212 [42], annex A. | | |
|  | | |
| Mobile network code (MNC):  The coding of MNC field is the responsibility of each administration but BCD coding shall be used. The MNC shall consist of 2 or 3 digits. If a network operator decides to use only two digits in the MNC, MNC digit 3 shall be coded as "1111". | | |
|  | | |
| NID assignment mode (see NOTE 1) | | |
| NID assignment mode is coded as specified in 3GPP TS 23.003 [4]. | | |
|  | | |
| NID value (see NOTE 1) | | |
| NID value is coded as specified in 3GPP TS 23.003 [4]. | | |
|  | | |
| Time indication (bit1 of octet u+5)  Bit | | |
| 1 | | |
| 0 |  | Time validity infomation not included |
| 1 |  | Time validity infomationinformation is included |
|  | | |
| Location assistance information indicator (LAII) (bit 2 of octet u+5)  Bit | | |
| 2 | | |
| 0 |  | Location assistance information not included |
| 1 |  | Location assistance information included |
|  | | |
| Location validity information indicator (LVII) (bit 3 of octet u+5)  Bit | | |
| 3 | | |
| 0 |  | Location validity information not included |
| 1 |  | Location validity information included |
|  | | |
| Tracking area code list indicator (TACI) (bit 1 of octet q+1) (see NOTE 2)  Bit | | |
| **1** | | |
| 0 |  | TAC list not included |
| 1 |  | TAC list included |
|  | | |
| Geographical area descriptions indicator (GADI) (bit 1 of octet s+1)  Bit | | |
| **1** | | |
| 0 |  | Geographical area descriptions not included |
| 1 |  | Geographical area descriptions included |
|  | | |
| Tracking area information of PLMNs (TAIPI) (bit 2 of octet s+1)  Bit | | |
| **2** | | |
| 0 |  | Tracking area information of PLMNs not included |
| 1 |  | Tracking area information of PLMNs included |
|  | | |
| Tracking area information of SNPNs (TAISI) (bit 3 of octet s+1)  Bit | | |
| **3** | | |
| 0 |  | Tracking area information of SNPNs not included |
| 1 |  | Tracking area information of SNPNs included |
|  | | |
|  | | |
| Location assistance information | | |
| Location assistance information field contains the geographical area descriptions field, the tracking area information of PLMNs field, the tracking area information of SNPNs field. or any combination of them. | | |
|  | | |
| Time period | | |
| The time period field is coded as the route selection descriptor component value field for "time window type" specified in 3GPP TS 24.526 [19] table 5.2.1. | | |
|  | | |
| Type of shape | | |
| Type of shape is coded as specified in Table 2a in 3GPP TS 23.032 [4B]. | | |
|  | | |
| Shape description | | |
| Shape description is coded as specified in subclause 7.3 in 3GPP TS 23.032 [4B]. | | |
| Tracking area information of PLMNs | | |
| Tracking area information of PLMNs field contains one or more tracking area information of PLMN fields. | | |
|  | | |
| Tracking area information of PLMN | | |
| Tracking area information of PLMN field contains an MCC and MNC of a PLMN identity and a TAC list field containing one or more tracking area code fields, each indicating a TAC of a PLMN identified by the PLMN identity. | | |
| Tracking area information of SNPNs | | |
| Tracking area information of SNPNs field contains one or more tracking area information of SNPN fields.  If the tracking area information of SNPNs field is included in a location assistance information field of an SNPN info field, the SNPN identity field in each tracking area information of SNPN field of the tracking area information of SNPNs field is different from the SNPN identity field in the SNPN info field. | | |
|  | | |
| Tracking area information of SNPN | | |
| Tracking area information of SNPN field contains SNPN identity and a TAC list containing one or more tracking area code fields, each indicating a TAC of an SNPN identified by the SNPN identity. | | |
| Tracking area code (TAC) | | |
| In the TAC field bit 8 of the first octet is the most significant bit and bit 1 of third octet the least significant bit.  The coding of the tracking area code is the responsibility of each administration. Coding using full hexadecimal representation may be used. The tracking area code consists of 3 octets. | | |
|  | | |
|  | | |
| NOTE 1: NID coding deviates from coding of value part of NID IE as specified in subclause 9.2.7 of 3GPP TS 24.502 [18], coding of the NID field of the SNPN list IE as specified in subclause 9.11.3.92, and coding of the NID field of the SNPN list with trusted 5G connectivity IE as specified in subclause H.2.4.7 of 3GPP TS 24.302 [16].  NOTE 2: If the location validity information indicator is set to 'Location validity information included' but TAC list indicator is set to 'TAC list not included', the UE shall ignore the location validity information. | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of CH controlled prioritized list of GINs contents | | | | | | | | octet t+1  octet t+2 |
| GIN 1 | | | | | | | | octet (t+3)\*  octet (t+11)\* |
| GIN 2 | | | | | | | | octet (t+12)\*  octet (t+20)\* |
| ... | | | | | | | | octet (t+21)\*  octet (t+n\*9-5)\* |
| GIN n | | | | | | | | octet (t+n\*9-6)\*  octet (t+n\*9+2)\* = octet u\* |

figure 9.11.3.51.12 CH controlled prioritized list of GINs

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of CH controlled prioritized list of preferred GINs for access for localized services in SNPN contents | | | | | | | | octet v+1  octet v+2 |
| GIN info 1 | | | | | | | | octet (v+3)\*  octet v1\* |
| GIN info 2 | | | | | | | | octet (v1+1)\*  octet v2\* |
| ... | | | | | | | | octet (v2+1)\*  octet v3\* |
| GIN info n | | | | | | | | octet (v3+1)\*  octet w\* |

figure 9.11.3.51.12A CH controlled prioritized list of preferred GINs for access for localized services in SNPN

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | | 7 | | 6 | | 5 | | 4 | | 3 | | 2 | | 1 | |  | |
| Length of GIN info | | | | | | | | | | | | | | | | octet v+3  octet v+4 | |
| 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | LVII | | LAII | | Time Ind | | octet v+5 | |
| GIN | | | | | | | | | | | | | | | | octet (v+6)\*  octet (v+14)\* | |
| Time validity information | | | | | | | | | | | | | | | | octet (v+15)\*  octet s\* | |
| Location assistance information | | | | | | | | | | | | | | | | octet (s+1)\*  octet q\* | |
| Location validity information | | | | | | | | | | | | | | | | octet (q+1)\*  octet v1\* | |

figure 9.11.3.51.12B GIN info

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| MCC digit 2 | | | | MCC digit 1 | | | | octet t+12 |
| MNC digit 3 | | | | MCC digit 3 | | | | octet t+13 |
| MNC digit 2 | | | | MNC digit 1 | | | | octet t+14 |
| 0  Spare | 0  Spare | 0  Spare | 0  Spare | NID assignment mode | | | | octet t+15 |
| NID value digit 2 | | | | NID value digit 1 | | | | octet t+16 |
| NID value digit 4 | | | | NID value digit 3 | | | | octet t+17 |
| NID value digit 6 | | | | NID value digit 5 | | | | octet t+18 |
| NID value digit 8 | | | | NID value digit 7 | | | | octet t+19 |
| NID value digit 10 | | | | NID value digit 9 | | | | octet t+20 |

figure 9.11.3.51.13 GIN

table 9.11.3.51.6 CH controlled prioritized list of GINs and CH controlled prioritized list of preferred GINs for access for localized services in SNPN

|  |  |  |
| --- | --- | --- |
| Mobile country code (MCC):  The MCC field is coded as in ITU-T Recommendation E.212 [42], annex A. | | |
|  | | |
| Mobile network code (MNC):  The coding of MNC field is the responsibility of each administration but BCD coding shall be used. The MNC shall consist of 2 or 3 digits. If a network operator decides to use only two digits in the MNC, MNC digit 3 shall be coded as "1111". | | |
|  | | |
| NID assignment mode (see NOTE) | | |
| NID assignment mode is coded as specified in 3GPP TS 23.003 [4]. | | |
|  | | |
| NID value (see NOTE) | | |
| NID value is coded as specified in 3GPP TS 23.003 [4]. | | |
|  | | |
| Time indication (bit1 of octet v+5)  Bit | | |
| 1 | | |
| 0 |  | Time validity information not included |
| 1 |  | Time validity information included |
|  | | |
| Location assistance information indicator (LAII) (bit 2 of octet v+5)  Bit | | |
| 2 | | |
| 0 |  | Location assistance information not included |
| 1 |  | Location assistance information included |
|  | | |
| Location validity information indicator (LVII) (bit 3 of octet v+5)  Bit | | |
| 3 | | |
| 0 |  | Location validity information not included |
| 1 |  | Location validity information included |
|  | | |
| Time period | | |
| The time period field is coded as the route selection descriptor component value field for "time window type" specified in 3GPP TS 24.526 [19] table 5.2.1. | | |
|  | | |
| Location assistance information (oct(s+1)\* to (q)\*) | | |
| The Location assistance information is coded according to Figure 9.11.3.51.11B and Table 9.11.3.51.5. | | |
|  | | |
| NOTE: NID coding deviates from coding of value part of NID IE as specified in subclause 9.2.7 of 3GPP TS 24.502 [18], coding of the NID field of the SNPN list IE as specified in subclause 9.11.3.92, and coding of the NID field of the SNPN list with trusted 5G connectivity IE as specified in subclause H.2.4.7 of 3GPP TS 24.302 [16]. | | |

#### 9.11.3.51A supported codec list

see subclause 10.5.4.32 in 3GPP TS 24.008 [12]

#### 9.11.3.52 time zone

see subclause 10.5.3.8 in 3GPP TS 24.008 [12]

#### 9.11.3.53 time zone and time

see subclause 10.5.3.9 in 3GPP TS 24.008 [12]

#### 9.11.3.53A UE parameters update transparent container

the purpose of the UE parameters update transparent container when sent from the network to the UE is to provide UE parameters update data optional acknowledgement request and optional re-registration request the purpose of the UE parameters update transparent container when sent from the UE to the network is to indicate the UE acknowledgement of successful reception of the UE parameters update transparent container

the UE parameters update transparent container information element is coded as shown in figure 9.11.3.53A.1 figure 9.11.3.53A.2 figure 9.11.3.53A.3 figure 9.11.3.53A.4 figure 9.11.3.53A.4B figure 9.11.3.53A.5 figure 9.11.3.53A.6 figure 9.11.3.53A.7 and table 9.11.3.53A.1

the UE parameters update transparent container is a type 6 information element with a minimum length of 20 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| UE parameters update transparent container IEI | | | | | | | | octet 1 |
| Length of UE parameters update transparent container contents | | | | | | | | octet 2  octet 3 |
| UE parameters update header | | | | | | | | octet 4 |
| UPU-MAC-IAUSF | | | | | | | | octet 5-20 |
| CounterUPU | | | | | | | | octet 21-22 |
| UE parameters update list | | | | | | | | octet 23\* - n\* |

figure 9.11.3.53A.1 UE parameters update transparent container information element for UE parameters update data type with value "0"

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | | 7 | | 6 | | 5 | | 4 | 3 | 2 | 1 | |  | |
| 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | UE parameters update data set 1 type | | | | | octet 23\* | |
| Length of UE parameters update data set 1 | | | | | | | | | | | | | octet 24\*-  25\* | |
| UE parameters update data set 1 | | | | | | | | | | | | | octet 26\*-  x\* | |
| … | | | | | | | | | | | | |  | |
| 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | UE parameters update data set n type | | | | | octet y\* | |
| Length of UE parameters update data set n | | | | | | | | | | | | | octet y+1\*-  y+2\* | |
| UE parameters update data set n | | | | | | | | | | | | | octet y+3\*-  n\* | |

figure 9.11.3.53A.2 UE parameters update list

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Secured packet | | | | | | | | octet a\* - a+z\* |

figure 9.11.3.53A.3 UE parameters update data set for UE parameters update data set type with value "0001"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Default configured NSSAI | | | | | | | | octet b\* -  c\* |

figure 9.11.3.53A.4 UE parameters update data set for UE parameters update data set type with value "0010"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | AOL | DREI | octet d\* |

figure 9.11.3.53A.4A UE parameters update data set for UE parameters update data set type with value "0011"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Routing indicator digit 2 | | | | Routing indicator digit 1 | | | | octet e\* |
| Routing indicator digit 4 | | | | Routing indicator digit 3 | | | | octet (e+1)\* |

figure 9.11.3.53A.4B UE parameters update data set for UE parameters update data set type with value "0100"

|  |  |
| --- | --- |
| UE parameters update transparent container IEI | octet 1 |
| Length of UE parameters update transparent container contents | octet 2  octet 3 |
| UE parameters update header | octet 4 |
| UPU-MAC-IUE | octet 5 - 20 |

figure 9.11.3.53A.5 UE parameters update transparent container information element for UE parameters update data type with value "1"

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | | 7 | | 6 | | 5 | | 4 | | 3 | | 2 | | 1 | |  | |
| 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | REG | | ACK | | UPU data type | | octet 4 | |

figure 9.11.3.53A.6 UE parameters update header for UE parameters update data type with value "0"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | UPU data type | octet 4 |

figure 9.11.3.53A.7 UE parameters update header for UE parameters update data type with value "1"

table 9.11.3.53A.1 UE parameters update transparent container information element

|  |  |
| --- | --- |
| UPU-MAC-IAUSF, UPU-MAC-IUE and CounterUPU are coded as specified in 3GPP TS 33.501 [24] | |
|  | |
| UPU data type (octet 4, bit 1) | |
| 0 | The UE parameters update transparent container carries a UE parameters update list (NOTE 2) |
| 1 | The UE parameters update transparent container carries an acknowledgement of successful reception of a UE parameters update list (NOTE 2) |
|  | |
| Acknowledgement (ACK) value (octet 4, bit 2) | |
| 0 | acknowledgement not requested |
| 1 | acknowledgement requested |
|  | |
| Re-registration (REG) value (octet 4, bit 3) | |
| 0 | re-registration not requested |
| 1 | re-registration requested |
|  | |
| UE parameters update data set type | |
| Bits  4 3 2 1 | |
| 0 0 0 1 Routing indicator update data | |
| 0 0 1 0 Default configured NSSAI update data | |
| 0 0 1 1 Disaster roaming information update data | |
| 0 1 0 0 ME routing indicator update data | |
|  | |
| All other values are reserved | |
|  | |
| Disaster Roaming Enabled Indication (DREI) value (octet d\*, bit 1) | |
| |  |  | | --- | --- | | 0 | Disaster roaming is disabled in the UE | | 1 | Disaster roaming is enabled in the UE | | |
|  | |
| Indication of 'applicability of "lists of PLMN(s) to be used in disaster condition" provided by a VPLMN' (AOL) value (octet d\*, bit 2) | |
| |  |  | | --- | --- | | 0 | false | | 1 | true | | |
|  | |
| The secured packet is coded as specified in 3GPP TS 31.115 [22B]. | |
|  | |
| The default configured NSSAI is encoded as the value part of the NSSAI IE (see subclause 9.11.3.37). | |
|  | |
| Routing indicator | |
| Routing indicator is encoded as the routing indicator field of the 5GS mobile identity IE (see subclause 9.11.3.4). | |
|  | |
| NOTE 1: When the routing indicator is updated, if the SNPN uses the EAP based primary authentication and key agreement procedure using the EAP-AKA' or the 5G AKA based primary authentication and key agreement procedure, then UE parameter update data set type is set to "routing indicator update data", otherwise, UE parameter update data set type is set to "ME routing indicator update data".  NOTE 2: The UPU data type set to "0" is used in the network to UE direction. The UPU data type set to "1" is used in the UE to network direction. | |

#### 9.11.3.54 UE security capability

the UE security capability information element is used by the UE and by the network to indicate which security algorithms are supported by the UE in N1 mode for NAS security as well as which security algorithms are supported over NR and E-UTRA connected to 5GCN for AS security

the UE security capability information element is coded as shown in figure 9.11.3.54.1 and table 9.11.3.54.1

the UE security capability is a type 4 information element with a minimum length of 4 octets and a maximum length of 10 octets

octets 5 to 10 are optional if octet 5 is included then also octet 6 shall be included

if the UE does not support any security algorithm for AS security over E-UTRA connected to 5GCN it shall not include octets 5 and 6 the UE shall not include octets 7 to 10

if the UE does not support any security algorithm for AS security over E-UTRA connected to 5GCN and if the network includes octets 7 to 10 then the network shall also include octets 5 to 6

if the network includes octet 7 then it shall include also octet 8 if the network includes octet 9 then it shall include also octet 10

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| UE security capability IEI | | | | | | | | octet 1 |
| Length of UE security capability contents | | | | | | | | octet 2 |
| 5G-EA0 | 128-  5G-EA1 | 128-  5G-EA2 | 128-  5G-EA3 | 5G-EA4 | 5G-EA5 | 5G-EA6 | 5G-EA7 | octet 3 |
| 5G-IA0 | 128-  5G-IA1 | 128-  5G-IA2 | 128-  5G-IA3 | 5G-IA4 | 5G-IA5 | 5G-IA6 | 5G-IA7 | octet 4 |
| EEA0 | 128-  EEA1 | 128-  EEA2 | 128-  EEA3 | EEA4 | EEA5 | EEA6 | EEA7 | octet 5\* |
| EIA0 | 128-  EIA1 | 128-  EIA2 | 128-  EIA3 | EIA4 | EIA5 | EIA6 | EIA7 | octet 6\* |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
| Spare | | | | | | | | octet 7\* -10\* |

figure 9.11.3.54.1 UE security capability information element

table 9.11.3.54.1 UE security capability information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 5GS encryption algorithms supported (see NOTE 1) (octet 3) | | | | |
|  | | | | |
| 5GS encryption algorithm 5G-EA0 supported (octet 3, bit 8) | | | | |
| 0 |  |  |  | 5GS encryption algorithm 5G-EA0 not supported |
| 1 |  |  |  | 5GS encryption algorithm 5G-EA0 supported |
|  | | | | |
| 5GS encryption algorithm 128-5G-EA1 supported (octet 3, bit 7) | | | | |
| 0 |  |  |  | 5GS encryption algorithm 128-5G-EA1 not supported |
| 1 |  |  |  | 5GS encryption algorithm 128-5G-EA1 supported |
|  | | | | |
| 5GS encryption algorithm 128-5G-EA2 supported (octet 3, bit 6) | | | | |
| 0 |  |  |  | 5GS encryption algorithm 128-5G-EA2 not supported |
| 1 |  |  |  | 5GS encryption algorithm 128-5G-EA2 supported |
|  | | | | |
| 5GS encryption algorithm 128-5G-EA3 supported (octet 3, bit 5) | | | | |
| 0 |  |  |  | 5GS encryption algorithm 128-5G-EA3 not supported |
| 1 |  |  |  | 5GS encryption algorithm 128-5G-EA3 supported |
|  | | | | |
| 5GS encryption algorithm 5G-EA4 supported (octet 3, bit 4) | | | | |
| 0 |  |  |  | 5GS encryption algorithm 5G-EA4 not supported |
| 1 |  |  |  | 5GS encryption algorithm 5G-EA4 supported |
|  | | | | |
| 5GS encryption algorithm 5G-EA5 supported (octet 3, bit 3) | | | | |
| 0 |  |  |  | 5GS encryption algorithm 5G-EA5 not supported |
| 1 |  |  |  | 5GS encryption algorithm 5G-EA5 supported |
|  | | | | |
| 5GS encryption algorithm 5G-EA6 supported (octet 3, bit 2) | | | | |
| 0 |  |  |  | 5GS encryption algorithm 5G-EA6 not supported |
| 1 |  |  |  | 5GS encryption algorithm 5G-EA6 supported |
|  | | | | |
| 5GS encryption algorithm 5G-EA7 supported (octet 3, bit 1) | | | | |
| 0 |  |  |  | 5GS encryption algorithm 5G-EA7 not supported |
| 1 |  |  |  | 5GS encryption algorithm 5G-EA7 supported |
|  | | | | |
| 5GS integrity algorithms supported (see NOTE 2) (octet 4) | | | | |
|  | | | | |
| 5GS integrity algorithm 5G-IA0 supported (octet 4, bit 8) | | | | |
| 0 |  |  |  | 5GS integrity algorithm 5G-IA0 not supported |
| 1 |  |  |  | 5GS integrity algorithm 5G-IA0 supported |
|  | | | | |
| 5GS integrity algorithm 128-5G-IA1 supported (octet 4, bit 7) | | | | |
| 0 |  |  |  | 5GS integrity algorithm 128-5G-IA1 not supported |
| 1 |  |  |  | 5GS integrity algorithm 128-5G-IA1 supported |
|  | | | | |
| 5GS integrity algorithm 128-5G-IA2 supported (octet 4, bit 6) | | | | |
| 0 |  |  |  | 5GS integrity algorithm 128-5G-IA2 not supported |
| 1 |  |  |  | 5GS integrity algorithm 128-5G-IA2 supported |
|  | | | | |
| 5GS integrity algorithm 128-5G-IA3 supported (octet 4, bit 5) | | | | |
| 0 |  |  |  | 5GS integrity algorithm 128-5G-IA3 not supported |
| 1 |  |  |  | 5GS integrity algorithm 128-5G-IA3 supported |
|  | | | | |
| 5GS integrity algorithm 5G-IA4 supported (octet 4, bit 4) | | | | |
| 0 |  |  |  | 5GS integrity algorithm 5G-IA4 not supported |
| 1 |  |  |  | 5GS integrity algorithm 5G-IA4 supported |
|  | | | | |
| 5GS integrity algorithm 5G-IA5 supported (octet 4, bit 3) | | | | |
| 0 |  |  |  | 5GS integrity algorithm 5G-IA5 not supported |
| 1 |  |  |  | 5GS integrity algorithm 5G-IA5 supported |
|  | | | | |
| 5GS integrity algorithm 5G-IA6supported (octet 4, bit 2) | | | | |
| 0 |  |  |  | 5GS integrity algorithm 5G-IA6 not supported |
| 1 |  |  |  | 5GS integrity algorithm 5G-IA6 supported |
|  | | | | |
| 5GS integrity algorithm 5G-IA7 supported (octet 4, bit 1) | | | | |
| 0 |  |  |  | 5GS integrity algorithm 5G-IA7 not supported |
| 1 |  |  |  | 5GS integrity algorithm 5G-IA7 supported |
|  | | | | |
| EPS encryption algorithms supported (see NOTE 3) (octet 5) | | | | |
|  | | | | |
| EPS encryption algorithm EEA0 supported (octet 5, bit 8) | | | | |
| 0 |  |  |  | EPS encryption algorithm EEA0 not supported |
| 1 |  |  |  | EPS encryption algorithm EEA0 supported |
|  | | | | |
| EPS encryption algorithm 128-EEA1 supported (octet 5, bit 7) | | | | |
| 0 |  |  |  | EPS encryption algorithm 128-EEA1 not supported |
| 1 |  |  |  | EPS encryption algorithm 128-EEA1 supported |
|  | | | | |
| EPS encryption algorithm 128-EEA2 supported (octet 5, bit 6) | | | | |
| 0 |  |  |  | EPS encryption algorithm 128-EEA2 not supported |
| 1 |  |  |  | EPS encryption algorithm 128-EEA2 supported |
|  | | | | |
| EPS encryption algorithm 128-EEA3 supported (octet 5, bit 5) | | | | |
| 0 |  |  |  | EPS encryption algorithm 128-EEA3 not supported |
| 1 |  |  |  | EPS encryption algorithm 128-EEA3 supported |
|  | | | | |
| EPS encryption algorithm EEA4 supported (octet 5, bit 4) | | | | |
| 0 |  |  |  | EPS encryption algorithm EEA4 not supported |
| 1 |  |  |  | EPS encryption algorithm EEA4 supported |
|  | | | | |
| EPS encryption algorithm EEA5 supported (octet 5, bit 3) | | | | |
| 0 |  |  |  | EPS encryption algorithm EEA5 not supported |
| 1 |  |  |  | EPS encryption algorithm EEA5 supported |
|  | | | | |
| EPS encryption algorithm EEA6 supported (octet 5, bit 2) | | | | |
| 0 |  |  |  | EPS encryption algorithm EEA6 not supported |
| 1 |  |  |  | EPS encryption algorithm EEA6 supported |
|  | | | | |
| EPS encryption algorithm EEA7 supported (octet 5, bit 1) | | | | |
| 0 |  |  |  | EPS encryption algorithm EEA7 not supported |
| 1 |  |  |  | EPS encryption algorithm EEA7 supported |
|  | | | | |
| EPS integrity algorithms supported (see NOTE 4) (octet 6) | | | | |
|  | | | | |
| EPS integrity algorithm EIA0 supported (octet 6, bit 8) | | | | |
| 0 |  |  |  | EPS integrity algorithm EIA0 not supported |
| 1 |  |  |  | EPS integrity algorithm EIA0 supported |
|  | | | | |
| EPS integrity algorithm 128-EIA1 supported (octet 6, bit 7) | | | | |
| 0 |  |  |  | EPS integrity algorithm 128-EIA1 not supported |
| 1 |  |  |  | EPS integrity algorithm 128-EIA1 supported |
|  | | | | |
| EPS integrity algorithm 128-EIA2 supported (octet 6, bit 6) | | | | |
| 0 |  |  |  | EPS integrity algorithm 128-EIA2 not supported |
| 1 |  |  |  | EPS integrity algorithm 128-EIA2 supported |
|  | | | | |
| EPS integrity algorithm 128-EIA3 supported (octet 6, bit 5) | | | | |
| 0 |  |  |  | EPS integrity algorithm 128-EIA3 not supported |
| 1 |  |  |  | EPS integrity algorithm 128-EIA3 supported |
|  | | | | |
| EPS integrity algorithm EIA4 supported (octet 6, bit 4) | | | | |
| 0 |  |  |  | EPS integrity algorithm EIA4 not supported |
| 1 |  |  |  | EPS integrity algorithm EIA4 supported |
|  | | | | |
| EPS integrity algorithm EIA5 supported (octet 6, bit 3) | | | | |
| 0 |  |  |  | EPS integrity algorithm EIA5 not supported |
| 1 |  |  |  | EPS integrity algorithm EIA5 supported |
|  | | | | |
| EPS integrity algorithm EIA6 supported (octet 6, bit 2) | | | | |
| 0 |  |  |  | EPS integrity algorithm EIA6 not supported |
| 1 |  |  |  | EPS integrity algorithm EIA6 supported |
|  | | | | |
| EPS integrity algorithm EIA7 supported (octet 6, bit 1) | | | | |
| 0 |  |  |  | EPS integrity algorithm EIA7 not supported |
| 1 |  |  |  | EPS integrity algorithm EIA7 supported |
|  | | | | |
| For the UE not supporting any security algorithm for AS security over E-UTRA connected to 5GCN, all bits in octets 5 to 10 are spare and shall be ignored, if the respective octet is received with the information element.  For the UE supporting at least one security algorithm for AS security over E-UTRA connected to 5GCN all bits in octets 7 to 10 are spare and shall be ignored, if the respective octet is received with the information element.  If the AMF receives any of the octets 7 to 10 (NOTE 5), it shall store the octets as received and include them when sending the UE security capability information element to the UE. | | | | |
| NOTE 1: The code points in octet 3 are used to indicate support for 5GS encryption algorithms for NAS security in N1 mode and support for 5GS encryption algorithms for AS security over NR.  NOTE 2: The code points in octet 4 are used to indicate support for 5GS integrity algorithms for NAS security in N1 mode and support for 5GS integrity algorithms for AS security over NR.  NOTE 3: The code points in octet 5 are used to indicate support for EPS encryption algorithms for AS security over E-UTRA connected to 5GCN.  NOTE 4: The code points in octet 6 are used to indicate support for EPS integrity algorithms for AS security over E-UTRA connected to 5GCN.  NOTE 5: The AMF can receive this information element also from another AMF or MME during N1 mode to N1 mode or S1 mode to N1 mode handover preparation. | | | | |

#### 9.11.3.55 UE's usage setting

the purpose of the UE's usage setting information element is to provide the network with the UE's usage setting as defined in 3GPP TS 24.301 [15] the network uses the UE's usage setting to select the RFSP index

the UE's usage setting information element is coded as shown in figure 9.11.3.55.1 and table 9.11.3.55.1

the UE's usage setting is a type 4 information element with a length of 3 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| UE's usage setting IEI | | | | | | | | octet 1 |
| Length of UE's usage setting contents | | | | | | | | octet 2 |
| 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | UE's usage setting | octet 3 |

figure 9.11.3.55.1 UE's usage setting information element

table 9.11.3.55.1 UE's usage setting information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| UE's usage setting (octet 3, bit 1) | | | | |
| 0 |  |  |  | voice centric |
| 1 |  |  |  | data centric |
|  | | | | |
| All other bits in the octet 3 are spare and shall be coded as zero, | | | | |

#### 9.11.3.56 UE status

the purpose of the UE status information element is to provide the network with information concerning aspects of the current UE registration status which is used for interworking with EPS

the UE status information element is coded as shown in figure 9.11.3.56.1 and table 9.11.3.56.1

the UE status is a type 4 information element with a length of 3 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| UE status IEI | | | | | | | | octet 1 |
| Length of UE status contents | | | | | | | | octet 2 |
| 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | N1 mode reg | S1 mode reg | octet 3 |

figure 9.11.3.56.1 UE status information element

table 9.11.3.56.1 UE status information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| EMM registration status (S1 mode reg) (octet 3, bit 1) | | | | |
| 0 |  |  |  | UE is not in EMM-REGISTERED state |
| 1 |  |  |  | UE is in EMM-REGISTERED state |
|  | | | | |
| 5GMM registration status (N1 mode reg) (octet 3, bit 2) | | | | |
| 0 |  |  |  | UE is not in 5GMM-REGISTERED state |
| 1 |  |  |  | UE is in 5GMM-REGISTERED state |
|  | | | | |
| All other bits in the octet 3 are spare and shall be coded as zero. | | | | |

#### 9.11.3.57 uplink data status

the purpose of the uplink data status information element is to indicate to the network which preserved PDU session(s) have uplink data pending or which preserved PDU session(s) are associated with active multicast MBS session(s)

the uplink data status information element is coded as shown in figure 9.11.3.57.1 and table 9.11.3.57.1

the uplink data status information element is a type 4 information element with minimum length of 4 octets a maximum length of 34 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Uplink data status IEI | | | | | | | | octet 1 |
| Length of uplink data status contents | | | | | | | | octet 2 |
| PSI  (7) | PSI  (6) | PSI  (5) | PSI  (4) | PSI  (3) | PSI  (2) | PSI  (1) | PSI  (0) | octet 3 |
| PSI  (15) | PSI  (14) | PSI  (13) | PSI  (12) | PSI  (11) | PSI  (10) | PSI  (9) | PSI  (8) | octet 4 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
| spare | | | | | | | | octet 5\* -34\* |

figure 9.11.3.57.1 uplink data status information element

table 9.11.3.57.1 uplink data status information element

|  |
| --- |
| PSI(x) shall be coded as follows:  PSI(0):  Bit 1 of octet 3 is spare and shall be coded as zero.  PSI(1) – PSI(15):  0 indicates that no uplink data are pending for the corresponding PDU session identity or the PDU session is in PDU SESSION INACTIVE state or is in PDU SESSION ACTIVE state with user-plane resources already established.  1 indicates that uplink data are pending for the corresponding PDU session identity and the user-plane resources for the corresponding PDU session are not established, or the UE has active multicast MBS session(s) associated with the corresponding PDU session.  All bits in octet 5 to 34 are spare and shall be coded as zero, if the respective octet is included in the information element. |

#### 9.11.3.58 void

#### 9.11.3.59 void

#### 9.11.3.60 void

#### 9.11.3.61 void

#### 9.11.3.62 void

#### 9.11.3.63 void

#### 9.11.3.64 void

#### 9.11.3.65 void

#### 9.11.3.66 void

#### 9.11.3.67 void

#### 9.11.3.68 UE radio capability ID

the purpose of the UE radio capability ID information element is to carry a UE radio capability ID

the UE radio capability ID information element is coded as shown in figure 9.11.3.68.1 and table 9.11.3.68.1

the UE radio capability ID is a type 4 information element with a length of n octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| UE radio capability ID IEI | | | | | | | | octet 1 |
| Length of UE radio capability ID contents | | | | | | | | octet 2 |
| UE radio capability ID | | | | | | | | octet 3 |
| octet n |

figure 9.11.3.68.1 UE radio capability ID information element

table 9.11.3.68.1 UE radio capability ID information element

|  |
| --- |
| UE radio capability ID (octets 3 to n) |
| The UE radio capability ID contents contain the UE radio capability ID as specified in 3GPP TS 23.003 [4], with each hexadecimal digit coded over 4 bits, starting with the first hexadecimal digit coded in bits 4 to 1 of octet 3, the second hexadecimal digit coded in bits 8 to 5 of octet 3, and so on. If the UE radio capability ID contains an odd number of hexadecimal digits, bits 8 to 5 of the last octet (octet n) shall be coded as "1111". |
|  |

#### 9.11.3.69 UE radio capability ID deletion indication

the purpose of the UE radio capability ID deletion indication information element is to indicate to the UE that deletion of UE radio capability IDs is requested

the UE radio capability ID deletion indication is a type 1 information element

the UE radio capability ID deletion indication information element is coded as shown in figure 9.11.3.69.1 and table 9.11.3.69.1

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | | 4 | 3 | | 2 | 1 |  |
| UE radio capability ID deletion indication  IEI | | | | 0  spare | | | Deletion request | | | octet 1 |

figure 9.11.3.69.1 UE radio capability ID deletion indication information element

table 9.11.3.69.1 UE radio capability ID deletion indication information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Deletion requested (octet 1) | | | | |
| Bits | | | | |
| 3 | 2 | 1 |  |  |
| 0 | 0 | 0 |  | UE radio capability ID deletion not requested |
| 0 | 0 | 1 |  | Network-assigned UE radio capability IDs deletion requested |
|  | | | | |
| All other values are unused and shall be interpreted as "UE radio capability ID deletion not requested", if received by the UE. | | | | |

#### 9.11.3.70 truncated 5G-S-TMSI configuration

the purpose of the truncated 5G-S-TMSI configuration information element is to provide the size of the components of the truncated 5G-S-TMSI to the UE in NB-N1 mode to create the truncated 5G-S-TMSI

the truncated 5G-S-TMSI configuration information element is coded as shown in figure 9.11.3.70.1 and table 9.11.3.70.1

the truncated 5G-S-TMSI configuration is a type 4 information element with 3 octets length

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | | 4 | 3 | 2 | 1 |  |
| Truncated 5G-S-TMSI configuration IEI | | | | | | | | | octet 1 |
| Length of Truncated 5G-S-TMSI configuration contents | | | | | | | | | octet 2 |
| Truncated AMF Set ID value | | | | Truncated AMF Pointer value | | | | | octet 3 |

figure 9.11.3.70.1 truncated 5G-S-TMSI configuration information element

table 9.11.3.70.1 truncated 5G-S-TMSI configuration information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Truncated AMF Pointer value (bits 4 to 1 of octet 3)  This field represents the size of the least significant bits of the AMF Pointer. | | | | |
| Bits | | | | |
| 4 | 3 | 2 | 1 |  |
| 0 | 0 | 0 | 0 | reserved |
| 0 | 0 | 0 | 1 | 1 least significant bit of the AMF Pointer |
| 0 | 0 | 1 | 0 | 2 least significant bits of the AMF Pointer |
| 0 | 0 | 1 | 1 | 3 least significant bits of the AMF Pointer |
| 0 | 1 | 0 | 0 | 4 least significant bits of the AMF Pointer |
| 0 | 1 | 0 | 1 | 5 least significant bits of the AMF Pointer |
| 0 | 1 | 1 | 0 | 6 least significant bits of the AMF Pointer |
|  | | | | |
| All other values shall be interpreted as "6 least significant bits of the AMF Pointer" by this version of the protocol. | | | | |
| Truncated AMF Set ID value (bits 8 to 5 of octet 3)  This field represents the size of the least significant bits of the AMF Set ID. | | | | |
| Bits | | | | |
| 4 | 3 | 2 | 1 |  |
| 0 | 0 | 0 | 0 | reserved |
| 0 | 0 | 0 | 1 | 1 least significant bit of the AMF Set ID |
| 0 | 0 | 1 | 0 | 2 least significant bits of the AMF Set ID |
| 0 | 0 | 1 | 1 | 3 least significant bits of the AMF Set ID |
| 0 | 1 | 0 | 0 | 4 least significant bits of the AMF Set ID |
| 0 | 1 | 0 | 1 | 5 least significant bits of the AMF Set ID |
| 0 | 1 | 1 | 0 | 6 least significant bits of the AMF Set ID |
| 0 | 1 | 1 | 1 | 7 least significant bits of the AMF Set ID |
| 1 | 0 | 0 | 0 | 8 least significant bits of the AMF Set ID |
| 1 | 0 | 0 | 1 | 9 least significant bits of the AMF Set ID |
| 1 | 0 | 1 | 0 | 10 least significant bits of the AMF Set ID |
|  | | | | |
| All other values shall be interpreted as "10 least significant bits of the AMF Set ID" by this version of the protocol. | | | | |
|  | | | | |
| NOTE: Total sum of the "Truncated AMF Set ID value" and the "Truncated AMF Pointer value" in the Truncated 5G-S-TMSI configuration IE is specified in 3GPP TS 23.003 [4] and 3GPP TS 36.300 [25B]. | | | | |

#### 9.11.3.71 WUS assistance information

see subclause 9.9.3.62 in 3GPP TS 24.301 [15]

#### 9.11.3.72 N5GC indication

the purpose of the N5GC indication information element is to indicate to the network that the registration request by the W-AGF is on behalf of an N5GC device

the N5GC indication information element is coded as shown in figure 9.11.3.72.1

the N5GC indication is a type 1 information element

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | | 4 | | 3 | | 2 | | 1 | |  | |
| N5GC indication IEI | | | | 0  Spare | | 0  Spare | | 0  Spare | | N5GCREG | | octet 1 | |

figure 9.11.3.72.1 N5GC indication

table 9.11.3.72.1 N5GC indication

|  |  |
| --- | --- |
| N5GC device indication bit (N5GCREG) (octet 1, bit 1) | |
| Bit | |
| 1 |  |
| 0 | N5GC device registration is not requested |
| 1 | N5GC device registration is requested |
|  | |
| Bits 2 to 4 are spare and shall be coded as zero. | |

#### 9.11.3.73 NB-N1 mode DRX parameters

the purpose of the NB-N1 mode DRX parameters information element is to indicate that the UE wants to use DRX in NB-N1 mode and for the network to indicate the DRX cycle value to be used at paging in NB-N1 mode

the NB-N1 mode DRX parameters is a type 4 information element with a length of 3 octets

the NB-N1 mode DRX parameters information element is coded as shown in figure 9.11.3.73.1 and table 9.11.3.73.1

the value part of a DRX parameter information element is coded as shown in table 9.11.3.73.1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| NB-N1 mode DRX parameters IEI | | | | | | | | octet 1 |
| Length of NB-N1 mode DRX parameters contents | | | | | | | | octet 2 |
| 0 | 0 | 0 | 0 | NB-N1 mode DRX value | | | |  |
| Spare | | | | octet 3 |

figure 9.11.3.73.1 NB-N1 mode DRX parameters information element

table 9.11.3.73.1 NB-N1 mode DRX parameters information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NB-N1 mode DRX value (octet 3, bits 1 to 4)  This field represents the DRX cycle parameter 'T', for NB-N1 mode, as defined in 3GPP TS 36.304 [25C]. | | | | |
| Bits | | | | |
| 4 | 3 | 2 | 1 |  |
| 0 | 0 | 0 | 0 | DRX value not specified |
| 0 | 0 | 0 | 1 | DRX cycle parameter T = 32 |
| 0 | 0 | 1 | 0 | DRX cycle parameter T = 64 |
| 0 | 0 | 1 | 1 | DRX cycle parameter T = 128 |
| 0 | 1 | 0 | 0 | DRX cycle parameter T = 256 |
| 0 | 1 | 0 | 1 | DRX cycle parameter T = 512 |
| 0 | 1 | 1 | 1 | DRX cycle parameter T = 1024 |
|  | | | | |
| All other values shall be interpreted as "DRX value not specified" by this version of the protocol.  Bits 5 to 8 of octet 3 are spare and shall be coded as zero. | | | | |
|  | | | | |

#### 9.11.3.74 additional configuration indication

the purpose of the additional configuration indication information element is to indicate additional information associated with the generic UE configuration update procedure

the additional configuration indication information element is coded as shown in figure 9.11.3.74.1 and table 9.11.3.74.1

the additional configuration indication is a type 1 information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Additional configuration indication IEI | | | | 0  Spare | 0  Spare | 0  Spare | SCMR | octet 1 |

figure 9.11.3.74.1 additional configuration indication

table 9.11.3.74.1 additional configuration indication

|  |  |
| --- | --- |
| Signalling connection maintain request (SCMR) (octet 1, bit 1) | |
| Bit | |
| 1 |  |
| 0 | no additional information |
| 1 | release of N1 NAS signalling connection not required |
|  | |
| Bits 2 to 4 are spare and shall be coded as zero, | |

#### 9.11.3.75 extended rejected NSSAI

the purpose of the extended rejected NSSAI information element is to identify a collection of rejected S-NSSAIs if UE supports extended rejected NSSAI

the extended rejected NSSAI information element is coded as shown in figure 9.11.3.75.1 figure 9.11.3.75.2 and table 9.11.3.75.1

the extended rejected NSSAI is a type 4 information element with a minimum length of 5 octets and a maximum length of 90 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Extended rejected NSSAI IEI | | | | | | | | octet 1 |
| Length of Extended rejected NSSAI contents | | | | | | | | octet 2 |
| Partial extended rejected NSSAI list 1 | | | | | | | | octet 3  octet m |
| Partial extended rejected NSSAI list 2 | | | | | | | | octet m+1\*  octet n\* |
| … | | | | | | | | octet n+1\*  octet u\* |
| Partial extended rejected NSSAI list n | | | | | | | | octet u+1\*  octet v\* |

figure 9.11.3.75.1 extended rejected NSSAI information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| spare | Type of list | | | Number of elements | | | | octet 3 |
| Rejected S-NSSAI 1 | | | | | | | | octet 4  octet j |
| Rejected S-NSSAI 2 | | | | | | | | octet j+1\*  octet k\* |
| … | | | | | | | | octet k+1  octet p\* |
| Rejected S-NSSAI n | | | | | | | | octet p+1\*  octet m\* |

figure 9.11.3.75.2 partial extended rejected NSSAI list – type of list = 000

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| spare | Type of list | | | Number of elements | | | | octet 3 |
| Back-off timer value | | | | | | | | octet 4 |
| Rejected S-NSSAI 1 | | | | | | | | octet 5  octet j |
| Rejected S-NSSAI 2 | | | | | | | | octet j+1\*  octet k\* |
| … | | | | | | | | octet k+1\*  octet p\* |
| Rejected S-NSSAI n | | | | | | | | octet p+1\*  octet m\* |

figure 9.11.3.75.3 partial extended rejected NSSAI list – type of list = 001

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of rejected S-NSSAI | | | | Cause value | | | | octet 4 |
| SST | | | | | | | | octet 5 |
| SD | | | | | | | | octet 6\*  octet 8\* |
| Mapped HPLMN SST | | | | | | | | octet 9\* |
| Mapped HPLMN SD | | | | | | | | octet 10\*  octet 12\* |

figure 9.11.3.75.4 rejected S-NSSAI

table 9.11.3.75.1 extended rejected NSSAI information element

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Value part of the Extended rejected NSSAI information element (octet 3 to v) | | | | | |
|  | | | | | |
| The value part of the Extended rejected NSSAI information element consists of one or more partial extended rejected NSSAI lists. The length of each partial extended rejected NSSAI list can be determined from the 'type of list' field and the 'number of elements' field in the first octet of the partial extended rejected NSSAI list.  Each rejected S-NSSAI consists of one S-NSSAI and an associated cause value. Each rejected S-NSSAI also includes the mapped HPLMN S-NSSAI if available. The length of each rejected S-NSSAI can be determined by the 'length of rejected S-NSSAI' field in the first octet of the rejected S-NSSAI. | | | | | |
| The UE shall store the complete list received (NOTE 0). If more than 8 rejected S-NSSAIs are included in this information element, the UE shall store the first 8 rejected S-NSSAIs and ignore the remaining octets of the information element. | | | | | |
|  | | | | | |
| Partial extended rejected NSSAI list: | | | | | |
|  | | | | | |
| Number of elements (octet 3, bits 1 to 4) | | | | | |
| Bits | | | | | |
| 4 | 3 | 2 | 1 |  | |
| 0 | 0 | 0 | 0 | 1 element | |
| 0 | 0 | 0 | 1 | 2 element | |
|  |  | … |  |  | |
| 0 | 1 | 1 | 0 | 7 element | |
| 0 | 1 | 1 | 1 | 8 element | |
|  | | | | | |
| All other values are unused and shall be interpreted as 8, if received by the UE. | | | | | |
|  | | | | | |
| Type of list (octet 3, bits 5 to 7) (NOTE 7) | | | | | |
| Bits | | | | | |
| 7 | 6 | 5 |  |  | |
| 0 | 0 | 0 |  | list of S-NSSAIs without any associated back-off timer value | |
| 0 | 0 | 1 |  | list of S-NSSAIs with one associated back-off timer value that applies to all S-NSSAIs in the list | |
|  | | | | | |
| All other values are reserved. | | | | | |
|  | | | | | |
| Bit 8 of octet 3 is spare and shall be coded as zero. | | | | | |
|  | | | | | |
| Back-off timer value (octet 4): | | | | | |
|  | | | | | |
| Back-off timer value is coded as the value part of GPRS timer 3 in subclause 10.5.7.4a in 3GPP TS 24.008 [12]. | | | | | |
|  | | | | | |
| Rejected S-NSSAI: | | | | | |
|  | | | | | |
| Cause value (octet x) (NOTE 8) | | | | | |
| Bits | | | | | |
| 4 | 3 | 2 | 1 |  |  |
| 0 | 0 | 0 | 0 |  | S-NSSAI not available in the current PLMN or SNPN |
| 0 | 0 | 0 | 1 |  | S-NSSAI not available in the current registration area |
| 0 | 0 | 1 | 0 |  | S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization |
| 0 | 0 | 1 | 1 |  | S-NSSAI not available due to maximum number of UEs reached |
| All other values are reserved. | | | | | |
|  | | | | | |
| Slice/service type (SST) (octet x+1) | | | | | |
| This field contains the 8 bit SST value. The coding of the SST value part is defined in 3GPP TS 23.003 [4]. (NOTE 5) | | | | | |
|  | | | | | |
| Slice differentiator (SD) (octet x+2 to octet x+4) | | | | | |
| This field contains the 24 bit SD value. The coding of the SD value part is defined in 3GPP TS 23.003 [4]. (NOTE 6)  If the SST encoded in octet x+1 is not associated with a valid SD value, and the sender needs to include a mapped HPLMN SST (octet x+5) and a mapped HPLMN SD (octets x+6 to x+8), then the sender shall set the SD value (octets x+2 to x+4) to "no SD value associated with the SST".  mapped HPLMN Slice/service type (SST) (octet x+5)  This field contains the 8 bit SST value of an S-NSSAI in the S-NSSAI(s) of the HPLMN to which the SST value is mapped. The coding of the SST value part is defined in 3GPP TS 23.003 [4].  mapped HPLMN Slice differentiator (SD) (octet x+6 to octet x+8)  This field contains the 24 bit SD value of an S-NSSAI in the S-NSSAI(s) of the HPLMN to which the SD value is mapped. The coding of the SD value part is defined in 3GPP TS 23.003 [4]. | | | | | |
| NOTE 0: The number of rejected S-NSSAI(s) shall not exceed eight.  NOTE 1: Octet x and octet x+1 shall always be included.  NOTE 2: If the octet x+2 is included, then octet x+3 and octet x+4 shall be included.  NOTE 3: If the octet x+5 is included, then octets x+6, x+7, and x+8 may be included.  NOTE 4: If the octet x+6 is included, then octet x+7 and octet x+8 shall be included.  NOTE 5: If the Cause value is "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization", this field shall contain the 8 bit SST value of an S-NSSAI in the S-NSSAI(s) of the HPLMN and octets x+5, x+6, x+7, and x+8 shall not be included.  NOTE 6: If the Cause value is "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization", this field shall contain the 24 bit SD value of an S-NSSAI in the S-NSSAI(s) of the HPLMN and octets x+5, x+6, x+7, and x+8 shall not be included.  NOTE 7: The partial extended rejected NSSAI with type of list = 001 shall only be used for rejected S-NSSAI(s) with the rejection cause "S-NSSAI not available due to maximum number of UEs reached". | | | | | |
| NOTE 8: Octet x can be 4 or 5. | | | | | |

#### 9.11.3.76 UE request type

see subclause 9.9.3.65 in 3GPP TS 24.301 [15]

#### 9.11.3.77 paging restriction

the purpose of the paging restriction information element is to request the network to restrict paging

the paging restriction information element is coded as shown in figure 9.11.3.77.1 figure 9.11.3.77.2 and table 9.11.3.77.1

the paging restriction is a type 4 information element with a minimum length of 3 octets and a maximum length of 35 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Paging restriction IEI | | | | | | | | octet 1 |
| Length of Paging restriction contents | | | | | | | | octet 2 |
| 0  Spare | 0  Spare | 0  Spare | 0  Spare | Paging restriction type | | | | octet 3 |

figure 9.11.3.77.1 paging restriction information element for paging restriction type = "All paging is restricted" and for paging restriction type = "All paging is restricted except voice"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Paging restriction IEI | | | | | | | | octet 1 |
| Length of Paging restriction contents | | | | | | | | octet 2 |
| 0  Spare | 0  Spare | 0  Spare | 0  Spare | Paging restriction type | | | | octet 3 |
| PSI  (7) | PSI  (6) | PSI  (5) | PSI  (4) | PSI  (3) | PSI  (2) | PSI  (1) | PSI  (0) | octet 4 |
| PSI  (15) | PSI  (14) | PSI  (13) | PSI  (12) | PSI  (11) | PSI  (10) | PSI  (9) | PSI  (8) | octet 5 |
| 0 0 0 0 0 0 0 0  spare | | | | | | | | octet 6\*-35\* |

figure 9.11.3.77.2 paging restriction information element for paging restriction type = "All paging is restricted except for specified PDU session(s)" and for paging restriction type = "All paging is restricted except for voice service and specified PDU session(s)"

table 9.11.3.77.1 paging restriction information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Paging restriction type (bits 4 to 1 of octet 3) | | | | |
| Bits | | | | |
| 4 | 3 | 2 | 1 |  |
| 0 | 0 | 0 | 0 | reserved |
| 0 | 0 | 0 | 1 | All paging is restricted |
| 0 | 0 | 1 | 0 | All paging is restricted except for voice service |
| 0 | 0 | 1 | 1 | All paging is restricted except for specified PDU session(s) |
| 0 | 1 | 0 | 0 | All paging is restricted except for voice service and specified PDU session(s) |
|  | | | | |
| All other values are reserved. | | | | |
| Bits 5 to 8 of octet 3 are spare and shall be coded as zero.  PSI(x) (bits 8 to 1 of octet 4 and octet 5):  This field indicates the PDU session identity of the PDU session for which paging is restricted.  PSI(0): (bit 1 of octet 4)  Spare and shall be coded as zero.  PSI(1) – PSI(15):  0 indicates that paging is restricted for the PDU session associated with the PDU session identity.  1 indicates that paging is not restricted for the PDU session associated with the PDU session identity. | | | | |
| All bits in octet 6 to 35 are spare and shall be coded as zero, if the respective octet is included in the information element. | | | | |

#### 9.11.3.78 void

#### 9.11.3.79 NID

see subclause 9.2.7 in 3GPP TS 24.502 [18]

#### 9.11.3.80 PEIPS assistance information

the purpose of the PEIPS assistance information information element is to transfer the required assistance information to indicate the paging subgroup used when paging the UE

the coding of the information element allows combining different types of PEIPS assistance information

the PEIPS assistance information information element is coded as shown in figure 9.11.3.80.1 figure 9.11.3.80.2 figure 9.11.3.80.3 and table 9.11.3.80.1

the PEIPS assistance information is a type 4 information element with a minimum length of 3 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| PEIPS assistance information IEI | | | | | | | | octet 1 |
| Length of PEIPS assistance information contents | | | | | | | | octet 2 |
| PEIPS assistance information type 1 | | | | | | | | octet 3  octet i |
| PEIPS assistance information type 2 | | | | | | | | octet i+1\*  octet l\* |
| … | | | | | | | | octet l+1\*  octet m\* |
| PEIPS assistance information type p | | | | | | | | octet m+1\*  octet n\* |

figure 9.11.3.80.1 PEIPS assistance information information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Type of information | | | Paging subgroup ID value | | | | | octet 1 |

figure 9.11.3.80.2 PEIPS assistance information type –type of information= "000"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Type of information | | | UE paging probability information value | | | | | octet 1 |

figure 9.11.3.80.3 PEIPS assistance information type –type of information= "001"

table 9.11.3.80.1 PEIPS assistance information information element

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Value part of the PEIPS assistance information information element (octets 3 to n) | | | | | |
|  | | | | | |
| The value part of the PEIPS assistance information information element consists of one or several types of PEIPS assistance information. | | | | | |
|  | | | | | |
| PEIPS assistance information type: | | | | | |
|  | | | | | |
| Type of information (octet 1) | | | | | |
| Bits | | | | | |
| 8 | 7 | 6 |  | | |
| 0 | 0 | 0 | Paging subgroup ID | | |
| 0 | 0 | 1 | UE paging probability information | | |
|  | | | | | |
| All other values are reserved. | | | | | |
|  | | | | | |
| Paging subgroup ID value: (octet 1, bits 1-5) | | | | | |
| This field contains the value (in decimal) of paging subgroup ID that is assigned by the AMF for paging the UE. This field has a valid range of values from (0-7). All other values are unused and shall be interpreted as 0 by this version of the protocol. | | | | | |
| UE paging probability information value: (octet 1, bits 1-5) | | | | | |
| This field contains the value of UE paging probability information provided by the UE to the AMF. It represents the probability of the UE receiving the paging. | | | | | |
|  | | | | | |
| Bit | | | | | |
| 5 | 4 | 3 | 2 | 1 | UE paging probability information value |
| 0 | 0 | 0 | 0 | 0 | p00 (UE calculated paging probability is 0%) |
| 0 | 0 | 0 | 0 | 1 | p05 (UE calculated paging probability > 0% and <= 5%) |
| 0 | 0 | 0 | 1 | 0 | p10 (UE calculated paging probability > 5% and <= 10%) |
| 0 | 0 | 0 | 1 | 1 | p15 (UE calculated paging probability > 10% and <= 15%) |
| 0 | 0 | 1 | 0 | 0 | p20 (UE calculated paging probability > 15% and <= 20%) |
| 0 | 0 | 1 | 0 | 1 | p25 (UE calculated paging probability > 20% and <= 25%) |
| 0 | 0 | 1 | 1 | 0 | p30 (UE calculated paging probability > 25% and <= 30%) |
| 0 | 0 | 1 | 1 | 1 | p35 (UE calculated paging probability > 30% and <= 35%) |
| 0 | 1 | 0 | 0 | 0 | p40 (UE calculated paging probability > 35% and <= 40%) |
| 0 | 1 | 0 | 0 | 1 | p45 (UE calculated paging probability > 40% and <= 45%) |
| 0 | 1 | 0 | 1 | 0 | p50 (UE calculated paging probability > 45% and <= 50%) |
| 0 | 1 | 0 | 1 | 1 | p55 (UE calculated paging probability > 50% and <= 55%) |
| 0 | 1 | 1 | 0 | 0 | p60 (UE calculated paging probability > 55% and <= 60%) |
| 0 | 1 | 1 | 0 | 1 | p65 (UE calculated paging probability > 60% and <= 65%) |
| 0 | 1 | 1 | 1 | 0 | p70 (UE calculated paging probability > 65% and <= 70%) |
| 0 | 1 | 1 | 1 | 1 | p75 (UE calculated paging probability > 70% and <= 75%) |
| 1 | 0 | 0 | 0 | 0 | p80 (UE calculated paging probability > 75% and <= 80%) |
| 1 | 0 | 0 | 0 | 1 | p85 (UE calculated paging probability > 80% and <= 85%) |
| 1 | 0 | 0 | 1 | 0 | p90 (UE calculated paging probability > 85% and <= 90%) |
| 1 | 0 | 0 | 1 | 1 | p95 (UE calculated paging probability > 90% and <= 95%) |
| 1 | 0 | 1 | 0 | 0 | p100 (UE calculated paging probability > 95% and <= 100%) |
|  | | | | | |
| All other values shall be interpreted as 10100 by this version of the protocol. | | | | | |
|  | | | | | |

#### 9.11.3.81 5GS additional request result

the purpose of the 5GS additional request result information element is to inform the UE about the result of additional request

the 5GS additional request result information element is coded as shown in figure 9.11.3.81.1 and table 9.11.3.81.1

the 5GS additional request result is a type 4 information element with a length of 3 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 5GS additional request result IEI | | | | | | | | octet 1 |
| Length of 5GS additional request result contents | | | | | | | | octet 2 |
| 0 Spare | 0 Spare | 0 Spare | 0 Spare | 0 Spare | 0 Spare | PRD | | octet 3 |

figure 9.11.3.81.1 5GS additional request result information element

table 9.11.3.81.1 5GS additional request result information element

|  |  |  |
| --- | --- | --- |
| Paging restriction decision (PRD) (bits 2 to 1 of octet 3) | | |
| Bits | | |
| 2 | 1 |  |
| 0 | 0 | no additional information |
| 0 | 1 | paging restriction is accepted |
| 1 | 0 | paging restriction is rejected |
|  | | |
| All other values are reserved. | | |
| Bits 3 to 8 of octet 3 are spare and shall be coded as zero. | | |

#### 9.11.3.82 NSSRG information

the purpose of the NSSRG information information element is to identify one or more NSSRG values associated with each of the HPLMN S-NSSAIs in a configured NSSAI

the NSSRG information information element is coded as shown in figure 9.11.3.82.1 figure 9.11.3.82.2 and table 9.11.3.82.1

the NSSRG information is a type 6 information element with minimum length of 7 octets and maximum length of 4099 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| NSSRG information IEI | | | | | | | | octet 1 |
| Length of NSSRG information contents | | | | | | | | octet 2  octet 3 |
| NSSRG values for S-NSSAI 1 | | | | | | | | octet 4  octet m |
| NSSRG values for S-NSSAI 2 | | | | | | | | octet m+1\*  octet n\* |
| … | | | | | | | | octet n+1\*  octet u\* |
| NSSRG values for S-NSSAI x | | | | | | | | octet u+1\*  octet v\* |

figure 9.11.3.82.1 NSSRG information information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of NSSRG values for S-NSSAI | | | | | | | | octet 4 |
| S-NSSAI value | | | | | | | | octet 5  octet w |
| NSSRG value 1 for the S-NSSAI | | | | | | | | octet w+1 |
| NSSRG value 2 for the S-NSSAI | | | | | | | | octet w+2\* |
| … | | | | | | | | octet w+3\*  octet w+15 |
| NSSRG value y for the S-NSSAI | | | | | | | | octet w+16 |

figure 9.11.3.82.2 NSSRG values for S-NSSAI

table 9.11.3.82.1 NSSRG information information element

|  |
| --- |
| Value part of the NSSRG information information element (octet 4 to v)  The value part of the NSSRG information information element consists of one or more NSSRG values for each S-NSSAI in the Configured NSSAI IE.  S-NSSAI value (octet 5 to w) (see NOTE 2)  S-NSSAI value is coded as the length and value part of S-NSSAI information element as specified in subclause 9.11.2.8 starting with the second octet. See NOTE 1. |
| NSSRG value for the S-NSSAI (octet w+1) |
| This field contains the 8 bit NSSRG value. |
| NOTE 1: If a mapped HPLMN SST is included in a S-NSSAI value, then the NSSRG value(s) are associated with the Mapped HPLMN SST, and the Mapped HPLMN SD, if included.  NOTE 2: The NSSRG information IE shall contain the complete set of S-NSSAI(s) included in the configured NSSAI.  NOTE 3: The number of NSSRG values associated with an S-NSSAI cannot exceed 16. If there are more than 16 NSSRG values for an S-NSSAI in the NSSRG information, then the UE shall retain only the first 16 NSSRG values and ignore the rest. |

#### 9.11.3.83 list of PLMNs to be used in disaster condition

the purpose of the list of PLMNs to be used in disaster condition information element is to provide the "list of PLMN(s) to be used in disaster condition" associated with the serving PLMN to the UE

the list of PLMNs to be used in disaster condition information element is coded as shown in figures 9.11.3.83.1 and 9.11.3.83.2 and table 9.11.3.83.1

the list of PLMNs to be used in disaster condition is a type 4 information element with a minimum length of 2 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| List of PLMNs to be used in disaster condition list IEI | | | | | | | | octet 1 |
| Length of list of PLMNs to be used in disaster condition contents | | | | | | | | octet 2 |
| PLMN ID 1 | | | | | | | | octet 3\*  octet 5\* |
| PLMN ID 2 | | | | | | | | octet 6\*  octet 8\* |
| … | | | | | | | | octet 9\*  octet q\* |
| PLMN ID n | | | | | | | | octet q+1\*  octet q+3\* |

figure 9.11.3.83.1 list of PLMNs to be used in disaster condition information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| MCC digit 2 | | | | MCC digit 1 | | | | octet q+1 |
| MNC digit 3 | | | | MCC digit 3 | | | | octet q+2 |
| MNC digit 2 | | | | MNC digit 1 | | | | octet q+3 |

figure 9.11.3.83.2 PLMN ID n

table 9.11.3.83.1 list of PLMNs to be used in disaster condition information element

|  |
| --- |
| MCC, Mobile country code (octet q+1 and bits 1 to 4 octet q+2)  The MCC field is coded as in ITU-T Recommendation E.212 [42], annex A. |
|  |
| MNC, Mobile network code (bits 5 to 8 of octet q+2 and octet q+3)  The coding of this field is the responsibility of each administration but BCD coding shall be used. The MNC shall consist of 2 or 3 digits. If a network operator decides to use only two digits in the MNC, bits 5 to 8 of octet q+2 shall be coded as "1111". |
|  |
| The MCC and MNC digits are coded as octets 6 to 8 of the Temporary mobile group identity IE in figure 10.5.154 of 3GPP TS 24.008 [12]. |
| NOTE: The PLMN IDs are provided in decreasing order of priority, i.e. PLMN ID 1 indicates highest priority and PLMN ID n indicates lowest priority. |

#### 9.11.3.84 registration wait range

the purpose of the registration wait range information element is to provide the disaster roaming wait range or the disaster return wait range to the UE

the registration wait range information element is coded as shown in figure 9.11.3.84.1 and table 9.11.3.84.1

the registration wait range is a type 4 information element with a length of 4 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Registration wait range IEI | | | | | | | | octet 1 |
| Length of registration wait range | | | | | | | | octet 2 |
| Minimum registration wait time | | | | | | | | octet 3 |
| Maximum registration wait time | | | | | | | | octet 4 |

figure 9.11.3.84.1 registration wait range information element

table 9.11.3.84.1 registration wait range information element

|  |
| --- |
| Minimum registration wait time (octet 3)  The minimum registration wait time contains the minimum duration of the registration wait time, encoded as octet 2 of the GPRS timer information element (see 3GPP TS 24.008 [12] subclause 10.5.7.3). |
|  |
| Maximum registration wait time (octet 4)  The maximum registration wait time contains the maximum duration of the registration wait time, encoded as octet 2 of the GPRS timer information element (see 3GPP TS 24.008 [12] subclause 10.5.7.3). |
|  |

#### 9.11.3.85 PLMN identity

the purpose of the PLMN identity information element is to provide a PLMN identity

the PLMN identity information element is coded as shown in figure 9.11.3.85.1 and table 9.11.3.85.1

the PLMN identity is a type 4 information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| PLMN identity IEI | | | | | | | | octet 1 |
| Length of PLMN identity contents | | | | | | | | octet 2 |
| MCC digit 2 | | | | MCC digit 1 | | | | octet 3 |
| MNC digit 3 | | | | MCC digit 3 | | | | octet 4 |
| MNC digit 2 | | | | MNC digit 1 | | | | octet 5 |

figure 9.11.3.85.1 PLMN identity information element

table 9.11.3.85.1 PLMN identity information element

|  |
| --- |
| MCC, Mobile country code (octet 3, octet 4 bits 1 to 4) |
| The MCC field is coded as in ITU-T Recommendation E.212 [42], annex A. |
|  |
| MNC, Mobile network code (octet 4 bits 5 to 8, octet 5) |
| The coding of this field is the responsibility of each administration but BCD coding shall be used. The MNC shall consist of 2 or 3 digits. If a network operator decides to use only two digits in the MNC, bits 5 to 8 of octet 4 shall be coded as "1111". |
| The MCC and MNC digits are coded as octets 6 to 8 of the Temporary mobile group identity IE in figure 10.5.154 of 3GPP TS 24.008 [12]. |
|  |

#### 9.11.3.86 extended CAG information list

the purpose of the extended CAG information list information element is to provide "CAG information list" or to delete the "CAG information list" at the UE

the extended CAG information list information element is coded as shown in figures 9.11.3.86.1 figure 9.11.3.86.2 figure 9.11.3.86.3 figure 9.11.3.86.4 figure 9.11.3.86.5 and table 9.11.3.86.1

the extended CAG information list is a type 6 information element with a minimum length of 3 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Extended CAG information list IEI | | | | | | | | octet 1 |
| Length of Extended CAG information list contents | | | | | | | | octet 2  octet 3 |
| Entry 1 | | | | | | | | octet 4\*  octet a\* |
| Entry 2 | | | | | | | | octet a+1\*  octet b\* |
| … | | | | | | | | octet b+1\*  octet g\* |
| Entry n | | | | | | | | octet g+1\*  octet h\* |

figure 9.11.3.86.1 extended CAG information list information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of entry contents | | | | | | | | octet q |
| octet q+1 |
| MCC digit 2 | | | | MCC digit 1 | | | | octet q+2 |
| MNC digit 3 | | | | MCC digit 3 | | | | octet q+3 |
| MNC digit 2 | | | | MNC digit 1 | | | | octet q+4 |
| 0  Spare | 0  Spare | 0  Spare | 0  Spare | CAILI | LCI | 0  Spare | CAG  only | octet q+5 |
| Length of CAG-ID without additional information list | | | | | | | | octet (q+6)\*  octet (q+7)\* |
| CAG-ID 1 | | | | | | | | octet r\* (see NOTE)  octet (r+3)\* |
| CAG-ID 2 | | | | | | | | octet (r+4)\*  octet (r+7)\* |
| … | | | | | | | | octet (r+8)\*  octet (r+4\*m-5)\* |
| CAG-ID m | | | | | | | | octet (r+4\*m-4)\*  octet (r+4\*m-1)\* |
| CAG-ID with additional information list | | | | | | | | octet t\*  (see NOTE)  octet u\* |

NOTE the field is placed immediately after the last present preceding field

figure 9.11.3.86.2 entry n

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of CAG-ID with additional information list contents | | | | | | | | octet t |
| octet t+1 |
| CAG-ID with additional information 1 | | | | | | | | octet t+2  octet v |
| CAG-ID with additional information 2 | | | | | | | | octet (v+1)\*  octet (w)\* |
| … | | | | | | | | octet (w+1)\*  octet (x)\* |
| CAG-ID with additional information o | | | | | | | | octet (x+1)\*  octet u\* |

figure 9.11.3.86.3 CAG-ID with additional information list

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of CAG-ID with additional information contents | | | | | | | | octet x+1 |
| octet x+2 |
| CAG-ID | | | | | | | | octet x+3  octet x+6 |
| 0  Spare | SVII | SVII | SVII | SVII | SVII | SVII | TVII | octet x+7 |
| Time validity information | | | | | | | | octet (x+8)\*  octet (x+23)\* |

NOTE the field is placed immediately after the last present preceding field

figure 9.11.3.86.4 CAG-ID with additional information

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Number of time periods | | | | | | | | octet (x+8) |
| Time period 1 | | | | | | | | octet (x+9)  octet (x+24) |
| Time period 2 | | | | | | | | octet (x+25)\*  octet (x+40)\* |
| ... | | | | | | | | octet (x+41)\*  octet (x-8+o\*16)\* |
| Time period o | | | | | | | | octet (x-7+o\*16)  octet (x+8+o\*16)\* = octet u\* |

figure 9.11.3.86.5 time validity infomation

table 9.11.3.86.1 extended CAG information list information element

|  |  |
| --- | --- |
| Value part of the Extended CAG information list information element (octet 4 to h)  The value part of the Extended CAG information list information element consists of one or more entries.  Entry n:  Length of entry contents (octet q and q+1)  MCC, Mobile country code (octet q+2 and bits 1 to 4 octet q+3)  The MCC field is coded as in ITU-T Recommendation E.212 [42], annex A. | |
|  | |
| MNC, Mobile network code (bits 5 to 8 of octet q+3 and octet q+4)  The coding of this field is the responsibility of each administration, but BCD coding shall be used. The MNC shall consist of 2 or 3 digits. If a network operator decides to use only two digits in the MNC, bits 5 to 8 of octet q+2 shall be coded as "1111". | |
|  | |
| The MCC and MNC digits are coded as octets 6 to 8 of the Temporary mobile group identity IE in figure 10.5.154 of 3GPP TS 24.008 [12]. | |
|  | |
| Indication that the UE is only allowed to access 5GS via CAG cells (CAGonly) (bit 1 of octet q+5) | |
| Bit | |
| 1 |  |
| 0 | "Indication that the UE is only allowed to access 5GS via CAG cells" is not set (i.e., the UE is allowed to access 5GS via non-CAG cells) |
| 1 | "Indication that the UE is only allowed to access 5GS via CAG cells" is set (i.e., the UE is not allowed to access 5GS via non-CAG cells) |
|  | |
| Length of CAG-IDs indicator (LCI) (bit 3 of octet q+5) | |
| Bit | |
| 3 |  |
| 0 | Length of CAG-IDs field is absent |
| 1 | Length of CAG-IDs field is present |
| If the UE does not support enhanced CAG information, the LCI bit shall be set to "Length of CAG-IDs field is absent". | |
|  | |
| CAG-ID with additional information list indicator (CAILI) (bit 4 of octet q+5) | |
| Bit | |
| 4 |  |
| 0 | CAG-ID with additional information list field is absent |
| 1 | CAG-ID with additional information list field is present |
| If the UE does not support enhanced CAG information, the CAILI bit shall be set to "CAG-ID with additional information list field is absent". | |
|  | |
| Length of CAG-ID without additional information list (octet q+6 to octet q+7) | |
| This field indicates length of CAG-ID fields in octet r to octet (r+4\*m-1). | |
|  | |
| CAG-ID m (octet r+4\*m-4 to octet r+4\*m-1)  This field contains the 32 bit CAG-ID which is not associated with additional information. The coding of the CAG-ID is defined as the CAG-Identifier in 3GPP TS 23.003 [4]. See NOTE 4. | |
|  | |
| If the length of entry contents field indicates a length bigger than indicated in figure 9.11.3.86.1, receiving entity shall ignore any superfluous octets located at the end of the entry contents. | |
|  | |
| CAG-ID (octet x+3 to octet x+6)  This field contains the 32 bit CAG-ID which is associated with additional information. The additional information is indicated in remaining fields of figure 9.11.3.86.4. The coding of the CAG-ID is defined as the CAG-Identifier in 3GPP TS 23.003 [4]. | |
|  | |
| Time validity information indicator (TVII) (bit 1 of octet x+7) | |
| Bit | |
| 1 |  |
| 0 | Time validity information field is absent |
| 1 | Time validity information field is present |
|  | |
| Spare validity information indicator (SVII) | |
| 0 | Spare validity information is absent |
| 1 | Spare validity information is present |
| The SVII bit indicates presence of a validity information not specified in the present version of the present document. See NOTE 5. | |
| If the SVII bit is set to "Spare validity information is present", the receiving entity shall ignore the CAG-ID with additional information field. | |
|  | |
| Time period (octet x+25 to octet x+40) | |
| The time period field is coded as the route selection descriptor component value field for "time window type" specified in 3GPP TS 24.526 [19] table 5.2.1. | |
|  | |
| If the length of CAG-ID with additional information contents field indicates a length bigger than indicated in figure 9.11.3.86.4, receiving entity shall ignore any superfluous octets located at the end of the CAG-ID with additional information contents. | |
|  | |
| NOTE 1: The length of extended CAG information list contents field shall be 0 if no subscription data for CAG information list exists. | |
| NOTE 2: The length of entry contents field shall be 4 if there is no allowed CAG-ID for the PLMN. | |
| NOTE 3: For a given PLMN ID, there shall be up to one entry field containing the MCC value and the MNC value of the PLMN ID. | |
| NOTE 4: CAG-ID field containing a CAG-ID which is not associated with additional information, can be provided regardless whether the LCI bit is set to "Length of CAG-IDs field is absent" or "Length of CAG-IDs field is present". | |
| NOTE 5: In a future version of the present document, semantic of this bit can be changed to indicate presence or absence of an additional validity information. | |

#### 9.11.3.87 NSAG information

the purpose of the NSAG information information element is to provide the NSAG information to the UE

the NSAG information information element is coded as shown in figures 9.11.3.87.1 9.11.3.87.2 and 9.11.3.87.3 and table 9.11.3.87.1

the NSAG information information element can contain a maximum of 32 NSAG entries

in the NSAG information information element at most 4 NSAG entries can contain a TAI list

the NSAG information is a type 6 information element with a minimum length of 9 octets and a maximum length of 3143 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| NSAG information IEI | | | | | | | | octet 1 |
| Length of NSAG information contents | | | | | | | | octet 2  octet 3 |
| NSAG 1 | | | | | | | | octet 4  octet m |
| NSAG 2 | | | | | | | | octet m+1\*  octet n\* |
| … | | | | | | | | octet n+1\*  octet u\* |
| NSAG x | | | | | | | | octet u+1\*  octet v\* |

figure 9.11.3.87.1 NSAG information information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of NSAG | | | | | | | | octet 4 |
|  |
| NSAG identifier | | | | | | | | octet 5 |
| S-NSSAI list of NSAG | | | | | | | | octet 6  octet j |
| NSAG priority | | | | | | | | octet j+1 |
| TAI list | | | | | | | | octet j+2\*  octet m\* |

figure 9.11.3.87.2 NSAG

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of S-NSSAI list of NSAG | | | | | | | | octet 6 |
| S-NSSAI value 1 | | | | | | | | octet 7  octet k |
| S-NSSAI value 2 | | | | | | | | octet k+1\*  octet s\* |
| … | | | | | | | | octet s+1\*  octet i-1\* |
| S-NSSAI value x | | | | | | | | octet i\*  octet j\* |

figure 9.11.3.87.3 S-NSSAI list of NSAG

table 9.11.3.87.1 NSAG information information element

|  |
| --- |
| NSAG part of the NSAG information information element (octet 4 to m)  Each entry of the NSAG information information element consists of one NSAG in the NSAG information IE. |
| NSAG identifier(octet 5)  NSAG identifier field contains an 8 bits NSAG ID value. |
| S-NSSAI list of NSAG (octet 6 to j)  S-NSSAI list of NSAG field consists of one or more S-NSSAIs in the configured NSSAI. Each S-NSSAI in S-NSSAI list of NSAG field is coded as the length and value part of S-NSSAI information element as specified in subclause 9.11.2.8 starting with the second octet, without the mapped HPLMN SST field and without the mapped HPLMN SD field. |
| NSAG priority (octet j+1)  The NSAG priority field represents the binary coded value of NSAG priority for cell reselection (see 3GPP TS 38.304 [28]) and random access (see 3GPP TS 38.321 [58]). The range of the NSAG priority is 0 to 255. A lower value indicates a higher priority, with 0 as the highest priority. |
| TAI list (octet j+2 to m)  The TAI list field is coded as the length and value part of the 5GS tracking area identity list IE defined in subclause 9.11.3.9 starting with the second octet. |

#### 9.11.3.88 ProSe relay transaction identity

the purpose of the ProSe relay transaction identity (PRTI) information element is to uniquely identify an authentication and key agreement procedure for 5G ProSe UE-to-network relay or 5G ProSe UE-to-UE relay the PRTI allows distinguishing up to 254 different bi-directional messages

the ProSe relay transaction identity information element is coded as shown in figure 9.11.3.88.1 and table 9.11.3.88.1

the ProSe relay transaction identity is a type 3 information element with a length of 2 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| ProSe relay transaction identity IEI | | | | | | | | octet 1 |
| ProSe relay transaction identity value | | | | | | | | octet 2 |

figure 9.11.3.88.1 ProSe relay transaction identity information element

table 9.11.3.88.1 ProSe relay transaction identity information element

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | |
| ProSe relay transaction identity value (octet 2) | | | | | | | | | |
| Bits | | | | | | | | | |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |  |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  | No ProSe relay transaction identity assigned |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |  | \ |
| to | | | | | | | |  | } ProSe relay transaction identity value |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |  | / |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  | Reserved |
|  |  |  |  |  |  |  |  |  |  |

#### 9.11.3.89 relay key request parameters

the purpose of the relay key request parameters information element is to transport the parameters of the key request for 5G ProSe UE-to-network relay or 5G ProSe UE-to-UE relay as specified in 3GPP TS 33.503 [56]

the relay key request parameters information element is coded as shown in figure 9.11.3.89.1 figure 9.11.3.89.2 and table 9.11.3.89.1

the relay key request parameters is a type 6 information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Relay key request parameters IEI | | | | | | | | octet 1 |
| Length of Relay key request parameters | | | | | | | | octet 2  octet 3 |
| Relay service code | | | | | | | | octet 4  octet 6 |
| Nonce\_1 | | | | | | | | octet 7  octet 22 |
| UE identity | | | | | | | | octet 23  octet n |

figure 9.11.3.89.1 relay key request parameters information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 0  spare | 0  spare | 0  spare | 0  spare | 0  spare | 0  spare | 0  spare | UIT | octet 23 |
| UE ID | | | | | | | | octet 23+1  octet n |

figure 9.11.3.89.2 UE identity

table 9.11.3.89.1 relay key request parameters information element

|  |
| --- |
| Relay service code (octet 4 to 6)  The relay service code contains 24-bit relay service code as defined in 3GPP TS 24.554 [19E].  Nonce\_1 (octet 7 to 22)  Nonce\_1 is the 128-bit nonce value as defined in 3GPP TS 24.554 [19E].  UE ID type (UIT) (octet 23, bit 1)  Bit  **1**  0 SUCI  1 CP-PRUK ID  UE ID (octet 23+1 to n)  UE ID indicates the value of the 5G ProSe remote UE identity or the 5G ProSe end UE identity.  If the UE ID type is set to SUCI, the UE ID is coded as 5GS mobile identity IE starting from octet 2 with the Type of identity set to "SUCI" (see subclause 9.11.3.4).  If the UE ID type is set to CP-PRUK ID, the UE ID is coded as the CP-PRUK ID as defined in 3GPP TS 33.503 [56]. |

#### 9.11.3.90 relay key response parameters

the purpose of the relay key response parameters information element is to transport the parameters of the key response for 5G ProSe UE-to-network relay or 5G ProSe UE-to-UE relay as specified in 3GPP TS 33.503 [56]

the relay key response parameters information element is coded as shown in figure 9.11.3.90.1 and table 9.11.3.90.1

the relay key response parameters is a type 6 information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Relay key response parameters IEI | | | | | | | | octet 1 |
| Length of Relay key response parameters | | | | | | | | octet 2  octet 3 |
| Key KNR\_ProSe | | | | | | | | octet 4  octet 35 |
| Nonce\_2 | | | | | | | | octet 36  octet 51 |
| CP-PRUK ID | | | | | | | | octet 52  octet m |

figure 9.11.3.90.1 relay key response parameters information element

table 9.11.3.90.1 relay key response parameters information element

|  |
| --- |
| Key KNR\_ProSe (octet 5 to 35)  Key KNR\_ProSe contains a 256-bit root key that is established between the two entities that communicating using NR PC5 unicast link as defined in 3GPP TS 33.503 [56].  Nonce\_2 (octet 36 to 51)  Nonce\_2 is the 128-bit nonce value as defined in 3GPP TS 24.554 [19E].  CP-PRUK ID (octet 52 to m)  The CP-PRUK ID is defined in 3GPP TS 33.503 [56]. |

#### 9.11.3.91 priority indicator

the purpose of the priority indicator information element is to convey a priority indication to the UE

the priority indicator information element is coded as shown in figure 9.11.3.91.1 and table 9.11.3.91.1

the priority indicator is a type 1 information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Priority indicator IEI | | | | 0  Spare | 0  Spare | MCSI | MPSI | octet 1 |

figure 9.11.3.91.1 priority indicator

table 9.11.3.91.1 priority indicator

|  |  |  |
| --- | --- | --- |
| MPS indicator (MPSI) (octet 1, bit 1) | | |
| Bit  **1** | | |
| 0  1 | | Access identity 1 not valid  Access identity 1 valid |
|  | | |
| MCS indicator (MCSI) (octet 1, bit 2) | | |
| Bit  **2** | | |
| 0 | Access identity 2 not valid | |
| 1 | Access identity 2 valid | |
|  | | |
| Bits 3, 4 are spare and shall be coded as zero. | | |

#### 9.11.3.92 SNPN list

the purpose of the SNPN list information element is to provide a list of SNPN identities

the SNPN list information element is coded as shown in figure 9.11.3.92.1 table 9.11.3.92.1 figure 9.11.3.92.2 and table 9.11.3.92.2

the SNPN list is a type 4 information element with a minimum length of 11 octets and a maximum length of 137 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| SNPN list IEI | | | | | | | | octet 1 |
| Length of SNPN list contents | | | | | | | | octet 2 |
| SNPN identity 1 | | | | | | | | octet 3  octet 11 |
| SNPN identity 2 | | | | | | | | octet 12\*  octet 20\* |
| … | | | | | | | | octet 21\*  octet (n\*9-7)\* |
| SNPN identity n | | | | | | | | octet (n\*9-6)\*  octet (n\*9+2)\* |

figure 9.11.3.92.1 SNPN list information element

table 9.11.3.92.1 SNPN list information element

|  |
| --- |
| Each SNPN identity field is coded according to figure 9.11.3.92.2 and table 9.11.3.92.2. |
|  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| MCC digit 2 | | | | MCC digit 1 | | | | octet (i\*9-6) |
| MNC digit 3 | | | | MCC digit 3 | | | | octet (i\*9-5) |
| MNC digit 2 | | | | MNC digit 1 | | | | octet (i\*9-4) |
| NID | | | | | | | | octet (i\*9-3)  octet (i\*9+2) |

figure 9.11.3.92.2 SNPN identity i

table 9.11.3.92.2 SNPN identity i

|  |
| --- |
| MCC, Mobile country code (octet (i\*9-6), octet (i\*9-5) bits 1 to 4) |
| The MCC field is coded as in ITU-T Recommendation E.212 [42], annex A. |
|  |
| MNC, Mobile network code (octet (i\*9-5) bits 5 to 8, octet (i\*9-4)) |
| The coding of this field is the responsibility of each administration but BCD coding shall be used. The MNC shall consist of 2 or 3 digits. If a network operator decides to use only two digits in the MNC, bits 5 to 8 of octet 6 shall be coded as "1111" |
|  |
| The MCC and MNC digits are coded as octets 6 to 8 of the Temporary mobile group identity IE in figure 10.5.154 of 3GPP TS 24.008 [12]. |
|  |
| NID (octet (i\*9-3) to octet (i\*9+2)) |
| NID field is coded as the NID field of NID IE as specified in figure 9.2.7-2 and table 9.2.7-2 of 3GPP TS 24.502 [18] starting with the octet 3 and ending with the octet 8. |
|  |

#### 9.11.3.93 N3IWF identifier

the purpose of the N3IWF identifier information element is to enable the network to assign the UE a suitable N3IWF for the requested NSSAI

the N3IWF identifier information element is coded as shown in figure 9.11.3.93.1 figure 9.11.3.93.2 figure 9.11.3.93.3 and table 9.11.3.93.1

the N3IWF identifier information element is a type 4 information element with a minimum length of 7 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| N3IWF identifier IEI | | | | | | | | octet 1 |
| Length of N3IWF identifier contents | | | | | | | | octet 2 |
| N3IWF identifier type | | | | | | | | octet 3 |
| N3IWF identifier entry | | | | | | | | octet 4  octet k |

figure 9.11.3.93.1 N3IWF identifier information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| N3IWF IP address | | | | | | | | octet 4  octet m |

figure 9.11.3.93.2 N3IWF address entry (N3IWF identifier type = "IPv4" "IPv6" or "IPv4v6")

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| N3IWF FQDN | | | | | | | | octet 4  octet n |

figure 9.11.3.93.3 N3IWF identifier entry (N3IWF identifiertype ="FQDN")

table 9.11.3.93.1 N3IWF address entry

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| N3IWF identifier type (octet 3) is set as follows: | | | | | | | | | |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |  |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |  | IPv4 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |  | IPv6 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |  | IPv4v6 |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |  | FQDN |
| All other values are reserved. | | | | | | | | | |
|  | | | | | | | | | |
| If the N3IWF identifier type indicates IPv4, then the N3IWF IP address field contains an IPv4 address in octet 4 to octet 7. | | | | | | | | | |
|  | | | | | | | | | |
| If the N3IWF identifier type indicates IPv6, then the N3IWF IP address field contains an IPv6 address in octet 4 to octet 19. | | | | | | | | | |
|  | | | | | | | | | |
| If the N3IWF identifier type indicates IPv4v6, then the N3IWF IP address field contains two IP addresses. The first IP address is an IPv4 address in octet 4 to octet 7. The second IP address is an IPv6 address in octet 8 to octet 23. | | | | | | | | | |
|  | | | | | | | | | |
|  | | | | | | | | | |
|  | | | | | | | | | |
| If the N3IWF identifier type indicates FQDN, the N3IWF FQDN field in octet 4 to octet n is encoded as defined in subclauses 28.3.2.2.2, 28.3.2.2.3, 28.3.2.2.8 or 28.3.2.2.9 in 3GPP TS 23.003 [4]. | | | | | | | | | |
|  | | | | | | | | | |

#### 9.11.3.94 TNAN information

the purpose of the TNAN information information element is to enable the network to assign the UE a suitable TNAN information (SSID and TNGF ID) for the requested NSSAI

the TNAN information information element is coded as shown in figure 9.11.3.94.1 and table 9.11.3.94.1

the TNAN information information element is a type 4 information element with a minimum length of 3 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| TNAN information IEI | | | | | | | | octet 1 |
| Length of TNAN information contents | | | | | | | | octet 2 |
| 0  Spare | | | | | | SSID ind | TNGF ID ind | octet 3 |
| TNGF ID length | | | | | | | | octet 4\* |
| TNGF ID | | | | | | | | octet 5\*  octet m\* |
| SSID length | | | | | | | | octet m+1\* |
| SSID | | | | | | | | octet m+2\*  octet u\* |

figure 9.11.3.94.1 TNAN information information element

table 9.11.3.94.1 TNAN information information element

|  |  |
| --- | --- |
| TNGF ID indication (TNGF ID ind) (bit 1 of octet 3) | |
| The TNGF ID ind indicates whether the TNGF ID length field and the TNGF ID field are included in the TNAN information or not. | |
| Bit | |
| **1** | |
| 0 | TNGF ID length and TNGF ID not included |
| 1 | TNGF ID length and TNGF ID included |
|  | |
| SSID indication (SSID ind) (bit 2 of octet 3) | |
| The SSID ind indicates whether the SSID length field and the SSID field are included in the TNAN information or not. | |
| Bit | |
| **2** | |
| 0 | SSID length and SSID not included |
| 1 | SSID length and SSID included |
|  | |
| Bits 3 to 8 of octet 3 are spare and shall be coded as zero | |
|  | |
| TNGF ID length (octet 4) indicates the length of the TNGF ID field. | |
| TNGF ID (octets 5 to m) | |
| The TNGF ID field is an octet string that indicates the TNGF ID. | |
|  | |
| SSID length (octet m+1) indicates the length of the SSID field. | |
| SSID (octets m+2 to u) | |
| The SSID field is an octet string which shall have a maximum length of 32 octets (see IEEE Std 802.11 [59]). | |
|  | |

#### 9.11.3.95 RAN timing synchronization

the purpose of the RAN timing synchronization IE is to provide information related to the RAN timing synchronization

the RAN timing synchronization information element is coded as shown in figure 9.11.3.95.1 and table 9.11.3.95.1

the RAN timing synchronization is a type 4 information element with a length of 3 octets

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | | 7 | | 6 | | 5 | | 4 | | 3 | | 2 | | 1 | |  | |
| RAN timing synchronization IEI | | | | | | | | | | | | | | | | octet 1 | |
| Length of RAN timing synchronization | | | | | | | | | | | | | | | | octet 2 | |
| 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | Rec Req | | octet 3 | |

figure 9.11.3.95.1 RAN timing synchronization information element

table 9.11.3.95.1 RAN timing synchronization information element

|  |  |  |
| --- | --- | --- |
| Request to reconnect to the network upon receiving an indication of a change in the RAN timing synchronization status (RecReq) (octet 3, bit 1) | | |
| Bit | | |
| 1 |  |  |
| 0 |  | Reconnection not requested |
| 1 |  | Reconnection requested |
|  | | |
| Bits 2 to 8 of octet 3 are spare and shall be coded as zero. | | |
|  | | |

#### 9.11.3.96 extended LADN information

the purpose of the extended LADN information information element is to provide the UE with the LADN service area for each available LADN associated for an LADN DNN and an S-NSSAI in the current registration area or to delete the extended LADN information at the UE

the extended LADN information information element is coded as shown in figure 9.11.3.96.1 figure 9.11.3.96.2 and table 9.11.3.96.1

the extended LADN information is a type 6 information element with a minimum length of 3 octets and a maximum length of 1787 octets

the extended LADN information information element can contain a minimum of 0 and a maximum of 8 different LADNs each including a DNN an S-NSSAI and a 5GS tracking area identity list

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Extended LADN information IEI | | | | | | | | octet 1 |
| Length of Extended LADN information contents | | | | | | | | octet 2  octet 3 |
| LADN 1 | | | | | | | | octet 4  octet a |
| LADN 2 | | | | | | | | octet a+1\*  octet b\* |
| … | | | | | | | | octet b+1\*  octet g\* |
| LADN n | | | | | | | | octet g+1\*  octet h\* |

figure 9.11.3.96.1 extended LADN information information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of DNN value | | | | | | | | octet 4 |
| DNN value | | | | | | | | octet 5  octet m |
| S-NSSAI | | | | | | | | octet m+1  octet n |
| 5GS tracking area identity list | | | | | | | | octet n+1  octet a |

figure 9.11.3.96.2 LADN

table 9.11.3.96.1 extended LADN information information element

|  |
| --- |
| Value part of the Extended LADN information information element (octet 4 to octet h)  The value part of the Extended LADN information information element consists of one or several LADNs. Each LADN (e.g. octet 4 to octet a) consists of one DNN value, one S-NSSAI and one 5GS tracking area identity list. The length of each LADN is determined by the length of DNN value field, the length of S-NSSAI field and the length of 5GS tracking area identity list field.  The UE shall store the complete list as received. If more than 8 LADNs are included in this information element, the UE shall store the first 8 LADNs and ignore the remaining octets of the information element.  DNN value (octet 5 to octet m):  DNN value field is coded as DNN value part of DNN information element as specified in subclause 9.11.2.1B starting with the third octet. |
| S-NSSAI (octet m+1 to n) (see NOTE 1)  S-NSSAI is coded as the length and value part of S-NSSAI information element as specified in subclause 9.11.2.8 starting with the second octet.  5GS tracking area identity list (octet m+1 to octet a): |
| 5GS tracking area identity list field is coded as the length and the value part of the 5GS Tracking area identity list information element as specified in subclause 9.11.3.9 starting with the second octet. |
| NOTE 1: The S-NSSAI included in the Extended LADN information information element shall be an S-NSSAI from, an allowed NSSAI or an partially allowed NSSAI provided to the UE. |

#### 9.11.3.97 alternative NSSAI

the purpose of the alternative NSSAI information element is to identify a list of mapping information between the S-NSSAI to be replaced and the alternative S-NSSAI

the alternative NSSAI information element is coded as shown in figure 9.11.3.97.1 figure 9.11.3.97.2 and table 9.11.3.97.1

the alternative NSSAI is a type 4 information element with minimum length of 2 octets and maximum length of 146 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Alternative NSSAI IEI | | | | | | | | octet 1 |
| Length of Alternative NSSAI contents | | | | | | | | octet 2 |
| Entry 1 | | | | | | | | octet 3\*  octet a\* |
| Entry 2 | | | | | | | | octet a+1\*  octet b\* |
| … | | | | | | | | octet b+1\*  octet c\* |
| Entry n | | | | | | | | octet c+1\*  octet d\* |

figure 9.11.3.97.1 alternative NSSAI information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| S-NSSAI to be replaced | | | | | | | | octet 3  octet x |
| Alternative S-NSSAI | | | | | | | | octet x+1  octet a |

figure 9.11.3.97.2 entry

table 9.11.3.97.1 alternative NSSAI information element

|  |
| --- |
| Value part of the Alternative NSSAI information element (octet 3 to d)  The value part of the Alternative NSSAI information element consists of one or more entries, each entry consists of one S-NSSAI to be replaced and one alternative S-NSSAI. The number of entries shall not exceed eight.  S-NSSAI to be replaced (octet 3 to x) (see NOTE)  S-NSSAI to be replaced is coded as the length and value part of S-NSSAI information element as specified in subclause 9.11.2.8 starting with the second octet. |
| Alternative S-NSSAI (octet x+1 to a) |
| Alternative S-NSSAI is coded as the length and value part of S-NSSAI information element as specified in subclause 9.11.2.8 starting with the second octet. |
| NOTE: The S-NSSAI to be replaced shall be one S-NSSAI included in the allowed NSSAI. |

#### 9.11.3.98 type 6 IE container

the purpose of the type 6 IE container information element is to transfer type 6 IEs of format TLV-E explicitly specified for inclusion in this information element for the respective message

NOTE use of this information element is intended only for type 6 IEs added to a message in Rel-18 or later

the rules for the IEI value encoding specified in 3GPP TS 24.007 [11] subclause 11.2.4 are not applicable for the IEIs of the type 6 IEs within the type 6 IE container information element these IEIs can take any value in the range 00 to FF (hexadecimal)

the type 6 IE container information element is coded as shown in figure 9.11.3.98.1 figure 9.11.3.98.2 and table 9.11.3.98.1

the type 6 IE container is a type 6 information element with a minimum length of 6 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Type 6 IE container IEI | | | | | | | | octet 1 |
| Length of Type 6 IE container contents | | | | | | | | octet 2 |
|  | | | | | | | | octet 3 |
|  | | | | | | | | octet 4 |
| Type 6 IE container contents | | | | | | | |  |
|  | | | | | | | | octet n |

figure 9.11.3.98.1 type 6 IE container information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Type 6 IE 1 | | | | | | | | octet 4  octet j |
| Type 6 IE 2 | | | | | | | | octet j + 1\*  octet k\* |
| ….. | | | | | | | | octet k+1\*  octet m\* |
| Type 6 IE z | | | | | | | | octet m+1\*  octet n\* |

figure 9.11.3.98.2 type 6 IE container contents

table 9.11.3.98.1 type 6 IE container contents

|  |
| --- |
| Type 6 IE container contents (octets 4 to n)  The Type 6 IE container is coded according to figure 9.11.3.98.2. |
| The sender of this information element shall encode each type 6 IE included in the contents in format TLV-E. |
| For the coding of each of the type 6 IEs in the type 6 IE container, see the definition of the respective type 6 IE in subclause 9.11 |
|  |

#### 9.11.3.99 Non-3GPP access path switching indication

the purpose of the Non-3GPP access path switching indication information element is to indicate whether the UE supports the non-3GPP access path switching for the PDU session

the Non-3GPP access path switching indication information element is coded as shown in figure 9.11.3.99.1 and table 9.11.3.99.1

the Non-3GPP access path switching indication is a type 4 information element with a length of 3 octets

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | | 2 | | 1 |  |
| Non-3GPP access path switching indication IEI | | | | | | | | | | octet 1 |
| Non-3GPP access path switching indication length | | | | | | | | | | octet 2 |
| 0 | 0 | 0 | 0 | 0 | | 0 | | 0 | NAPS | octet 3 |
| Spare | | | | | | | | |

figure 9.11.3.99.1 Non-3GPP access path switching indication information element

table 9.11.3.99.1 Non-3GPP access path switching indication information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Non-3GPP access path switching (NAPS) (octet 3, bit 1) | | | | |
| This bit indicates whether non-3GPP access path switching is supported. | | | | |
| Bit | | | | |
| **1** | | | | |
| 0 |  |  |  | non-3GPP access path switching not supported |
| 1 |  |  |  | non-3GPP access path switching supported |
|  | | | | |
| Bits 2 to 8 of octet 3 are spare and shall be coded as zero. | | | | |
|  | | | | |

#### 9.11.3.100 S-NSSAI location validity information

the purpose of the S-NSSAI location validity information information element is to provide the S-NSSAI location validity information to the UE

the S-NSSAI location validity information information element is coded as shown in figures 9.11.3.100.1 9.11.3.100.2 9.11.3.100.3 and 9.11.3.100.4 and table 9.11.3.100.1

the S-NSSAI location validity information information element can contain per-S-NSSAI location validity information for maximum 16 S-NSSAIs

the S-NSSAI location validity information information is a type 6 information element with a minimum length of 17 octets and a maximum length of 38611 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| S-NSSAI location validity information information IEI | | | | | | | | octet 1 |
| Length of S-NSSAI location validity information contents | | | | | | | | octet 2  octet 3 |
| Per-S-NSSAI location validity information for S-NSSAI 1 | | | | | | | | octet 4  octet a |
| Per-S-NSSAI location validity information for S-NSSAI 2 | | | | | | | | octet (a+1)\*  octet b\* |
| … | | | | | | | | octet (b+1)\*  octet c\* |
| Per-S-NSSAI location validity information for S-NSSAI n | | | | | | | | octet (c+1)\*  octet d\* |

figure 9.11.3.100.1 S-NSSAI location validity information information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of Per-S-NSSAI location validity information for S-NSSAI | | | | | | | | octet 4  octet 5 |
| S-NSSAI | | | | | | | | octet 6  octet e |
| NS-AoS | | | | | | | | octet e+1  octet a |

figure 9.11.3.100.2 Per-S-NSSAI location validity information for S-NSSAI

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Number of NR CGIs | | | | | | | | octet (e+1)  octet (e+2) |
| NR CGI 1 | | | | | | | | octet (e+3)  octet (e+10) |
| NR CGI 2 | | | | | | | | octet (e+11)\*  octet (e+18)\* |
| … | | | | | | | | octet (e+19)\*  octet f\* |
| NR CGI w | | | | | | | | octet (f+1)\*  octet a=(f+8)\* |

figure 9.11.3.100.3 NS-AoS

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| NR Cell ID | | | | | | | | octet (e+3)  octet (e+7) |
| MCC digit 2 | | | | MCC digit 1 | | | | octet (e+8) |
| MNC digit 3 | | | | MCC digit 3 | | | | octet (e+9) |
| MNC digit 2 | | | | MNC digit 1 | | | | octet (e+10) |

figure 9.11.3.100.4 NR CGI

table 9.11.3.100.1 S-NSSAI location validity information information element

|  |
| --- |
| S-NSSAI (octet 6 to e)  S-NSSAI value is coded as the length and value part of S-NSSAI information element as specified in subclause 9.11.2.8 starting with the second octet. |
|  |
| NS-AoS (octet e+1 to octet a) |
| NS-AoS field consists of the Number of NR CGIs field and at least one NR CGI. |
|  |
| Number of NR CGIs (octet e+1 to octet e+2) |
| The field indicates the number of NR CGIs included in octets e+3 to octet a. (NOTE). |
|  |
| NR CGI (octet e+3 to e+10) |
| The NR CGI globally identifies an NR cell. It contains the NR Cell ID and the PLMN ID of that cell. |
|  |
| NR Cell ID (octet e+3 to e+7) |
| The NR Cell ID consists of 36 bits identifying an NR Cell ID as specified in subclause 9.3.1.7 of 3GPP TS 38.413 [31], in hexadecimal representation. Bit 8 of octet e+3 is the most significant bit and bit 5 of octet e+7 is the least significant bit. Bits 1 to 4 of octet e+7 are spare and shall be coded as zero. |
| MCC, Mobile country code (octet e+8 and bits 1 to 4 octet e+9)  The MCC field is coded as in ITU-T Recommendation E.212 [42], annex A. |
|  |
| MNC, Mobile network code (bits 5 to 8 of octet e+9 and octet e+10)  The coding of this field is the responsibility of each administration but BCD coding shall be used. The MNC shall consist of 2 or 3 digits. If a network operator decides to use only two digits in the MNC, bits 5 to 8 of octet e+9 shall be coded as "1111". |
|  |
| The MCC and MNC digits are coded as octets 6 to 8 of the Temporary mobile group identity IE in figure 10.5.154 of 3GPP TS 24.008 [12]. |
|  |
| NOTE: In this version of the specification, the maximum number of NR CGIs is 300. |

#### 9.11.3.101 S-NSSAI time validity information

the purpose of the S-NSSAI time validity information information element is to provide S-NSSAI time validity information of one or more S-NSSAIs to the UE

the S-NSSAI time validity information information element is coded as shown in figures 9.11.3.101.1 and 9.11.3.101.2 and table 9.11.3.101.1

the S-NSSAI time validity information information element can contain per-S-NSSAI time validity information for maximum 16 S-NSSAIs

the S-NSSAI time validity information information is a type 4 information element with a minimum length of 23 octets and a maximum length of 257 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| S-NSSAI time validity information information IEI | | | | | | | | octet 1 |
| Length of S-NSSAI time validity information contents | | | | | | | | octet 2 |
| Per-S-NSSAI time validity information for S-NSSAI 1 | | | | | | | | octet 3  octet a |
| Per-S-NSSAI time validity information for S-NSSAI 2 | | | | | | | | octet a+1\*  octet b\* |
| … | | | | | | | | octet b+1\*  octet c\* |
| Per-S-NSSAI time validity information for S-NSSAI n | | | | | | | | octet c+1\*  octet d\* |

figure 9.11.3.101.1 S-NSSAI time validity information information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of Per-S-NSSAI time validity information for S-NSSAI | | | | | | | | octet 3 |
| S-NSSAI | | | | | | | | octet 4  octet e |
| Per-S-NSSAI time validity information for the S-NSSAI | | | | | | | | octet e+1  octet a |

figure 9.11.3.101.2 Per-S-NSSAI time validity information for S-NSSAI 1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of Per-S-NSSAI time validity information for the S-NSSAI | | | | | | | | octet e+1 |
| Time window 1 | | | | | | | | octet e+2  octet f |
| Time window 2 | | | | | | | | octet f+1\*  octet g\* |
| … | | | | | | | | octet g+1\*  octet h\* |
| Time window m | | | | | | | | octet h+1\*  octet i\* |

figure 9.11.3.101.3 Per-S-NSSAI time validity information for the S-NSSAI

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of Time window 1 | | | | | | | | octet e+2 |
| Start time | | | | | | | | octet e+3  octet e+10 |
| Stop time | | | | | | | | octet e+11  octet e+18 |
| 0  Spare | 0  Spare | 0  Spare | 0  Spare | Recurrence pattern | | | | octet e+19\* |
| Recurrence end time | | | | | | | | octet e+20\*  octet e+27\* |

figure 9.11.3.101.4 time window 1

table 9.11.3.101.1 S-NSSAI time validity information information element

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| S-NSSAI (octet 6 to octet e)  S-NSSAI value is coded as the length and value part of S-NSSAI information element as specified in subclause 9.11.2.8 starting with the second octet. | | | | | |
|  | | | | | |
| Start time (octet e+3 to octet e+10) | | | | | |
| The field indicates the time when the network slice identified by the S-NSSAI becomes available (for the first time if octet e+20 is included) and is represented by the number of seconds since 00:00:00 on 1 January 1970 UTC and is encoded as the 64-bit NTP timestamp format defined in IETF RFC 5905 [36A], where binary encoding of the integer part is in the first 32 bits and binary encoding of the fraction part in the last 32 bits. | | | | | |
|  | | | | | |
| Stop time (octet e+11 to octet e+18) | | | | | |
| The field indicates the time when the network slice identified by the S-NSSAI becomes unavailable (for the first time if octet e+20 is included) and is represented by the number of seconds since 00:00:00 on 1 January 1970 UTC and is encoded as the 64-bit NTP timestamp format defined in IETF RFC 5905 [36A], where binary encoding of the integer part is in the first 32 bits and binary encoding of the fraction part in the last 32 bits. | | | | | |
|  | | | | | |
| Recurrence pattern (bit 1 to bit 4 of octet e+19) | | | | | |
| Bits | | | | | |
| 4 | 3 | 2 | 1 |  |  |
| 0 | 0 | 0 | 0 |  | Everyday |
| 0 | 0 | 0 | 1 |  | Every weekday |
| 0 | 0 | 1 | 0 |  | Every week |
| 0 | 0 | 1 | 1 |  | Every 2 weeks |
| 0 | 1 | 0 | 0 |  | Every month (absolute) |
| 0 | 1 | 0 | 1 |  | Every month (relative) |
| 0 | 1 | 1 | 0 |  | Every quarter (absolute) |
| 0 | 1 | 1 | 1 |  | Every quarter (relative) |
| 1 | 0 | 0 | 0 |  | Every 6 months (absolute) |
| 1 | 0 | 0 | 1 |  | Every 6 months (relative) |
| All other values are reserved.  The recurrence pattern indicates how often the time window is repeated. For example, if the time window starts at 13:00 on Wednesday January 1st 2020 and stops at 13:30 on Wednesday January 1st 2020 and the recurrent pattern is set to:  - "Everyday", the time window repeats everyday from 13:00 to 13:30;  - "Every week", the time window repeats every Wednesday from 13:00 to 13:30;  - "Every month (absolute)", the time window repeats every 1st day of the month  from 13:00 to 13:30; and  - "Every month (relative)", the time window repeats every month on the first  Wednesday from 13:00 to 13:30. | | | | | |
| Recurrence end time (octet e+20 to octet e+27) | | | | | |
| The field indicates the time when the repetition of the time window ends. If the field is not included and octet e+19 is included in the IE, the time window is repeated indefinitely.  The field is represented by the number of seconds since 00:00:00 on 1 January 1970 UTC and is encoded as the 64-bit NTP timestamp format defined in IETF RFC 5905 [36A], where binary encoding of the integer part is in the first 32 bits and binary encoding of the fraction part in the last 32 bits. | | | | | |
|  | | | | | |

#### 9.11.3.102 Non-3GPP path switching information

the purpose of the Non-3GPP path switching information information element is to request from the network to keep using the user plane resources of the old non-3GPP access during path switching to the new non-3GPP access

the Non-3GPP path switching information information element is coded as shown in figure 9.11.3.102.1 and table 9.11.3.102.1

the Non-3GPP path switching information is a type 4 information element with a length of 3 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Non-3GPP path switching information IEI | | | | | | | | octet 1 |
| Length of Non-3GPP path switching information | | | | | | | | octet 2 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | NSONR | octet 3 |
| Spare | | | | | | |

figure 9.11.3.102.1 Non-3GPP path switching information information element

table 9.11.3.102.1 Non-3GPP path switching information information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Non-3GPP path switching while using old non-3GPP resources (NSONR) (octet 3, bit 1) | | | | |
| Bit | | | | |
| 1 |  |  |  |  |
| 0 |  |  |  | non-3GPP path switching while using old non-3GPP resources not requested |
| 1 |  |  |  | non-3GPP path switching while using old non-3GPP resources requested |
|  | | | | |
| Bits 8 to 2 of octet 3 are spare and shall be coded as zero. | | | | |
|  | | | | |

#### 9.11.3.103 partial NSSAI

the purpose of the partial NSSAI information element is to deliver one or more S-NSSAIs in a set of tracking areas of a registration area from the network to the UE

the partial NSSAI information element is coded as shown in figure 9.11.3.103.1 and table 9.11.3.103.1

the partial NSSAI information element is a type 6 information element with a minimum length of 3 octets and a maximum length of 808 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Partial NSSAI IEI | | | | | | | | octet 1 |
| Length of partial NSSAI contents | | | | | | | | octet 2 |
| octet 3 |
| S-NSSAI value1 | | | | | | | | octet 4\*  octet i\* |
| Partial tracking area identity list 1 | | | | | | | | octet (i+1)\*  octet j\* |
| … | | | | | | | | octet (j+1)\*  octet l\* |
| S-NSSAI value n | | | | | | | | octet (l+1)\*  octet k\* |
| Partial tracking area identity list n | | | | | | | | octet (k+1)\*  octet m\* |

figure 9.11.3.103.1 partial NSSAI information element

table 9.11.3.103.1 partial NSSAI information element

|  |
| --- |
| S-NSSAI value (octet 4 to i) (NOTE 1) |
| S-NSSAI value is coded as the length and value part of S-NSSAI information element as specified in subclause 9.11.2.8 starting with the second octet. |
|  |
| Partial tracking area identity list (octet i+1 to j) |
| The partial tracking area identity list field is coded as the length and value part of the 5GS tracking area identity list IE defined in subclause 9.11.3.9 starting with the second octet (NOTE 2). |
|  |
| NOTE 1: The maximum number of S-NSSAIs included in this information element is 7.  NOTE 2: A registration area contains maximum 16 different tracking areas, therefore the partial tracking area identity list can contain at the most 15 tracking area identities.  NOTE 3: The AMF shall set the Length of partial NSSAI contents to 0 if there are no S-NSSAIs to deliver in a set of tracking areas of a registration area and, the UE shall delete any existing stored partially allowed NSSAI for the current registration area or partially rejected NSSAI for the current registration area. |
|  |

#### 9.11.3.104 AUN3 indication

the purpose of the AUN3 indication information element is to indicate to the network that the registration request by the 5G-RG is on behalf of an AUN3 device

the AUN3 indication information element is coded as shown in figure 9.11.3.104.1 and table 9.11.3.104.1

the AUN3 indication is a type 4 information element with a length of 3 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| AUN3 indication IEI | | | | | | | | octet 1 |
| Length of AUN3 indication | | | | | | | | octet 2 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | AUN3REG | octet 3 |
| Spare | | | | | | |

figure 9.11.3.104.1 AUN3 indication information element

table 9.11.3.104.1 AUN3 indication information element

|  |  |  |
| --- | --- | --- |
| AUN3 device indication bit (AUN3REG) (octet 3, bit 1) | | |
| Bit | | |
| 1 |  |  |
| 0 |  | AUN3 device registration is not requested |
| 1 |  | AUN3 device registration is requested |
|  | | |
| Bits 8 to 2 of octet 3 are spare and shall be coded as zero. | | |
|  | | |

9.11.3.105 feature authorization indication

the purpose of the feature authorization indication information element is to indicate whether the UE that is authorized to operate certain feature

the feature authorization indication is a type 4 information element with a minimum length of 3 octets and maximum length of 257 octets

the feature authorization indication information element is coded as shown in figure 9.11.3.105.1 and table 9.11.3.105.1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Feature authorization indication IEI | | | | | | | | octet 1 |
| Length of Feature authorization indication contents | | | | | | | | octet 2 |
| 0 | 0 | 0 | 0 | 0 | 0 | MBSRAI | | octet 3 |
| Spare | Spare | Spare | Spare | Spare | Spare |  | |  |
| Spare | | | | | | | | octet 4  octet n |

figure 9.11.3.105.1 feature authorization indication information element

table 9.11.3.105.1 feature authorization indication information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| MBSR authorization indication (MBSRAI) (octet 3, bit 1 to bit 2) | | | | |
| This field indicates whether UE is authorized or not to operate as an MBSR node | | | | |
| Bits | | | | |
| 2 | 1 |  |  |  |
| 0 | 0 |  |  | no information |
| 0 | 1 |  |  | not authorized to operate as MBSR but allowed to operate as a UE |
| 1 | 0 |  |  | authorized to operate as MBSR |
| 1 | 1 |  |  | spare |
|  |  |  |  |  |
| Bits 3 to 8 of octet 3 are spare and shall be coded as zero. | | | | |

#### 9.11.3.106 payload container information

the purpose of the payload container information information element is to provide information related to a payload container

the payload container information is a type 1 information element

the payload container information information element is coded as shown in figure 9.11.3.106.1 and table 9.11.3.106.1

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | | 4 | 3 | | 2 | | 1 |  |
| Payload container information  IEI | | | | 0 | | | 0  spare | | 0 | PRU | octet 1 |

figure 9.11.3.106.1 payload container information information element

table 9.11.3.106.1 payload container information information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| PRU related content (PRU) (octet 1, bit 1) | | | | |
| Bit | | | | |
| 1 |  |  |  |  |
| 0 |  |  |  | Payload container not related to PRU |
| 1 |  |  |  | Payload container related to PRU |
|  | | | | |
|  | | | | |
| Bits 2 to 4 are spare and shall be coded as zero. | | | | |

#### 9.11.3.107 AUN3 device security key

the purpose of the AUN3 device security key information element is to provide the security keys to the 5G-RG that is acting on behalf of an AUN3 device

the AUN3 device security key information element is coded as shown in figure 9.11.3.107.1 and table 9.11.3.107.1

the AUN3 device security key is a type 4 information element with a minimum length of 36 octets

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | | 6 | | | 5 | 4 | | 3 | 2 | | 1 |  |
| AUN3 device security key IEI | | | | | | | | | | | | | octet 1 |
| Length of AUN3 device security key content | | | | | | | | | | | | | octet 2 |
| 0 | | 0 | | 0 | 0 | | | 0 | 0 | | ASKT | | octet 3 |
| Spare | | | | | | | | | | |
| Length of key content | | | | | | | | | | | | | octet 4 |
| Key content | | | | | | | | | | | | | octet 5  octet n |

figure 9.11.3.107.1 AUN3 device security key information element

table 9.11.3.107.1 AUN3 device security key information element

|  |  |  |
| --- | --- | --- |
| AUN3 device security key type (ASKT) (bits 1 and 2 of octet 3) | | |
| The ASKT indicates which AUN3 device security key is included in the IE.  Bits | | |
| **2** | **1** |  |
| 0 | 0 | Master session key is included |
| 0 | 1 | KWAGF key is included |
| All other values are unused and shall be interpreted as "Master session key is included", if received by the UE. | | |
|  | | |
| Key content (octets 5 to n)  If ASKT is set to "Master session key included", the Key content contains the value of the Master session key as defined in 3GPP TS 33.501 [24]. If ASKT is set to "KWAGF key included", the Key content contains the value of the KWAGF key as defined in 3GPP TS 33.501 [24]. | | |
|  | | |

#### 9.11.3.108 On-demand NSSAI

the purpose of the On-demand NSSAI information element is to provide a list of one or more on-demand S-NSSAIs and the associated slice deregistration inactivity timer value per the on-demand S-NSSAI to the UE

the On-demand NSSAI information element is coded as shown in figure 9.11.3.108.1 figure 9.11.3.108.2 and table 9.11.3.108.1

the On-demand NSSAI is a type 4 information element with a minimum length of 5 octets and a maximum length of 210 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| On-demand NSSAI IEI | | | | | | | | octet 1 |
| Length of On-demand NSSAI contents | | | | | | | | octet 2 |
| Information of on-demand S-NSSAI 1 | | | | | | | | octet 3  octet a |
| Information of on-demand S-NSSAI 2 | | | | | | | | octet (a+1)\*  octet b\* |
| … | | | | | | | | octet (b+1)\*  octet c\* |
| Information of on-demand S-NSSAI n | | | | | | | | octet (c+1)\*  octet d\* |

figure 9.11.3.108.1 On-demand NSSAI information element

|  |  |
| --- | --- |
| Length of Information of on-demand S-NSSAI | octet 3 |
| On-demand S-NSSAI | octet 4  octet a-3 |
| Slice deregistration inactivity timer | octet (a-2)\*  octet a\* |

figure 9.11.3.108.2 information of on-demand S-NSSAI

table 9.11.3.108.1 On-demand NSSAI information element

|  |
| --- |
| Value part of the On-demand NSSAI information element (octet 3 to d)  The value part of the On-demand NSSAI information element consists of one or more Information of on-demand S-NSSAIs. Each Information of on-demand S-NSSAI consists of one on-demand S-NSSAI and optionally the slice deregistration inactivity timer of the on-demand S-NSSAI. The number of information of on-demand S-NSSAIs shall not exceed 16.  On-demand S-NSSAI (octet 4 to a-3)  On-demand S-NSSAI is coded as the length and value part of S-NSSAI information element as specified in subclause 9.11.2.8 starting with the second octet.  Slice deregistration inactivity timer (octet (a-2)\* to a\*)  Slice deregistration inactivity timer is coded as the value part of Time duration information element as specified in subclause 9.9.3.68 of 3GPP TS 24.301 [15] starting with the third octet. |

#### 9.11.3.109 extended 5GMM cause

the purpose of the extended 5GMM cause information element is to indicate additional information associated with a 5GMM cause

the extended 5GMM cause information element is coded as shown in figure 9.11.3.109.1 and table 9.11.3.109.1

the extended 5GMM cause is a type 4 information element with a length of 3 octets

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | | 5 | | 4 | | 3 | | 2 | | 1 | |  |
| Extended 5GMM cause IEI | | | | | | | | | | | | | octet 1 | |
| Length of Extended 5GMM cause contents | | | | | | | | | | | | | octet 2 | |
| 0  Spare | 0  Spare | 0  Spare | 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | Sat-NR | | octet 3 | |

figure 9.11.3.109.1 extended 5GMM cause information element

table 9.11.3.109.1 extended 5GMM cause information element

|  |  |  |
| --- | --- | --- |
| Sat-NR value (octet 3, bit 1) | | |
|  | | |
| Bit | | |
| 1 |  |  |
| 0 |  | Satellite NG-RAN allowed in PLMN |
| 1 |  | Satellite NG-RAN not allowed in PLMN |
|  | | |
|  | | |
| Bit 2 to 8 of octet 3 are spare and shall be coded as zero. | | |
|  | | |

#### 9.11.3.110 RAT utilization control

see subclause 9.9.3.3A in 3GPP TS 24.301 [15]

### 9.11.4 5GS session management (5GSM) information elements

#### 9.11.4.1 5GSM capability

the purpose of the 5GSM capability information element is to indicate UE capability related to the PDU session management

the 5GSM capability information element is coded as shown in figure 9.11.4.1.1 and table 9.11.4.1.1

the 5GSM capability is a type 4 information element with a minimum length of 3 octets and a maximum length of 15 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 5GSM capability IEI | | | | | | | | octet 1 |
| Length of 5GSM capability contents | | | | | | | | octet 2 |
| TPMIC | ATSSS-ST | | | | EPT-S1 | MH6-PDU | RqoS | octet 3 |
| 0 Spare | 0 Spare | 0 Spare | 0 Spare | 0 Spare | RTPMMI | SDNAEPC | APMQF | octet 4\* |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | octet 5\* -15\* |
| Spare | | | | | | | |

figure 9.11.4.1.1 5GSM capability information element

table 9.11.4.1.1 5GSM capability information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 5GSM capability value | | | | |
| RqoS (octet 3, bit 1) | | | | |
| This bit indicates the 5GSM capability to support reflective QoS. | | | | |
| 0 |  |  |  | Reflective QoS not supported |
| 1 |  |  |  | Reflective QoS supported |
|  | | | | |
| Multi-homed IPv6 PDU session (MH6-PDU) (octet 3, bit 2) | | | | |
| This bit indicates the 5GSM capability for Multi-homed IPv6 PDU session. | | | | |
| 0 |  |  |  | Multi-homed IPv6 PDU session not supported |
| 1 |  |  |  | Multi-homed IPv6 PDU session supported |
|  | | | | |
| Ethernet PDN type in S1 mode (EPT-S1) (octet 3, bit 3) | | | | |
| This bit indicates UE's 5GSM capability for Ethernet PDN type in S1 mode. | | | | |
| 0 |  |  |  | Ethernet PDN type in S1 mode not supported |
| 1 |  |  |  | Ethernet PDN type in S1 mode supported |
|  | | | | |
| Supported ATSSS steering functionalities and steering modes (ATSSS-ST) (octet 3, bits 4 to 7) | | | | |
| These bits indicate the 5GSM capability of ATSSS steering functionalities and steering modes | | | | |
| 0 | 0 | 0 | 0 | ATSSS not supported |
| 0 | 0 | 0 | 1 | ATSSS Low-Layer functionality with any steering mode allowed for ATSSS-LL supported |
| 0 | 0 | 1 | 0 | MPTCP functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode supported |
| 0 | 0 | 1 | 1 | MPTCP functionality with any steering mode and ATSSS-LL functionality with any steering mode allowed for ATSSS-LL supported |
| 0 | 1 | 0 | 0 | MPQUIC functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode supported |
| 0 | 1 | 0 | 1 | MPQUIC functionality with any steering mode and ATSSS-LL functionality with any steering mode allowed for ATSSS-LL supported |
| 0 | 1 | 1 | 0 | MPTCP functionality with any steering mode, MPQUIC functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode supported |
| 0 | 1 | 1 | 1 | MPTCP functionality with any steering mode, MPQUIC functionality with any steering mode and ATSSS-LL functionality with any steering mode allowed for ATSSS-LL supported |
| All other values are reserved. | | | | |
| Transfer of port management information containers (TPMIC) (octet 3, bit 8) | | | | |
| This bit indicates the 5GSM capability to support transfer of port management information containers | | | | |
| 0 |  |  |  | Transfer of port management information containers not supported |
| 1 |  |  |  | Transfer of port management information containers supported |
|  | | | | |
| Access performance measurements per QoS flow rule (APMQF) (octet 4, bit1) | | | | |
| This bit indicates the 5GSM capability to support access performance measurements using the QoS flow of the non default QoS rule, that is used by the service data flow (SDF) traffic. | | | | |
| 0 |  |  |  | Access performance measurements per QoS flow not supported. |
| 1 |  |  |  | Access performance measurements per QoS flow supported. |
|  | | | | |
| Secondary DN authentication and authorization over EPC (SDNAEPC) (octet 4, bit 2) | | | | |
| This bit indicates the 5GSM capability to support secondary DN authentication and authorization over EPC | | | | |
| 0 |  |  |  | Secondary DN authentication and authorization over EPC not supported |
| 1 |  |  |  | Secondary DN authentication and authorization over EPC supported |
|  | | | | |
| (S)RTP multiplexed media information (RTPMMI) (octet 4, bit 3) | | | | |
| 0 |  |  |  | (S)RTP multiplexed media information not supported. |
| 1 |  |  |  | (S)RTP multiplexed media information supported. |
|  | | | | |
| All other bits in octet 5 to 15 are spare and shall be coded as zero, if the respective octet is included in the information element. | | | | |

#### 9.11.4.2 5GSM cause

the purpose of the 5GSM cause information element is to indicate the reason why a 5GSM request is rejected

the 5GSM cause information element is coded as shown in figure 9.11.4.2.1 and table 9.11.4.2.1

the 5GSM cause is a type 3 information element with a length of 2 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 5GSM cause IEI | | | | | | | | octet 1 |
| Cause value | | | | | | | | octet 2 |

figure 9.11.4.2.1 5GSM cause information element

table 9.11.4.2.1 5GSM cause information element

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cause value (octet 2) | | | | | | | | | |
| Bits | | | | | | | | | |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |  |
| 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |  | Operator determined barring |
| 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 |  | Insufficient resources |
| 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 |  | Missing or unknown DNN |
| 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 |  | Unknown PDU session type |
| 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 |  | User authentication or authorization failed |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |  | Request rejected, unspecified |
| 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |  | Service option not supported |
| 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |  | Requested service option not subscribed |
| 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |  | PTI already in use |
| 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |  | Regular deactivation |
| 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 |  | 5GS QoS not accepted |
| 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |  | Network failure |
| 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 |  | Reactivation requested |
| 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 |  | Semantic error in the TFT operation |
| 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 |  | Syntactical error in the TFT operation |
| 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 |  | Invalid PDU session identity |
| 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 |  | Semantic errors in packet filter(s) |
| 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 |  | Syntactical error in packet filter(s) |
| 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 |  | Out of LADN service area |
| 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 |  | PTI mismatch |
| 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 |  | PDU session type IPv4 only allowed |
| 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 |  | PDU session type IPv6 only allowed |
| 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |  | PDU session does not exist |
| 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 |  | PDU session type IPv4v6 only allowed |
| 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 |  | PDU session type Unstructured only allowed |
| 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 |  | Unsupported 5QI value |
| 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 |  | PDU session type Ethernet only allowed |
| 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 |  | Insufficient resources for specific slice and DNN |
| 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |  | Not supported SSC mode |
| 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |  | Insufficient resources for specific slice |
| 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 |  | Missing or unknown DNN in a slice |
| 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 |  | Invalid PTI value |
| 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 |  | Maximum data rate per UE for user-plane integrity protection is too low |
| 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 |  | Semantic error in the QoS operation |
| 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 |  | Syntactical error in the QoS operation |
| 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |  | Invalid mapped EPS bearer identity |
| 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 |  | UAS services not allowed |
| 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |  | Semantically incorrect message |
| 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |  | Invalid mandatory information |
| 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |  | Message type non-existent or not implemented |
| 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |  | Message type not compatible with the protocol state |
| 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 |  | Information element non-existent or not implemented |
| 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |  | Conditional IE error |
| 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 |  | Message not compatible with the protocol state |
| 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 |  | Protocol error, unspecified |
|  |  |  |  |  |  |  |  |  |  |
| Any other value received by the UE shall be treated as 0001 1111, " Request rejected, unspecified ". Any other value received by the network shall be treated as 0110 1111, "protocol error, unspecified". | | | | | | | | | |

#### 9.11.4.3 Always-on PDU session indication

the purpose of the Always-on PDU session indication information element is to indicate whether a PDU session is established as an always-on PDU session

the Always-on PDU session indication information element is coded as shown in figure 9.11.4.3.1 and table 9.11.4.3.1

the Always-on PDU session indication is a type 1 information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Always-on PDU session indication IEI | | | | 0  Spare | 0  Spare | 0  Spare | APSI | octet 1 |

figure 9.11.4.3.1 Always-on PDU session indication

table 9.11.4.3.1 Always-on PDU session indication

|  |  |
| --- | --- |
| Always-on PDU session indication (APSI) (octet 1) | |
|  | |
| Bit | |
| **1** |  |
| 0 | Always-on PDU session not allowed |
| 1 | Always-on PDU session required |
|  | |
| Bits 2, 3 and 4 are spare and shall be coded as zero, | |

#### 9.11.4.4 Always-on PDU session requested

the purpose of the Always-on PDU session requested information element is to indicate whether a PDU session is requested to be established as an always-on PDU session

the Always-on PDU session requested information element is coded as shown in figure 9.11.4.4.1 and table 9.11.4.4.1

the Always-on PDU session requested is a type 1 information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Always-on PDU session requested IEI | | | | 0  Spare | 0  Spare | 0  Spare | APSR | octet 1 |

figure 9.11.4.4.1 Always-on PDU session requested

table 9.11.4.4.1 Always-on PDU session requested

|  |  |
| --- | --- |
| Always-on PDU session requested (APSR) (octet 1) | |
|  | |
| Bit | |
| **1** |  |
| 0 | Always-on PDU session not requested |
| 1 | Always-on PDU session requested |
|  | |
| Bits 2, 3 and 4 are spare and shall be coded as zero, | |

#### 9.11.4.5 allowed SSC mode

the purpose of the allowed SSC mode information element is to indicate the SSC modes allowed to be used by the UE for the PDU session

the allowed SSC mode information element is coded as shown in figure 9.11.4.5.1 and table 9.11.4.5.1

the allowed SSC mode is a type 1 information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Allowed SSC mode IEI | | | | 0  Spare | SSC3 | SSC2 | SSC1 | octet 1 |

figure 9.11.4.5.1 allowed SSC mode information element

table 9.11.4.5.1 allowed SSC mode information element

|  |  |
| --- | --- |
| SSC1 (octet 1, bit 1) | |
| Bit | |
| 1 |  |
| 0 | SSC mode 1 not allowed |
| 1 | SSC mode 1 allowed |
|  |  |
| SSC2 (octet 1, bit 2) | |
| Bit | |
| 2 |  |
| 0 | SSC mode 2 not allowed |
| 1 | SSC mode 2 allowed |
|  |  |
| SSC3 (octet 1, bit 3) | |
| Bit | |
| 3 |  |
| 0 | SSC mode 3 not allowed |
| 1 | SSC mode 3 allowed |
|  | |
| Bit 4 is spare and shall be encoded as zero. | |

#### 9.11.4.6 extended protocol configuration options

see subclause 10.5.6.3A in 3GPP TS 24.008 [12]

#### 9.11.4.7 integrity protection maximum data rate

the purpose of the integrity protection maximum data rate information element is for the UE to indicate to the network the maximum data rate per UE for user-plane integrity protection for uplink and the maximum data rate per UE for user-plane integrity protection for downlink that are supported by the UE

the integrity protection maximum data rate is coded as shown in figure 9.11.4.7.1 and table 9.11.4.7.2

the integrity protection maximum data rate is a type 3 information element with a length of 3 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Integrity protection maximum data rate IEI | | | | | | | | octet 1 |
| Maximum data rate per UE for user-plane integrity protection for uplink | | | | | | | | octet 2 |
| Maximum data rate per UE for user-plane integrity protection for downlink | | | | | | | | octet 3 |

figure 9.11.4.7.1 integrity protection maximum data rate information element

table 9.11.4.7.2 integrity protection maximum data rate information element

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Maximum data rate per UE for user-plane integrity protection for uplink (octet 2) | | | | | | | | | |
| Bits | | | | | | | | | |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |  |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  | 64 kbps (NOTE 3) |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |  | NULL (NOTE 1) |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  | Full data rate (NOTE 2) |
| All other values are spare and shall not be used by a UE compliant to the present version of this specification. If received they shall be interpreted as "64 kbps". | | | | | | | | | |
|  | | | | | | | | | |
| Maximum data rate per UE for user-plane integrity protection for downlink (octet 3) | | | | | | | | | |
| Bits | | | | | | | | | |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |  |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  | 64 kbps (NOTE 3) |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |  | NULL (NOTE 1) |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  | Full data rate (NOTE 2) |
| All other values are spare and shall not be used by a UE compliant to the present version of this specification. If received they shall be interpreted as "64 kbps". | | | | | | | | | |
| NOTE 1: This value shall be used when N3 data transfer is not supported by the UE or when the UE does not support standalone NR connected to 5GCN. | | | | | | | | | |
| NOTE 2: If the UE supports N3 data transfer and supports standalone NR connected to 5GCN (this includes UEs supporting NR-NR dual connectivity, NR-E-UTRA dual connectivity with MN terminated bearers or both of them as described in 3GPP TS 37.340 [51]), then the UE shall use this value. | | | | | | | | | |
| NOTE 3: The network can receive this value from a UE compliant to an earlier version of this specification. | | | | | | | | | |

#### 9.11.4.8 mapped EPS bearer contexts

the purpose of the mapped EPS bearer contexts information element is to indicate a set of EPS bearer contexts for a PDU session as described in subclause 6.1.4.1

the mapped EPS bearer contexts information element is a type 6 information element with a minimum length of 7 octet and a maximum length of 65538 octets

the mapped EPS bearer contexts information element is coded as shown in figure 9.11.4.8.1 figure 9.11.4.8.2 figure 9.11.4.8.3 and table 9.11.4.8.1

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
|  | Mapped EPS bearer contexts IEI | | | | | | | | octet 1 |
|  | Length of Mapped EPS bearer contexts contents | | | | | | | | octet 2 |
|  | octet 3 |
|  | Mapped EPS bearer context 1 | | | | | | | | octet 4  octet u |
|  | Mapped EPS bearer context 2 | | | | | | | | octet u+1  octet v |
|  | … | | | | | | | | octet v+1  octet w |
|  | Mapped EPS bearer context n | | | | | | | | octet w+1  octet x |

figure 9.11.4.8.1 mapped EPS bearer contexts

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 8 | 7 | 6 | 5 | | 4 | 3 | 2 | 1 |  |
|  | EPS bearer identity | | | | | | | | | octet 4 |
|  | Length of Mapped EPS bearer context | | | | | | | | | octet 5  octet 6 |
|  | Operation code | | 0  Spare | | E bit | Number of EPS parameters | | | | octet 7 |
|  | EPS parameters list | | | | | | | | | octet 8\*  octet u\* |

figure 9.11.4.8.2 mapped EPS bearer context

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
|  | EPS parameter identifier 1 | | | | | | | | octet 8 |
|  | Length of EPS parameter contents 1 | | | | | | | | octet 9 |
|  | EPS parameter contents 1 | | | | | | | | octet 10  octet h |
|  | EPS parameter identifier 2 | | | | | | | | octet h+1 |
|  | Length of EPS parameter contents 2 | | | | | | | | octet h+2 |
|  | EPS parameter contents 2 | | | | | | | | octet h+3  octet i |
|  | … | | | | | | | | octet i+1  octet j |
|  | EPS parameter identifier N | | | | | | | | octet j+1 |
|  | Length of EPS parameter contents N | | | | | | | | octet j+2 |
|  | EPS parameter contents N | | | | | | | | octet j+3  octet u |

figure 9.11.4.8.3 EPS parameters list

table 9.11.4.8.1 mapped EPS bearer contexts information element

|  |
| --- |
| EPS bearer identity (octet 4)  Bits 5 to 8 contain the EPS bearer identity, and are coded as specified in subclause 9.3.2 of 3GPP TS 24.301 [15]. Bits 1 to 4 are spare and shall be coded as zero.  Operation code (bits 8 to 7 of octet 7) Bits 8 7  0 0 Reserved 0 1 Create new EPS bearer  1 0 Delete existing EPS bearer  1 1 Modify existing EPS bearer  Bit 6 of octet 7 is spare and shall be coded as zero.  E bit (bit 5 of octet 7)  For the "create new EPS bearer" operation, the E bit is encoded as follows:  Bit 5  0 parameters list is not included (NOTE)  1 parameters list is included  For the "modify existing EPS bearer" operation, the E bit is encoded as follows:  Bit 5  0 extension of previously provided parameters list  1 replacement of all previously provided parameters list  If the E bit is set to "parameters list is included", the number of EPS parameters field has non-zero value. If the E bit is set to "extension of previously provided parameters list" or "replacement of previously provided parameters list", the number of parameters field has non-zero value. If the E bit is set to "extension of previously provided parameters" and one of the parameters in the new parameters list already exists in the previously provided parameters, the parameter shall be set to the new value. If the E bit is set to "replacement of all previously provided parameters list" and a parameter in the previously provided parameters is not provided in the new parameters list, the parameter shall be deleted.  For the "create new EPS bearer" operation and "delete existing EPS bearer" operation, bit 5 of octet 7 is ignored.  Number of EPS parameters (bits 4 to 1 of octet 7)  The number of EPS parameters contains the binary coding for the number of EPS parameters in the EPS parameters list field. The number of EPS parameters field is encoded in bits 4 through 1 of octet 7 where bit 4 is the most significant and bit 1 is the least significant bit.  EPS parameters list (octets 8 to u)  The EPS parameters list contains a variable number of EPS parameters.  Each EPS parameter included in the EPS parameters list is of variable length and consists of:  - an EPS parameter identifier (1 octet);  - the length of the EPS parameter contents (1 octet); and - the EPS parameter contents itself (variable amount of octets).  The EPS parameter identifier field is used to identify each EPS parameter included in the EPS parameters list and it contains the hexadecimal coding of the EPS parameter identifier. Bit 8 of the EPS parameter identifier field contains the most significant bit and bit 1 contains the least significant bit. In this version of the protocol, the following EPS parameter identifiers are specified:  - 01H (Mapped EPS QoS parameters); - 02H (Mapped extended EPS QoS parameters); and  - 03H (Traffic flow template).  - 04H (APN-AMBR).  - 05H (extended APN-AMBR).  If the EPS parameters list contains an EPS parameter identifier that is not supported by the receiving entity the corresponding EPS parameter shall be discarded.  The length of EPS parameter contents field contains the binary coded representation of the length of the EPS parameter contents field. The first bit in transmission order is the most significant bit.  When the parameter identifier indicates mapped EPS QoS parameters, the length and parameter contents field are coded as specified in subclause 9.9.4.3 of 3GPP TS 24.301 [15].  When the parameter identifier indicates mapped extended EPS QoS parameters, the length and parameter contents field are coded as specified in subclause 9.9.4.30 of 3GPP TS 24.301 [15].  When the parameter identifier indicates traffic flow template, the length and parameter contents field are coded from octet 2 as shown figure 10.5.144 and table 10.5.162 of 3GPP TS 24.008 [12].  When the parameter identifier indicates APN-AMBR, the length and parameter contents field are coded as specified in subclause 9.9.4.2 of 3GPP TS 24.301 [15].  When the parameter identifier indicates Extended APN-AMBR, the length and parameter contents field are coded as specified in subclause 9.9.4.29 of 3GPP TS 24.301 [15]. |
| NOTE: This value shall not be used In this version of the specification. |

#### 9.11.4.9 maximum number of supported packet filters

the purpose of the maximum number of supported packet filters information element is for the UE to indicate to the network the maximum number of packet filters associated with signaled QoS rules that can be supported by the UE for the PDU session that is being established when the PDU session type "IPv4" "IPv6" "IPv4v6" or "Ethernet"

the maximum number of supported packet filters is coded as shown in figure 9.11.4.9.1 and table 9.11.4.9.1

the maximum number of supported packet filters is a type 3 information element with a length of 3 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Maximum number of supported packet filters IEI | | | | | | | | octet 1 |
| Maximum number of supported packet filters | | | | | | | | octet 2 |
| Maximum number of supported packet filters (continued) | | | 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | octet 3 |

figure 9.11.4.9.1 maximum number of supported packet filters information element

table 9.11.4.9.1 maximum number of supported packet filters information element

|  |
| --- |
| Maximum number of supported packet filters (octet 2 to 3) |
| In the Maximum number of supported packet filters field bit 8 of the first octet is the most significant bit and bit 6 of second octet is the least significant bit. Bit 5 to bit 1 of the second octet are spare bits and shall be coded as zero.  The number of supported packet filters shall be in the range of 17 to 1024. |
|  |

#### 9.11.4.10 PDU address

the purpose of the PDU address information element is to assign to the UE

- an IPv4 address associated with a PDU session;

- an interface identifier for the IPv6 link local address associated with the PDU session; or

- an IPv4 address and an interface identifier for the IPv6 link local address associated with the PDU session

this purpose of the PDU address information element is also to enable the W-AGF acting on behalf of the FN-RG to provide an interface identifier for the IPv6 link local address associated with the PDU session suggested to be allocated to the FN-RG and to enable the SMF to provide SMF's IPv6 link local address to the W-AGF acting on behalf of the FN-RG

the PDU address information element is coded as shown in figure 9.11.4.10.1 and table 9.11.4.10.1

the PDU address is a type 4 information element with minimum length of 7 octets and a maximum length of 31 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| PDU address IEI | | | | | | | | octet 1 |
| Length of PDU address contents | | | | | | | | octet 2 |
| 0  Spare | 0  Spare | 0  Spare | 0  Spare | SI6LLA | PDU session type value | | | octet 3 |
| PDU address information | | | | | | | | octet 4  octet n |
| SMF's IPv6 link local address | | | | | | | | octet (n+1)\*  octet (n+16)\* |

figure 9.11.4.10.1 PDU address information element

table 9.11.4.10.1 PDU address information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| PDU session type value (octet 3, bits 1 to 3) | | | | |
| Bits | | | | |
| 3 | 2 | 1 |  |  |
| 0 | 0 | 1 |  | IPv4 |
| 0 | 1 | 0 |  | IPv6 |
| 0 | 1 | 1 |  | IPv4v6 |
|  | | | | |
| All other values are reserved. | | | | |
|  | | | | |
| SI6LLA (SMF's IPv6 link local address) bit (octet 3, bit 4) (see NOTE) | | | | |
| Bit | | | | |
| 4 |  |  |  |  |
| 0 |  |  |  | SMF's IPv6 link local address field is absent |
| 1 |  |  |  | SMF's IPv6 link local address field is present |
|  | | | | |
| Bits 5 to 8 of octet 3 are spare and shall be coded as zero. | | | | |
|  | | | | |
| PDU address information (octet 4 to n) | | | | |
|  | | | | |
| If the PDU session type value indicates IPv4, the PDU address information in octet 4 to octet 7 contains an IPv4 address. | | | | |
|  | | | | |
| If the PDU session type value indicates IPv6, the PDU address information in octet 4 to octet 11 contains an interface identifier for the IPv6 link local address. | | | | |
|  | | | | |
| If the PDU session type value indicates IPv4v6, the PDU address information in octet 4 to octet 11 contains an interface identifier for the IPv6 link local address and in octet 12 to octet 15 contains an IPv4 address. | | | | |
|  | | | | |
| SMF's IPv6 link local address (octet n+1 to n+16) | | | | |
|  | | | | |
| SMF's IPv6 link local address field contains SMF's IPv6 link local address. | | | | |
|  | | | | |
| NOTE: In the UE to network direction, the SI6LLA bit shall be set to "SMF's IPv6 link local address field is absent". | | | | |

#### 9.11.4.11 PDU session type

the purpose of the PDU session type information element is to indicate type of the PDU session

the PDU session type information element is coded as shown in figure 9.11.4.11.1 and table 9.11.4.11.1

the PDU session type is a type 1 information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| PDU session type IEI | | | | 0  Spare | PDU session type value | | | octet 1 |

figure 9.11.4.11.1 PDU session type information element

table 9.11.4.11.1 PDU session type information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| PDU session type value (octet 1, bit 1 to bit 3) | | | | |
| Bits | | | | |
| 3 | 2 | 1 |  |  |
| 0 | 0 | 1 |  | IPv4 |
| 0 | 1 | 0 |  | IPv6 |
| 0 | 1 | 1 |  | IPv4v6 |
| 1 | 0 | 0 |  | Unstructured |
| 1 | 0 | 1 |  | Ethernet |
| 1 | 1 | 1 |  | reserved |
|  | | | | |
| All other values are unused and shall be interpreted as "IPv4v6", if received by the UE or the network. | | | | |

#### 9.11.4.12 QoS flow descriptions

the purpose of the QoS flow descriptions information element is to indicate a set of QoS flow descriptions to be used by the UE where each QoS flow description is a set of parameters as described in subclause 6.2.5.1.1.4

the QoS flow descriptions information element is a type 6 information element with a minimum length of 6 octets the maximum length for the information element is 65538 octets

the QoS flow descriptions information element is coded as shown in figure 9.11.4.12.1 figure 9.11.4.12.2 figure 9.11.4.12.3 figure 9.11.4.12.4 and table 9.11.4.12.1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| QoS flow descriptions IEI | | | | | | | | octet 1 |
| Length of QoS flow descriptions contents | | | | | | | | octet 2  octet 3 |
| QoS flow description 1 | | | | | | | | octet 4  octet u |
| QoS flow description 2 | | | | | | | | octet u+1  octet v |
| ... | | | | | | | | octet v+1  octet w |
| QoS flow description n | | | | | | | | octet w+1  octet x |

figure 9.11.4.12.1 QoS flow descriptions information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 0  Spare | 0  Spare | QFI | | | | | | octet 4 |
| Operation code | | | 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | octet 5 |
| 0  Spare | E | Number of parameters | | | | | | octet 6 |
| Parameters list | | | | | | | | octet 7\*  octet u\* |

figure 9.11.4.12.2 QoS flow description

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Parameter 1 | | | | | | | | octet 7  octet m |
| Parameter 2 | | | | | | | | octet m+1  octet n |
| ... | | | | | | | | octet n+1  octet o |
| Parameter n | | | | | | | | octet o+1  octet u |

figure 9.11.4.12.3 parameters list

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Parameter identifier | | | | | | | | octet 7 |
| Length of parameter contents | | | | | | | | octet 8 |
| Parameter contents | | | | | | | | octet 9  octet m |

figure 9.11.4.12.4 parameter

table 9.11.4.12.1 QoS flow descriptions information element

|  |
| --- |
| QoS flow identifier (QFI) (bits 6 to 1 of octet 4)  QFI field contains the QoS flow identifier.  Bits  6 5 4 3 2 1  0 0 0 0 0 0 no QoS flow identifier assigned  0 0 0 0 0 1 QFI 1  to  1 1 1 1 1 1 QFI 63  The network shall not set the QFI value to 0. |
| Operation code (bits 8 to 6 of octet 5)  Bits  8 7 6  0 0 1 Create new QoS flow description  0 1 0 Delete existing QoS flow description  0 1 1 Modify existing QoS flow description  All other values are reserved. |
| E bit (bit 7 of octet 6)  For the "create new QoS flow description" operation, the E bit is encoded as follows:  Bit 7  0 reserved  1 parameters list is included  For the "Delete existing QoS flow description" operation, the E bit is encoded as follows:  Bit 7  0 parameters list is not included  1 reserved  For the "modify existing QoS flow description" operation, the E bit is encoded as follows:  Bit 7  0 extension of previously provided parameters  1 replacement of all previously provided parameters  If the E bit is set to "parameters list is not included", the number of parameters field has zero value. If the E bit is set to "parameters list is included", the number of parameters field has non-zero value. If the E bit is set to "extension of previously provided parameters" or "replacement of all previously provided parameters", the number of parameters field has non-zero value. If the E bit is set to "extension of previously provided parameters" and one of the parameters in the new parameters list already exists in the previously provided parameters, the parameter shall be set to the new value. If the E bit is set to "replacement of all previously provided parameters list" and a parameter in the previously provided parameters is not provided in the new parameters list, the parameter shall be deleted.  Number of parameters (bits 6 to 1 of octet 6)  The number of parameters field contains the binary coding for the number of parameters in the parameters list field. The number of parameters field is encoded in bits 6 through 1 of octet 6 where bit 6 is the most significant and bit 1 is the least significant bit.  Parameters list (octets 7 to u)  The parameters list contains a variable number of parameters.  Each parameter included in the parameters list is of variable length and consists of:  - a parameter identifier (1 octet);  - the length of the parameter contents (1 octet); and - the parameter contents itself (variable amount of octets).  The parameter identifier field is used to identify each parameter included in the parameters list and it contains the hexadecimal coding of the parameter identifier. Bit 8 of the parameter identifier field contains the most significant bit and bit 1 contains the least significant bit. In this version of the protocol, the following parameter identifiers are specified:  - 01H (5QI); - 02H (GFBR uplink);  - 03H (GFBR downlink);  - 04H (MFBR uplink);  - 05H (MFBR downlink);  - 06H (Averaging window); and  - 07H (EPS bearer identity).  If the parameters list contains a parameter identifier that is not supported by the receiving entity the corresponding parameter shall be discarded.  The length of parameter contents field contains the binary coded representation of the length of the parameter contents field. The first bit in transmission order is the most significant bit.  When the parameter identifier indicates 5QI, the parameter contents field contains the binary representation of 5G QoS identifier (5QI) that is one octet in length.  5QI:  Bits  8 7 6 5 4 3 2 1  0 0 0 0 0 0 0 0 Reserved  0 0 0 0 0 0 0 1 5QI 1  0 0 0 0 0 0 1 0 5QI 2  0 0 0 0 0 0 1 1 5QI 3  0 0 0 0 0 1 0 0 5QI 4  0 0 0 0 0 1 0 1 5QI 5  0 0 0 0 0 1 1 0 5QI 6  0 0 0 0 0 1 1 1 5QI 7  0 0 0 0 1 0 0 0 5QI 8  0 0 0 0 1 0 0 1 5QI 9  0 0 0 0 1 0 1 0 5QI 10  0 0 0 0 1 0 1 1  to Spare  0 1 0 0 0 0 0 0  0 1 0 0 0 0 0 1 5QI 65  0 1 0 0 0 0 1 0 5QI 66  0 1 0 0 0 0 1 1 5QI 67  0 1 0 0 0 1 0 0 Spare  0 1 0 0 0 1 0 1 5QI 69  0 1 0 0 0 1 1 0 5QI 70  0 1 0 0 0 1 1 1 5QI 71  0 1 0 0 1 0 0 0 5QI 72  0 1 0 0 1 0 0 1 5QI 73  0 1 0 0 1 0 1 0 5QI 74  0 1 0 0 1 0 1 1 5QI 75  0 1 0 0 1 1 0 0 5QI 76  0 1 0 0 1 1 0 1  to Spare  0 1 0 0 1 1 1 0  0 1 0 0 1 1 1 1 5QI 79  0 1 0 1 0 0 0 0 5QI 80  0 1 0 1 0 0 0 1 Spare  0 1 0 1 0 0 1 0 5QI 82  0 1 0 1 0 0 1 1 5QI 83  0 1 0 1 0 1 0 0 5QI 84  0 1 0 1 0 1 0 1 5QI 85  0 1 0 1 0 1 1 0 5QI 86  0 1 0 1 0 1 1 1 5QI 87  0 1 0 1 1 0 0 0 5QI 88  0 1 0 1 1 0 0 1 5QI 89  0 1 0 1 1 0 1 0 5QI 90  0 1 0 1 1 0 1 1  to Spare  0 1 1 1 1 1 1 1  1 0 0 0 0 0 0 0  to Operator-specific 5QIs  1 1 1 1 1 1 1 0  1 1 1 1 1 1 1 1 Reserved  The network shall consider all other values not explicitly defined in this version of the protocol as unsupported.  If the UE receives a 5QI value (excluding the reserved 5QI values) that it does not understand, the UE shall choose a 5QI value from the set of 5QI values defined in this version of the protocol (see 3GPP TS 23.501 [8]) and associated with:  - GBR QoS flows, if the QoS flow includes a GFBR uplink parameter, a GFBR downlink parameter, a MFBR uplink parameter and a MFBR downlink parameter; and  - non-GBR QoS flows, if the QoS flow does not include any one of a GFBR uplink parameter, a GFBR downlink parameter, a MFBR uplink parameter or a MFBR downlink parameter.  The UE shall use this chosen 5QI value for internal operations only. The UE shall use the received 5QI value in subsequent NAS signalling procedures.  When the parameter identifier indicates "GFBR uplink", the parameter contents field contains one octet indicating the unit of the guaranteed flow bit rate for uplink followed by two octets containing the value of the guaranteed flow bit rate for uplink.  Unit of the guaranteed flow bit rate for uplink (octet 1)  Bits  8 7 6 5 4 3 2 1  0 0 0 0 0 0 0 0 value is not used (see NOTE 2)  0 0 0 0 0 0 0 1 value is incremented in multiples of 1 Kbps  0 0 0 0 0 0 1 0 value is incremented in multiples of 4 Kbps  0 0 0 0 0 0 1 1 value is incremented in multiples of 16 Kbps  0 0 0 0 0 1 0 0 value is incremented in multiples of 64 Kbps  0 0 0 0 0 1 0 1 value is incremented in multiples of 256 Kbps  0 0 0 0 0 1 1 0 value is incremented in multiples of 1 Mbps  0 0 0 0 0 1 1 1 value is incremented in multiples of 4 Mbps  0 0 0 0 1 0 0 0 value is incremented in multiples of 16 Mbps  0 0 0 0 1 0 0 1 value is incremented in multiples of 64 Mbps  0 0 0 0 1 0 1 0 value is incremented in multiples of 256 Mbps  0 0 0 0 1 0 1 1 value is incremented in multiples of 1 Gbps  0 0 0 0 1 1 0 0 value is incremented in multiples of 4 Gbps  0 0 0 0 1 1 0 1 value is incremented in multiples of 16 Gbps  0 0 0 0 1 1 1 0 value is incremented in multiples of 64 Gbps  0 0 0 0 1 1 1 1 value is incremented in multiples of 256 Gbps  0 0 0 1 0 0 0 0 value is incremented in multiples of 1 Tbps  0 0 0 1 0 0 0 1 value is incremented in multiples of 4 Tbps  0 0 0 1 0 0 1 0 value is incremented in multiples of 16 Tbps  0 0 0 1 0 0 1 1 value is incremented in multiples of 64 Tbps  0 0 0 1 0 1 0 0 value is incremented in multiples of 256 Tbps  0 0 0 1 0 1 0 1 value is incremented in multiples of 1 Pbps  0 0 0 1 0 1 1 0 value is incremented in multiples of 4 Pbps  0 0 0 1 0 1 1 1 value is incremented in multiples of 16 Pbps  0 0 0 1 1 0 0 0 value is incremented in multiples of 64 Pbps  0 0 0 1 1 0 0 1 value is incremented in multiples of 256 Pbps  Other values shall be interpreted as multiples of 256 Pbps in this version of the protocol.  Value of the guaranteed flow bit rate for uplink (octets 2 and 3)  Octets 2 and 3 represent the binary coded value of the guaranteed flow bit rate for uplink in units defined by the unit of the guaranteed flow bit rate for uplink.  When the UE indicates subscribed GFBR for uplink, the "GFBR uplink" parameter is not included in the "Parameters list".  When the parameter identifier indicates "GFBR downlink", the parameter contents field contains one octet indicating the unit of the guaranteed flow bit rate for downlink followed by two octets containing the value of the guaranteed flow bit rate for downlink.  Unit of the guaranteed flow bit rate for downlink (octet 1)  The coding is identical to that of the unit of the guaranteed flow bit rate for uplink.  Value of the guaranteed flow bit rate for downlink (octets 2 and 3)  Octets 2 and 3 represent the binary coded value of the guaranteed flow bit rate for downlink in units defined by the unit of the guaranteed flow bit rate for downlink.  When the UE indicates subscribed GFBR for downlink, the "GFBR downlink" parameter is not included in the "Parameters list".  When the parameter identifier indicates "MFBR uplink", the parameter contents field contains the one octet indicating the unit of the maximum flow bit rate for uplink followed by two octets containing the value of maximum flow bit rate for uplink.  Unit of the maximum flow bit rate for uplink (octet 1)  The coding is identical to that of the unit of the guaranteed flow bit rate for uplink.  Value of the maximum flow bit rate for uplink (octets 2 and 3)  Octets 2 and 3 represent the binary coded value of the maximum flow bit rate for uplink in units defined by the unit of the maximum flow bit rate for uplink.  When the UE indicates subscribed MFBR for uplink, the "MFBR uplink" parameter is not included in the "Parameters list".  When the parameter identifier indicates "MFBR downlink", the parameter contents field contains one octet indicating the unit of the maximum flow bit rate for downlink followed by two octets containing the value of the maximum flow bit rate for downlink.  Unit of the maximum flow bit rate for downlink (octet 1)  The coding is identical to that of the unit of the guaranteed flow bit rate for uplink.  Value of the maximum flow bit rate for downlink (octets 2 and 3)  Octets 2 and 3 represent the binary coded value of the maximum flow bit rate for downlink in units defined by the unit of the maximum flow bit rate for downlink.  When the UE indicates subscribed MFBR for downlink, the "MFBR downlink" parameter is not included in the "Parameters list".  In this version of the protocol, for messages specified in the present document, the sending entity shall not request 0 kbps for both the maximum flow bit rate for downlink and the maximum flow bit rate for uplink at the same time. Any entity receiving a request for 0 kbps in both the maximum flow bit rate for downlink and the maximum flow bit rate for uplink shall consider that as a syntactical error (see clause 7).  When the parameter identifier indicates "averaging window", the parameter contents field contains the binary representation of the averaging window for both uplink and downlink in milliseconds and the parameter contents field is two octets in length.  When the parameter identifier indicates EPS bearer identity, the length of EPS bearer identity is one octet, bits 5 to 8 of the parameter contents contain the EPS bearer identity as specified in subclause 9.3.2 of 3GPP TS 24.301 [15] and bits 1 to 4 of the parameter contents are spare and shall be coded as zero. The UE shall not include the EPS bearer identity parameter in any mobile originated 5GSM messages (see NOTE 1). |
|  |
| NOTE 1: The total number of EPS bearer identities included in all QoS flow descriptions of a UE cannot exceed fifteen.  NOTE 2: In this release of the specifications if received it shall be interpreted as value is incremented in multiples of 1 Kbps. In earlier releases of specifications, the interpretation of this value is up to implementation. |

#### 9.11.4.13 QoS rules

the purpose of the QoS rules information element is to indicate a set of QoS rules to be used by the UE where each QoS rule is a set of parameters as described in subclause 6.2.5.1.1.2

a) for classification and marking of uplink user traffic; and

b) for identification of a QoS flow which the network is to use for a particular downlink user traffic

NOTE the UE needs to be aware of a QoS flow which the network is to use for a particular downlink user traffic e.g to determine whether a resource is available for downlink media of a media stream of an SDP media description provided by the UE in an IMS session

the QoS rules may contain a set of packet filters consisting of zero or more packet filters for UL direction zero or more packet filters for DL direction zero or more packet filters for both UL and DL directions or any combinations of these the set of packet filters determine the traffic mapping to QoS flows

the QoS rules information element is a type 6 information element with a minimum length of 7 octets the maximum length for the information element is 65538 octets

the QoS rules information element is coded as shown in figure 9.11.4.13.1 figure 9.11.4.13.2 figure 9.11.4.13.3 figure 9.11.4.13.4 and table 9.11.4.13.1

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
|  | QoS rules IEI | | | | | | | | octet 1 |
|  | Length of QoS rules IE | | | | | | | | octet 2 |
|  | octet 3 |
|  | QoS rule 1 | | | | | | | | octet 4  octet u |
|  | QoS rule 2 | | | | | | | | octet u+1  octet v |
|  | … | | | | | | | | octet v+1  octet w |
|  | QoS rule n | | | | | | | | octet w+1  octet x |

figure 9.11.4.13.1 QoS rules information element

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 8 | 7 | 6 | 5 | 4 | | 3 | 2 | 1 |  |
|  | QoS rule identifier | | | | | | | | | octet 4 |
|  | Length of QoS rule | | | | | | | | | octet 5 |
|  | octet 6 |
|  | Rule operation code | | | DQR bit | | Number of packet filters | | | | octet 7 |
|  | Packet filter list | | | | | | | | | octet 8\*  octet m\* |
|  | QoS rule precedence | | | | | | | | | octet m+1\* |
|  | 0  Spare | Segregation | QoS flow identifier (QFI) | | | | | | | octet m+2\* |

figure 9.11.4.13.2 QoS rule (u=m+2)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
|  | 0 | 0 | 0 | 0 | Packet filter identifier 1 | | | | octet 8 |
| Spare | | | |
|  | 0 | 0 | 0 | 0 | Packet filter identifier 2 | | | | octet 9 |
| Spare | | | |
|  | … | | | | | | | |  |
|  | 0 | 0 | 0 | 0 | Packet filter identifier N | | | | octet N+7 |
| Spare | | | |

figure 9.11.4.13.3 packet filter list when the rule operation is "modify existing QoS rule and delete packet filters" (m=N+7)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
|  | 0 | 0 | Packet filter direction 1 | | Packet filter identifier 1 | | | | octet 8 |
| Spare | |
|  | Length of packet filter contents 1 | | | | | | | | octet 9 |
|  | Packet filter contents 1 | | | | | | | | octet 10  octet m |
|  | 0 | 0 | Packet filter direction 2 | | Packet filter identifier 2 | | | | octet k+1 |
| Spare | |
|  | Length of packet filter contents 2 | | | | | | | | octet k+2 |
|  | Packet filter contents 2 | | | | | | | | octet k+3  octet n |
|  | … | | | | | | | | octet n+1  octet y |
|  | 0 | 0 | Packet filter direction N | | Packet filter identifier N | | | | octet y+1 |
| Spare | |
|  | Length of packet filter contents N | | | | | | | | octet y+2 |
|  | Packet filter contents N | | | | | | | | octet y+3  octet m |

figure 9.11.4.13.4 packet filter list when the rule operation is "create new QoS rule" or "modify existing QoS rule and add packet filters" or "modify existing QoS rule and replace all packet filters"

table 9.11.4.13.1 QoS rules information element

|  |
| --- |
| QoS rule identifier (octet 4)  The QoS rule identifier field is used to identify the QoS rule.  Bits  8 7 6 5 4 3 2 1  0 0 0 0 0 0 0 0 no QoS rule identifier assigned  0 0 0 0 0 0 0 1 QRI 1  to  1 1 1 1 1 1 1 1 QRI 255  The network shall not set the QRI value to 0.  QoS rule precedence (octet m+1)  The QoS rule precedence field is used to specify the precedence of the QoS rule among all QoS rules (both the signalled QoS rules as described in subclause 6.2.5.1.1.2 and the derived QoS rules as described in subclause 6.2.5.1.1.3) associated with the PDU session of the QoS flow. This field includes the binary coded value of the QoS rule precedence in the range from 0 to 255 (decimal). The higher the value of the QoS rule precedence field, the lower the precedence of that QoS rule is. For the "delete existing QoS rule" operation, the QoS rule precedence value field shall not be included. For the "create new QoS rule" operation, the QoS rule precedence value field shall be included.  The value 80 (decimal) is reserved.  Segregation bit (bit 7 of octet m+2) (see NOTE 1)  In the UE to network direction the segregation bit indicates whether the UE is requesting the network to bind service data flows described by the QoS rule to a dedicated QoS Flow and it is encoded as follows. In the network to UE direction this bit is spare.  Bit  7  0 Segregation not requested  1 Segregation requested  QoS flow identifier (QFI) (bits 6 to 1 of octet m+2) (see NOTE 1)  The QoS flow identifier (QFI) field contains the QoS flow identifier.  Bits  6 5 4 3 2 1  0 0 0 0 0 0 no QoS flow identifier assigned  0 0 0 0 0 1 QFI 1  to  1 1 1 1 1 1 QFI 63  The network shall not set the QFI value to 0.  For the "delete existing QoS rule" operation, the QoS flow identifier value field shall not be included. For the "create new QoS rule" operation, the QoS flow identifier value field shall be included.  DQR bit (bit 5 of octet 7)  The DQR bit indicates whether the QoS rule is the default QoS rule and it is encoded as follows:  Bit  5  0 the QoS rule is not the default QoS rule.  1 the QoS rule is the default QoS rule.  Rule operation code (bits 8 to 6 of octet 7) Bits 8 7 6  0 0 0 Reserved 0 0 1 Create new QoS rule  0 1 0 Delete existing QoS rule  0 1 1 Modify existing QoS rule and add packet filters  1 0 0 Modify existing QoS rule and replace all packet filters  1 0 1 Modify existing QoS rule and delete packet filters  1 1 0 Modify existing QoS rule without modifying packet filters  1 1 1 Reserved  Number of packet filters (bits 4 to 1 of octet 7)  The number of packet filters contains the binary coding for the number of packet filters in the packet filter list. The number of packet filters field is encoded in bits 4 through 1 of octet 7 where bit 4 is the most significant and bit 1 is the least significant bit. For the "delete existing QoS rule" operation and for the "modify existing QoS rule without modifying packet filters" operation, the number of packet filters shall be coded as 0. For the "create new QoS rule" operation and the "modify existing QoS rule and replace all packet filters" operation, the number of packet filters shall be greater than or equal to 0 and less than or equal to 15. For all other operations, the number of packet filters shall be greater than 0 and less than or equal to 15.  Packet filter list (octets 8 to m)  The packet filter list contains a variable number of packet filters.  For the "delete existing QoS rule" operation, the length of QoS rule field is set to one.  For the "delete existing QoS rule" operation and the "modify existing QoS rule without modifying packet filters" operation, the packet filter list shall be empty.  For the "modify existing QoS rule and delete packet filters" operation, the packet filter list shall contain a variable number of packet filter identifiers. This number shall be derived from the coding of the number of packet filters field in octet 7.  For the "create new QoS rule" operation and for the "modify existing QoS rule and replace all packet filters" operation, the packet filter list shall contain 0 or a variable number of packet filters. This number shall be derived from the coding of the number of packet filters field in octet 7.  For the "modify existing QoS rule and add packet filters" operation, the packet filter list shall contain a variable number of packet filters. This number shall be derived from the coding of the number of packet filters field in octet 7.  Each packet filter is of variable length and consists of  a packet filter direction (2 bits);  - a packet filter identifier (4 bits);  - the length of the packet filter contents (1 octet); and - the packet filter contents itself (variable amount of octets).  The packet filter direction field is used to indicate for what traffic direction the filter applies.  Bits  6 5  0 0 reserved  0 1 downlink only (see NOTE 2)  1 0 uplink only  1 1 bidirectional  The packet filter identifier field is used to identify each packet filter in a QoS rule. The least significant 4 bits are used. When the UE requests to "create new QoS rule", "modify existing QoS rule and replace all packet filters" or "modify existing QoS rule and add packet filters", the packet filter identifier values shall be set to 0.  The length of the packet filter contents field contains the binary coded representation of the length of the packet filter contents field of a packet filter. The first bit in transmission order is the most significant bit.  The packet filter contents field is of variable size and contains a variable number (at least one) of packet filter components. Each packet filter component shall be encoded as a sequence of a one octet packet filter component type identifier and a fixed length packet filter component value field. The packet filter component type identifier shall be transmitted first.  In each packet filter, there shall not be more than one occurrence of each packet filter component type. Among the "IPv4 remote address type" and "IPv6 remote address/prefix length type" packet filter components, only one shall be present in one packet filter. Among the "IPv4 local address type" and "IPv6 local address/prefix length type" packet filter components, only one shall be present in one packet filter. Among the "single local port type" and "local port range type" packet filter components, only one shall be present in one packet filter. Among the "single remote port type" and "remote port range type" packet filter components, only one shall be present in one packet filter. Among the "destination MAC address type" and "destination MAC address range type" packet filter components, only one shall be present in one packet filter. Among the "source MAC address type" and "source MAC address range type" packet filter components, only one shall be present in one packet filter. If the "match-all type" packet filter component is present in the packet filter, no other packet filter component shall be present in the packet filter and the length of the packet filter contents field shall be set to one. If the "Ethertype type" packet filter component is present in the packet filter and the "Ethertype type" packet filter component value is neither "0800H" (for IPv4) nor "86DDH" (for IPv6), no IP packet filter component shall be present in the packet filter.  The term "IP packet filter component" refers to "IPv4 remote address type", "IPv4 local address type", "IPv6 remote address/prefix length type", "IPv6 local address/prefix length type", "Protocol identifier/Next header type", "Single local port type", "Local port range type", "Single remote port type", "Remote port range type", "Security parameter index type", "Type of service/Traffic class type" and "Flow label type".  The term "(S)RTP multiplexed media packet filter component" refers to "synchronization source (SSRC) type" and "payload type type".  The "(S)RTP multiplexed media packet filter component" packet filter component can not be present in the packet filter with no "IP packet filter component".  The term local refers to the UE and the term remote refers to an external network entity.  Packet filter component type identifier Bits 8 7 6 5 4 3 2 1  0 0 0 0 0 0 0 1 Match-all type (see NOTE 2) 0 0 0 1 0 0 0 0 IPv4 remote address type 0 0 0 1 0 0 0 1 IPv4 local address type  0 0 1 0 0 0 0 1 IPv6 remote address/prefix length type 0 0 1 0 0 0 1 1 IPv6 local address/prefix length type 0 0 1 1 0 0 0 0 Protocol identifier/Next header type 0 1 0 0 0 0 0 0 Single local port type 0 1 0 0 0 0 0 1 Local port range type 0 1 0 1 0 0 0 0 Single remote port type  0 1 0 1 0 0 0 1 Remote port range type 0 1 1 0 0 0 0 0 Security parameter index type 0 1 1 1 0 0 0 0 Type of service/Traffic class type 1 0 0 0 0 0 0 0 Flow label type  1 0 0 0 0 0 0 1 Destination MAC address type 1 0 0 0 0 0 1 0 Source MAC address type 1 0 0 0 0 0 1 1 802.1Q C-TAG VID type 1 0 0 0 0 1 0 0 802.1Q S-TAG VID type 1 0 0 0 0 1 0 1 802.1Q C-TAG PCP/DEI type 1 0 0 0 0 1 1 0 802.1Q S-TAG PCP/DEI type 1 0 0 0 0 1 1 1 Ethertype type 1 0 0 0 1 0 0 0 Destination MAC address range type 1 0 0 0 1 0 0 1 Source MAC address range type 1 0 0 1 0 0 0 1 Synchronization source (SSRC) type 1 0 0 1 0 0 1 0 Payload type type  All other values are reserved.  The description and valid combinations of packet filter component type identifiers in a packet filter are defined in 3GPP TS 23.501 [8].  For "match-all type", the packet filter component shall not include the packet filter component value field.  For "IPv4 remote address type", the packet filter component value field shall be encoded as a sequence of a four octet IPv4 address field and a four octet IPv4 address mask field. The IPv4 address field shall be transmitted first.  For "IPv4 local address type", the packet filter component value field shall be encoded as defined for "IPv4 remote address type".  For "IPv6 remote address/prefix length type", the packet filter component value field shall be encoded as a sequence of a sixteen octet IPv6 address field and one octet prefix length field. The IPv6 address field shall be transmitted first.  For "IPv6 local address/prefix length type", the packet filter component value field shall be encoded as defined for "IPv6 remote address /prefix length".  For "protocol identifier/Next header type", the packet filter component value field shall be encoded as one octet which specifies the IPv4 protocol identifier or Ipv6 next header.  For "single local port type" and "single remote port type", the packet filter component value field shall be encoded as two octets which specify a port number.  For "local port range type" and "remote port range type", the packet filter component value field shall be encoded as a sequence of a two octet port range low limit field and a two octet port range high limit field. The port range low limit field shall be transmitted first.  For "security parameter index", the packet filter component value field shall be encoded as four octets which specify the IPSec security parameter index.  For "type of service/traffic class type", the packet filter component value field shall be encoded as a sequence of a one octet type-of-service/traffic class field and a one octet type-of-service/traffic class mask field. The type-of-service/traffic class field shall be transmitted first.  For "flow label type", the packet filter component value field shall be encoded as three octets which specify the IPv6 flow label. The bits 8 through 5 of the first octet shall be spare whereas the remaining 20 bits shall contain the IPv6 flow label.  For "destination MAC address type" and "source MAC address type", the packet filter component value field shall be encoded as 6 octets which specify a MAC address. When the packet filter direction field indicates "bidirectional", the destination MAC address is the remote MAC address and the source MAC address is the local MAC address.  For "802.1Q C-TAG VID type", the packet filter component value field shall be encoded as two octets which specify the VID of the customer-VLAN tag (C-TAG). The bits 8 through 5 of the first octet shall be spare whereas the remaining 12 bits shall contain the VID. If there are more than one C-TAG in the Ethernet frame header, the outermost C-TAG is evaluated.  For "802.1Q S-TAG VID type", the packet filter component value field shall be encoded as two octets which specify the VID of the service-VLAN tag (S-TAG). The bits 8 through 5 of the first octet shall be spare whereas the remaining 12 bits shall contain the VID. If there are more than one S-TAG in the Ethernet frame header, the outermost S-TAG is evaluated.  For "802.1Q C-TAG PCP/DEI type", the packet filter component value field shall be encoded as one octet which specifies the 802.1Q C-TAG PCP and DEI. The bits 8 through 5 of the octet shall be spare, the bits 4 through 2 contain the PCP and bit 1 contains the DEI. If there are more than one C-TAG in the Ethernet frame header, the outermost C-TAG is evaluated.  For "802.1Q S-TAG PCP/DEI type", the packet filter component value field shall be encoded as one octet which specifies the 802.1Q S-TAG PCP. The bits 8 through 5 of the octet shall be spare, the bits 4 through 2 contain the PCP and bit 1 contains the DEI. If there are more than one S-TAG in the Ethernet frame header, the outermost S-TAG is evaluated.  For "ethertype type", the packet filter component value field shall be encoded as two octets which specify an ethertype.    For "destination MAC address range type", the packet filter component value field shall be encoded as a sequence of a 6 octet destination MAC address range low limit field and a 6 octet destination MAC address range high limit field. The destination MAC address range low limit field shall be transmitted first. When the packet filter direction field indicates "bidirectional", the destination MAC address range is the remote MAC address range.  For "source MAC address range type", the packet filter component value field shall be encoded as a sequence of a 6 octet source MAC address range low limit field and a 6 octet source MAC address range high limit field. The source MAC address range low limit field shall be transmitted first. When the packet filter direction field indicates "bidirectional", the source MAC address is the local MAC address range.  For "synchronization source (SSRC) type", the packet filter component value field shall be encoded as 4 octet SSRC field which specify the synchronization source identifier in the RTP header as specified in IETF RFC 3550 [71].  For "payload type type", the packet filter component value field shall be encoded as octet payload type field which contains the binary representation of an integer between 1(inclusive) and 127(inclusive) as specified in IETF RFC 3550 [71]. |
| NOTE 1: Octet m+2 shall not be included without octet m+1.  NOTE 2: The "Match-all type" packet filter component type identifier shall not be used with packet filter direction "downlink only". |

Editor's note [WI XRM\_Ph2 CR 6576] other packet filter component types are FFS

#### 9.11.4.14 Session-AMBR

the purpose of the Session-AMBR information element is to indicate the initial subscribed PDU session aggregate maximum bit rate when the UE establishes a PDU session or to indicate the new subscribed PDU session aggregate maximum bit rate if it is changed by the network

the Session-AMBR information element is coded as shown in figure 9.11.4.14.1 and table 9.11.4.14.1

the Session-AMBR is a type 4 information element with a length of 8 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Session-AMBR IEI | | | | | | | | octet 1 |
| Length of Session-AMBR contents | | | | | | | | octet 2 |
| Unit for Session-AMBR for downlink | | | | | | | | octet 3 |
| Session-AMBR for downlink | | | | | | | | octet 4-5 |
| Unit for Session-AMBR for uplink | | | | | | | | octet 6 |
| Session-AMBR for uplink | | | | | | | | octet 7-8 |

figure 9.11.4.14.1 Session-AMBR information element

table 9.11.4.14.1 Session-AMBR information element

|  |
| --- |
| Unit for Session-AMBR for downlink (octet 3)  0 0 0 0 0 0 0 0 value is not used (see NOTE)  0 0 0 0 0 0 0 1 value is incremented in multiples of 1 Kbps  0 0 0 0 0 0 1 0 value is incremented in multiples of 4 Kbps  0 0 0 0 0 0 1 1 value is incremented in multiples of 16 Kbps  0 0 0 0 0 1 0 0 value is incremented in multiples of 64 Kbps  0 0 0 0 0 1 0 1 value is incremented in multiples of 256 kbps  0 0 0 0 0 1 1 0 value is incremented in multiples of 1 Mbps  0 0 0 0 0 1 1 1 value is incremented in multiples of 4 Mbps  0 0 0 0 1 0 0 0 value is incremented in multiples of 16 Mbps  0 0 0 0 1 0 0 1 value is incremented in multiples of 64 Mbps  0 0 0 0 1 0 1 0 value is incremented in multiples of 256 Mbps  0 0 0 0 1 0 1 1 value is incremented in multiples of 1 Gbps  0 0 0 0 1 1 0 0 value is incremented in multiples of 4 Gbps  0 0 0 0 1 1 0 1 value is incremented in multiples of 16 Gbps  0 0 0 0 1 1 1 0 value is incremented in multiples of 64 Gbps  0 0 0 0 1 1 1 1 value is incremented in multiples of 256 Gbps  0 0 0 1 0 0 0 0 value is incremented in multiples of 1 Tbps  0 0 0 1 0 0 0 1 value is incremented in multiples of 4 Tbps  0 0 0 1 0 0 1 0 value is incremented in multiples of 16 Tbps  0 0 0 1 0 0 1 1 value is incremented in multiples of 64 Tbps  0 0 0 1 0 1 0 0 value is incremented in multiples of 256 Tbps  0 0 0 1 0 1 0 1 value is incremented in multiples of 1 Pbps  0 0 0 1 0 1 1 0 value is incremented in multiples of 4 Pbps  0 0 0 1 0 1 1 1 value is incremented in multiples of 16 Pbps  0 0 0 1 1 0 0 0 value is incremented in multiples of 64 Pbps  0 0 0 1 1 0 0 1 value is incremented in multiples of 256 Pbps  Other values shall be interpreted as multiples of 256 Pbps in this version of the protocol.  Session-AMBR for downlink (octets 4 and 5)  Octets 4 and 5 represent the binary coded value of PDU session aggregated maximum bit rate for downlink in units defined by octet 3.  Unit for Session-AMBR for uplink (octet 6)  The coding is identical to the unit coding defined for Session-AMBR for downlink (octet 3)  Session-AMBR for uplink (octets 7 and 8)  Octets 7 and 8 represent the binary coded value of PDU session aggregated maximum bit rate for uplink in units defined by octet 6. |
| NOTE: In this release of the specifications if received it shall be interpreted as value is incremented in multiples of 1 Kbps. In earlier releases of specifications, the interpretation of this value is up to implementation. |

#### 9.11.4.15 SM PDU DN request container

the purpose of the SM PDU DN request container information element is to carry a DN-specific identity of the UE in the network access identifier (NAI) format

the SM PDU DN request container information element is coded as shown in figure 9.11.4.15.1 and table 9.11.4.15.1

the SM PDU DN request container is a type 4 information element with minimal length of 3 octets and maximum length of 255 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| SM PDU DN request container information IEI | | | | | | | | octet 1 |
| SM PDU DN request container information length | | | | | | | | octet 2 |
| DN-specific identity | | | | | | | | octets 3\*-n\* |

figure 9.11.4.15.1 SM PDU DN request container information element

table 9.11.4.15.1 SM PDU DN request container information element

|  |
| --- |
| DN-specific identity (octet 3 to octet n)  A DN-specific identity of the UE in the network access identifier (NAI) format according to IETF RFC 7542 [37], encoded as UTF-8 string. |

#### 9.11.4.16 SSC mode

the purpose of the SSC mode information element is to indicate SSC mode

the SSC mode information element is coded as shown in figure 9.11.4.16.1 and table 9.11.4.16.1

the SSC mode is a type 1 information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| SSC mode IEI | | | | 0  Spare | SSC mode value | | | octet 1 |

figure 9.11.4.16.1 SSC mode information element

table 9.11.4.16.1 SSC mode information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SSC mode value (octet 1, bit 1 to bit 4) | | | | |
| Bits | | | | |
| 3 | 2 | 1 |  |  |
| 0 | 0 | 1 |  | SSC mode 1 |
| 0 | 1 | 0 |  | SSC mode 2 |
| 0 | 1 | 1 |  | SSC mode 3 |
| 1 | 0 | 0 |  | unused; shall be interpreted as "SSC mode 1", if received by the network |
| 1 | 0 | 1 |  | unused; shall be interpreted as "SSC mode 2", if received by the network |
| 1 | 1 | 0 |  | unused; shall be interpreted as "SSC mode 3", if received by the network |
|  | | | | |
| All other values are reserved. | | | | |

#### 9.11.4.17 Re-attempt indicator

the purpose of the Re-attempt indicator information element is to indicate a condition under which the UE is allowed in the current PLMN or its equivalent PLMN(s) or the current SNPN or its equivalent SNPNs for the same DNN to re-attempt a session management procedure (see 3GPP TS 24.301 [15]) corresponding to the 5GS session management procedure which was rejected by the network

the Re-attempt indicator information element is coded as shown in figure 9.11.4.17.1 and table 9.11.4.17.1

the Re-attempt indicator is a type 4 information element with a length of 3 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Re-attempt indicator IEI | | | | | | | | octet 1 |
| Length of Re-attempt indicator contents | | | | | | | | octet 2 |
| 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | EPLMNC | RATC | octet 3 |

figure 9.11.4.17.1 Re-attempt indicator

table 9.11.4.17.1 Re-attempt indicator

|  |  |
| --- | --- |
| RATC (octet 3, bit 1) | |
| Bit | |
| 1 |  |
| 0 | UE is allowed to re-attempt the procedure in S1 mode |
| 1 | UE is not allowed to re-attempt the procedure in S1 mode |
|  | |
| EPLMNC (octet 3, bit 2) | |
| Bit | |
| 2 |  |
| 0 | UE is allowed to re-attempt the procedure in an equivalent PLMN or equivalent SNPN |
| 1 | UE is not allowed to re-attempt the procedure in an equivalent PLMN or equivalent SNPN |
|  | |
| Bits 3 to 8 of octet 3 are spare and shall be encoded as zero. | |

#### 9.11.4.18 5GSM network feature support

the purpose of the 5GSM network feature support information element is to indicate whether certain session management related features are supported by the network

the 5GSM network feature support information element is coded as shown in figure 9.11.4.18.1 and table 9.11.4.18.1

the 5GSM network feature support is a type 4 information element with a minimum length of 3 octets and a maximum length of 15 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 5GSM network feature support IEI | | | | | | | | octet 1 |
| Length of 5GSM network feature support contents | | | | | | | | octet 2 |
| 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | NAPS | EPT-S1 | octet 3 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | octet 4\* -15\* |
| Spare | | | | | | | |

figure 9.11.4.18.1 5GSM network feature support information element

table 9.11.4.18.1 5GSM network feature support information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 5GSM network feature support contents | | | | |
| Ethernet PDN type in S1 mode (IEPT-S1) (octet 3, bit 1) | | | | |
| This bit indicates network's capability for Ethernet PDN type in S1 mode. | | | | |
| 0 |  |  |  | Ethernet PDN type in S1 mode not supported |
| 1 |  |  |  | Ethernet PDN type in S1 mode supported |
|  | | | | |
|  | | | | |
| Non-3GPP access path switching (NAPS) (octet 3, bit 2) | | | | |
| This bit indicates whether non-3GPP access path switching is supported. | | | | |
| Bit | | | | |
| **2** | | | | |
| 0 |  |  |  | non-3GPP access path switching not supported |
| 1 |  |  |  | non-3GPP access path switching supported |
|  | | | | |
| All other bits in octet 3 to 15 are spare and shall be coded as zero, if the respective octet is included in the information element. | | | | |
|  | | | | |

#### 9.11.4.19 void

#### 9.11.4.20 serving PLMN rate control

see subclause 9.9.4.28 in 3GPP TS 24.301 [15]

#### 9.11.4.21 5GSM congestion re-attempt indicator

the purpose of the 5GSM congestion re-attempt indicator information element is to indicate whether the back-off timer is applied in the registered PLMN or all PLMNs or in the registered SNPN or all equivalent SNPNs and additionally to indicate whether the back-off timer is applied in the current access type or both 3GPP access type and non-3GPP access type

the 5GSM congestion re-attempt indicator information element is coded as shown in figure 9.11.4.21.1 and table 9.11.4.21.1

the 5GSM congestion re-attempt indicator is a type 4 information element with a length of 3 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 5GSM congestion re-attempt indicator IEI | | | | | | | | octet 1 |
| Length of 5GSM congestion re-attempt indicator contents | | | | | | | | octet 2 |
| 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | CATBO | ABO | octet 3 |

figure 9.11.4.21.1 5GSM congestion re-attempt indicator

table 9.11.4.21.1 5GSM congestion re-attempt indicator

|  |  |
| --- | --- |
| ABO (All PLMNs Back-off timer) (octet 3, bit 1) | |
| Bit | |
| 1 |  |
| 0 | The back-off timer is applied in the registered PLMN or registered SNPN. |
| 1 | The back-off timer is applied in all PLMNs or all equivalent SNPNs. |
|  | |
| CATBO (Current Access Type Back-off Timer) (octet 3, bit 2)  Bit  **2** | |
| 0 | The back-off timer is applied in both 3GPP access type and non-3GPP access type |
| 1 | The back-off timer is applied in the current access type |
| Bits 3 to 8 of octet 3 are spare and shall be encoded as zero. | |

#### 9.11.4.22 ATSSS container

the purpose of the ATSSS container information element is to transfer parameters associated with ATSSS

the ATSSS container information element is coded as shown in figure 9.11.4.22.1 and table 9.11.4.22.1

the ATSSS container is a type 6 information element with a minimum length of 3 octets and a maximum length of 65538 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| ATSSS container IEI | | | | | | | | octet 1 |
| Length of ATSSS container contents | | | | | | | | octet 2  octet 3 |
| ATSSS container contents | | | | | | | | octet 4\*  octet x\* |

figure 9.11.4.22.1 ATSSS container information element

table 9.11.4.22.1 ATSSS container information element

|  |
| --- |
| ATSSS container contents are defined in 3GPP TS 24.193 [13B]. |

#### 9.11.4.23 control plane only indication

the purpose of the control plane only indication information element is to indicate that a PDU session is only for control plane CIoT 5GS optimization

the control plane only indication information element is coded as shown in figure 9.11.4.23.1

the control plane only indication is a type 1 information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Control plane only indication IEI | | | | 0  Spare | 0  Spare | 0  Spare | CPOI value | octet 1 |

figure 9.11.4.23.1 control plane only indication information element

table 9.11.4.23.1 control plane only indication information element

|  |  |
| --- | --- |
| Control plane only indication value (CPOI) (octet 1) | |
| Bit | |
| 1 |  |
| 0 | reserved |
| 1 | PDU session can be used for control plane CIoT 5GS optimization only |
|  | |
| The value 0 is reserved. If received, it shall be interpreted as if the control plane only indication IE was not included in the message. | |
| Bits 4 to 2 of octet 1 are spare and shall be all encoded as zero. | |
|  | |

#### 9.11.4.24 IP header compression configuration

the purpose of the IP header compression configuration information element is to negotiate ROHC channel setup parameters specified in IETF RFC 5795 [39B] and optionally provide additional header compression context setup parameters

the IP header compression configuration information element is coded as shown in figure 9.11.4.24.1 and table 9.11.4.24.1

the IP header compression configuration is a type 4 information element with a minimum length of 5 octets and a maximum length of 257 octets

the optional additional IP header compression parameters container field conveys the additional header compression context setup parameters as specified in 3GPP TS 23.501 [8] in a generic container this field corresponds to the profile-specific information in the header of the ROHC IR packet type in IETF RFC 5795 [39B]

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| IP header compression configuration IEI | | | | | | | | octet 1 |
| Length of IP header compression configuration contents | | | | | | | | octet 2 |
| Spare | P0x0104 | P0x0103 | P0x0102 | P0x0006 | P0x0004 | P0x0003 | P0x0002 | octet 3 |
| MAX\_CID | | | | | | | | octet 4 |
| octet 5 |
| Additional IP header compression context setup parameters type | | | | | | | | octet 6\* |
| Additional IP header compression context setup parameters container | | | | | | | | octet 7\* |
|  |
| octet n\* |

figure 9.11.4.24.1 IP header compression configuration information element

table 9.11.4.24.1 IP header compression configuration information element

|  |
| --- |
| ROHC Profiles (octet 3)  The ROHC Profiles shall indicate which of the ROHC profiles is supported. When a particular bit is set to 1, this indicates that the corresponding profile is supported. The No Compression profile 0x0000 (see IETF RFC 5795 [39B]) shall always be supported. When all the bits are set to 0, this indicates that only the No Compression profile 0x0000 is supported.  Profile 0x0002 support indicator (see IETF RFC 3095 [33A] and IETF RFC 4815 [38A]) (octet 3 bit 1)  0 RoHC profile 0x0002 (UDP/IP) is not supported  1 RoHC profile 0x0002 (UDP/IP) is supported  Profile 0x0003 support indicator (see IETF RFC 3095 [33A] and IETF RFC 4815 [38A]) (octet 3 bit 2)  0 RoHC profile 0x0003 (ESP/IP) is not supported  1 RoHC profile 0x0003 (ESP/IP) is supported  Profile 0x0004 support indicator (see IETF RFC 3843 [34A] and IETF RFC 4815 [38A]) (octet 3 bit 3)  0 RoHC profile 0x0004 (IP) is not supported  1 RoHC profile 0x0004 (IP) is supported  Profile 0x0006 support indicator (see IETF RFC 6846 [40B]) (octet 3 bit 4)  0 RoHC profile 0x0006 (TCP/IP) is not supported  1 RoHC profile 0x0006 (TCP/IP) is supported  Profile 0x0102 support indicator (see IETF RFC 5225 [39A]) (octet 3 bit 5)  0 RoHC profile 0x0102 (UDP/IP) is not supported  1 RoHC profile 0x0102 (UDP/IP) is supported  Profile 0x0103 support indicator (see IETF RFC 5225 [39A]) (octet 3 bit 6)  0 RoHC profile 0x0103 (ESP/IP) is not supported  1 RoHC profile 0x0103 (ESP/IP) is supported  Profile 0x0104 support indicator (see IETF RFC 5225 [39A]) (octet 3 bit 7)  0 RoHC profile 0x0104 (IP) is not supported  1 RoHC profile 0x0104 (IP) is supported  Bits 8 is spare and shall be set to 0.  MAX\_CID (octet 4 and octet 5)  This is the MAX\_CID value as specified in 3GPP TS 36.323 [25]. It is encoded in binary coding with a value in the range from 1 to 16383.  Additional IP header compression context parameters type (octet 6).  The Additional IP header compression context parameters type octet indicates the profile associated with the profile-specific information in the Additional IP header compression context parameters container.  Bits  **8 7 6 5 4 3 2 1** Type    0 0 0 0 0 0 0 0 0x0000 (No Compression)  0 0 0 0 0 0 0 1 0x0002 (UDP/IP)  0 0 0 0 0 0 1 0 0x0003 (ESP/IP)  0 0 0 0 0 0 1 1 0x0004 (IP)  0 0 0 0 0 1 0 0 0x0006 (TCP/IP)  0 0 0 0 0 1 0 1 0x0102 (UDP/IP)  0 0 0 0 0 1 1 0 0x0103 (ESP/IP)  0 0 0 0 0 1 1 1 0x0104 (IP)  0 0 0 0 1 0 0 0 Other  0 0 0 0 1 0 0 1  to  1 1 1 1 1 1 1 1 Spare  Additional IP header compression context parameters container (octets 7 to n).  Additional IP header compression context parameters container carries the profile-specific information (see IETF RFC 5795 [39B]). The maximum size is 251 octets.  NOTE: If the Additional IP header compression context setup parameters container is included, then the Additional IP header compression context parameters type shall be included in the octet 6. |

#### 9.11.4.25 DS-TT ethernet port MAC address

the purpose of the DS-TT ethernet port MAC address information element is to signal the MAC address of the DS-TT ethernet port used for a PDU session of "Ethernet" PDU session type

the DS-TT ethernet port MAC address information element is coded as shown in figure 9.11.4.25.1 and table 9.11.4.25.1

the DS-TT ethernet port MAC address is a type 4 information element with a length of 8 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| DS-TT Ethernet port MAC address IEI | | | | | | | | octet 1 |
| Length of DS-TT Ethernet port MAC address contents | | | | | | | | octet 2 |
|  | | | | | | | | octet 3 |
| DS-TT Ethernet port MAC address contents | | | | | | | |  |
|  | | | | | | | | octet 8 |

figure 9.11.4.25.1 DS-TT ethernet port MAC address information element

table 9.11.4.25.1 DS-TT ethernet port MAC address information element

|  |
| --- |
| DS-TT Ethernet port MAC address contents (octets 3 to 8)  The DS-TT Ethernet port MAC address contents consist of the binary representation of the MAC address of the DS-TT Ethernet port used for the PDU session, starting with the LSB bit of the first octet of the MAC address included in bit 1 of octet 3. |

#### 9.11.4.26 UE-DS-TT residence time

the purpose of the UE-DS-TT residence time information element is to signal the time taken within the UE and the DS-TT to forward a packet i.e between the ingress of the UE and the DS-TT port in the DL direction or between the DS-TT port and the egress of the UE in the UL direction

the UE- DS-TT residence time information element is coded as shown in figure 9.11.4.26.1 and table 9.11.4.26.1

the UE-DS-TT residence time is a type 4 information element with a length of 10 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| UE-DS-TT residence time IEI | | | | | | | | octet 1 |
| Length of UE-DS-TT residence time contents | | | | | | | | octet 2 |
|  | | | | | | | | octet 3 |
| UE-DS-TT residence time contents | | | | | | | |  |
|  | | | | | | | | octet 10 |

figure 9.11.4.26.1 UE-DS-TT residence time information element

table 9.11.4.26.1 UE-DS-TT residence time information element

|  |
| --- |
| UE-DS-TT residence time contents (octets 3 to 10)  The UE-DS-TT residence time contents contain the UE-DS-TT residence time encoded as specified for the correctionField in IEEE Std 1588-2019 [43B], with the LSB bit of the first octet of the UE-DS-TT residence time included in bit 1 of octet 3. If the UE-DS-TT residence time.is too big to be represented, all bits of octets 3 to 10 shall be coded as "1" except the MSB bit of octet 10. |

#### 9.11.4.27 port management information container

the purpose of the port management information container information element is to transport a port management service message as specified in clause 8 of 3GPP TS 24.539 [19BA]

the port management information container information element is coded as shown in figure 9.11.4.27.1 and table 9.11.4.27.1

the port management information container is a type 6 information element with a minimum length of 4 octets and a maximum length of 65538 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Port management information container IEI | | | | | | | | octet 1 |
| Length of Port management information container contents | | | | | | | | octet 2  octet 3 |
| Port management information container | | | | | | | | octet 4  octet n |

figure 9.11.4.27.1 port management information container information element

table 9.11.4.27.1 port management information container information element

|  |
| --- |
| Port management information container (octet 4 to n) |
| A port management service message as specified in clause 8 of 3GPP TS 24.539 [19BA]. |

#### 9.11.4.28 ethernet header compression configuration

the purpose of the ethernet header compression configuration information element is to negotiate the use of EHC and the length of the CID field in the EHC packet (see 3GPP TS 38.323 [29])

the ethernet header compression configuration information element is coded as shown in figure 9.11.4.28.1 and table 9.11.4.28.1

the ethernet header compression configuration is a type 4 information element with the length of 3 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Ethernet header compression configuration IEI | | | | | | | | octet 1 |
| Length of Ethernet header compression configuration contents | | | | | | | | octet 2 |
| 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | CID Length | | octet 3 |

figure 9.11.4.28.1 ethernet header compression configuration information element

table 9.11.4.28.1 ethernet header compression configuration information element

|  |  |  |
| --- | --- | --- |
| Length of CID field value (CID Length) (octet 3 bits 1 and 2) | | |
|  | | |
| Bit | | |
| 2 | **1** |  |
| 0 | 0 | Ethernet header compression not used |
| 0 | 1 | 7 bits |
| 1 | 0 | 15 bits |
|  | | |
| All other values shall be interpreted as "7 bits".  Bits 3 to 8 of octet 3 are spare and shall be coded as zero. | | |

#### 9.11.4.29 remote UE context list

the purpose of the remote UE context list information element is to provide identity and optionally IP address of a 5G ProSe remote UE connected to or disconnected from a UE acting as a 5G ProSe layer-3 UE-to-network relay

the remote UE context list information element is coded as shown in figure 9.11.4.29.1 figure 9.11.4.29.2 table 9.11.4.29.1 and table 9.11.4.29.2

the remote UE context list is a type 6 information element with a minimum length of 16 octets and a maximum length of 65538 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Remote UE context list IEI | | | | | | | | octet 1 |
| Length of remote UE context list contents | | | | | | | | octet 2 |
| octet 3 |
| Number of remote UE contexts | | | | | | | | octet 4 |
| Remote UE context 1 | | | | | | | | octet 5 |
|  |
| octet a |
| … | | | | | | | | octet a+1\*  octet b\* |
| Remote UE context k | | | | | | | | octet b+1\* |
|  |
| octet c\* |

figure 9.11.4.29.1 remote UE context list

table 9.11.4.29.1 remote UE context list

|  |
| --- |
| Remote UE context (octet 5 etc) |
|  |
| The contents of remote UE context are applicable for one individual UE and are coded as shown in figure 9.11.4.29.2 and table 9.11.4.29.2. |
|  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of remote UE context | | | | | | | | octet 5 |
| 0  Spare | 0  Spare | 0  Spare | 0  Spare | Remote UE ID format | Remote UE ID type | | | octet 6 |
| Length of remote UE ID | | | | | | | | octet 7 |
| Remote UE ID | | | | | | | | octet 8 |
|  |
| Octet j\* |
| Spare | | | UPRI4I | TPRI4I | Protocol used by remote UE | | | octet j+1\* |
| Address information | | | | | | | | octet j+2\*  octet j+k\* |
| HPLMN ID | | | | | | | | octet (j+k+1)\*  octet (j+k+3)\* |

figure 9.11.4.29.2 remote UE context

table 9.11.4.29.2 remote UE context

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Remote UE ID type (bits 1 to 3 of octet 6) | | | | | |
| Bits | | | | | |
| 3 | 2 | 1 |  |  | |
| 0 | 0 | 1 |  | UP-PRUK ID | |
| 0 | 1 | 0 |  | CP-PRUK ID | |
| 0 | 1 | 1 |  | IMEI |
| 1 | 0 | 0 |  | IMEISV |
| All other values are reserved. | | | | | |
|  | | | | | |
| Remote UE ID format (bit 4 of octet 6) (NOTE) | | | | | |
| Bit | | | | | |
| 4 |  |  |  |  | |
| 0 |  |  |  | Network access identifier (NAI) | |
| 1 |  |  |  | 64-bit string | |
|  | | | | | |
| Bits 5 to 8 of octet 6 are spare and shall be coded as zero. | | | | | |
|  | | | | | |
| Remote UE ID (octet 8 to octet j) | | | | | |
| The UP-PRUK ID as specified in 3GPP TS 33.503 [56], the CP-PRUK ID as specified in 3GPP TS 33.503 [56], the IMEI or the IMEISV of the 5G ProSe Remote UE. If the remote UE ID type field indicates "UP-PRUK ID" or "CP-PRUK ID", and the remote UE ID format field indicates "NAI", the remote UE ID field contains the UP-PRUK ID or the CP-PRUK ID in the NAI format as defined in 3GPP TS 23.003 [4], encoded as UTF-8 string. If the remote UE ID type field indicates "UP-PRUK ID", and the remote UE ID format field indicates "64-bit string", the remote UE ID field contains the UP-PRUK ID as a 64-bit string, encoded using binary encoding. If the remote UE ID type field indicates "IMEI" or "IMEISV", the remote UE ID field contains the IMEI or the IMEISV encoded as 5GS mobile identity information element for type of identity "IMEI" or "IMEISV" as specified in subclause 9.11.3.4, starting with the fourth octet. | | | | | |
|  | | | | | |
| Protocol used by remote UE (octet j+1, bits 1 to 3)  Bits | | | | | |
| 3 | 2 | 1 |  |  | |
| 0 | 0 | 0 |  | No IP info | |
| 0 | 0 | 1 |  | IPv4 | |
| 0 | 1 | 0 |  | IPv6 | |
| 1 | 0 | 0 |  | Unstructured | |
| 1 | 0 | 1 |  | Ethernet | |
| All other values are reserved. | | | | | |
|  | | | | | |
| TCP port range for IPv4 indicator (TPRI4I) (octet j+1, bits 4) | | | | | |
| Bit | | | | | |
| **4** |  |  | | | |
| 0 |  | TCP port range for IPv4 absent | | | |
| 1 |  | TCP port range for IPv4 present | | | |
|  | | | | | |
| UDP port range for IPv4 indicator (UPRI4I) (octet j+1, bits 5) | | | | | |
| Bit | | | | | |
| **5** |  |  | | | |
| 0 |  | UDP port range for IPv4 absent | | | |
| 1 |  | UDP port range for IPv4 present | | | |
|  | | | | | |
| Bits 4 to 8 of octet j+1 are spare and shall be coded as zero. | | | | | |
|  | | | | | |
| The length of remote UE ID field contains the binary coded representation of the length of the remote UE ID field. The first bit in transmission order is the most significant bit. | | | | | |
| If the Protocol used by remote UE indicates IPv4 and:  - TPRI4I bit indicates "TCP port range for IPv4 absent" and UPRI4I bit indicates "UDP port range for IPv4 absent", the Address information in octet j+2 to octet j+5 contains the IPv4 address.  - TPRI4I bit indicates "TCP port range for IPv4 present" and UPRI4I bit indicates "UDP port range for IPv4 absent", the Address information in octet j+2 to octet j+9 contains the IPv4 address followed by the TCP port range field.  - TPRI4I bit indicates "TCP port range for IPv4 absent" and UPRI4I bit indicates "UDP port range for IPv4 present", the Address information in octet j+2 to octet j+9 contains the IPv4 address followed by the UDP port range field.  - TPRI4I bit indicates "TCP port range for IPv4 present" and UPRI4I bit indicates "UDP port range for IPv4 present", the Address information in octet j+2 to octet j+13 contains the IPv4 address followed by the UDP port range field followed by the TCP port range field.  See NOTE.  The UDP port range field consists of the lowest UDP port number field followed by the highest UDP port number field, of the UDP port range assigned to the remote UE in the NAT function of 5G ProSe layer-3 UE-to-network relay.  The TCP port range field consists of the lowest TCP port number field followed by highest TCP port number field, of the TCP port range assigned to the remote UE in the NAT function of 5G ProSe layer-3 UE-to-network relay.  Each port number field is two octets long and bit 8 of first octet of the port number field represents the most significant bit of the port number and bit 1 of second octet of the port number field the least significant bit.  If the Protocol used by remote UE indicates IPv6, the Address information in octet j+2 to octet j+9 contains the /64 IPv6 prefix of a remote UE. Bit 8 of octet j+2 represents the most significant bit of the /64 IPv6 prefix and bit 1 of octet j+9 the least significant bit.  If the Protocol used by remote UE indicates Ethernet, the Address information in octet j+2 to octet j+7 contains the remote UE MAC address. Bit 8 of octet j+2 represents the most significant bit of the MAC address and bit 1 of octet j+7 the least significant bit.  If the Protocol used by remote UE indicates Unstructured, the Address information octets are not included.  If the Protocol used by remote UE indicates No IP info, the Address information octets are not included | | | | | |
| If the Remote UE ID type field indicates "PRUK ID" and the Remote UE ID format field indicates "64-bit string", then the HPLMN ID field is present otherwise the HPLMN ID field is absent. The HPLMN ID field indicates HPLMN ID of the 5G ProSe remote UE and is coded as value part of the PLMN ID information element as specified in 3GPP TS 24.554 [19E] subclause 11.3.33 starting with the second octet. | | | | | |
| NOTE: In the present release of the specification, providing information for IP protocols other than UDP or TCP is not specified | | | | | |

#### 9.11.4.30 requested MBS container

the purpose of the requested MBS container information element is for UE to request to join or leave one or more multicast MBS sessions

the requested MBS container information element is coded as shown in figure 9.11.4.30.1 figure 9.11.4.30.2 figure 9.11.4.30.3 figure 9.11.4.30.4 and table 9.11.4.30.1

the requested MBS container is a type 6 information element with a minimum length of 8 octets and a maximum length of 65538 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Requested MBS container IEI | | | | | | | | octet 1 |
| Length of Requested MBS container contents | | | | | | | | octet 2  octet 3 |
| multicast MBS session information 1 | | | | | | | | octet 4  octet i |
| multicast MBS session information 2 | | | | | | | | octet i+1\*  octet l\* |
| … | | | | | | | | octet l+1\*  octet m\* |
| multicast MBS session information p | | | | | | | | octet m+1\*  octet n\* |

figure 9.11.4.30.1 requested MBS container information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 0 | 0 | 0 | 0 | MBS operation | | Type of multicast MBS session ID | | octet 4 |
| spare | | | |  | |  |
| multicast MBS session ID | | | | | | | | octet 5  octet i |

figure 9.11.4.30.2 multicast MBS session information

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| TMGI | | | | | | | | octet 5 |
| octet i |

figure 9.11.4.30.3 multicast MBS session ID for type of multicast MBS session ID = "Temporary mobile group identity (TMGI)"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Source IP address information | | | | | | | | octet 5  octet v |
| Destination IP address information | | | | | | | | Octet v+1  Octet i |

figure 9.11.4.30.4 multicast MBS session ID for type of multicast MBS session ID = "Source specific IP multicast address for IPv4" or "Source specific IP multicast address for IPv6"

table 9.11.4.30.1 requested MBS container information element

|  |  |  |  |
| --- | --- | --- | --- |
| Type of multicast MBS session ID (bits 1 to 2 of octet 4) | | | |
| Bits | | | |
| **2** | **1** |  |  |
| 0 | 1 |  | Temporary Mobile Group Identity (TMGI) |
| 1 | 0 |  | Source specific IP multicast address for IPv4 |
| 1 | 1 |  | Source specific IP multicast address for IPv6 |
| All other values are reserved. | | | |
|  | | | |
| MBS operation (bits 3 to 4 of octet 4) | | | |
| Bits | | | |
| **4** | **3** |  |  |
| 0 | 1 |  | Join multicast MBS session |
| 1 | 0 |  | Leave multicast MBS session |
| All other values are reserved. | | | |
|  | | | |
| Bits 5 to 8 of octet 4 are spare and shall be coded as zero. | | | |
|  | | | |
| If Type of multicast MBS session ID is set to "Temporary Mobile Group Identity (TMGI)", the multicast MBS session ID contains the TMGI (octet 5 to i) and is coded as described in subclause 10.5.6.13 in 3GPP TS 24.008 [12] starting from octet 2. The structure of the TMGI is defined in 3GPP TS 23.003 [4]. | | | |
|  | | | |
| If Type of multicast MBS session ID is set to "Source specific IP multicast address for IPv4" or " Source specific IP multicast address for IPv6", the multicast MBS session ID contains the Source IP address information and the Destination IP address information. | | | |
|  | | | |
| Source IP address information (octet 5 to v) | | | |
| This field contains the IP unicast address used as source address in IP packets for identifying the source of the multicast service. | | | |
|  | | | |
| If the type of multicast MBS session ID indicates "Source specific IP multicast address for IPv4", the Source IP address information in octet 5 to octet 8 contains an IPv4 address. If the type of multicast MBS session ID indicates "Source specific IP multicast address for IPv6", the Source IP address information in octet 5 to octet 20 contains an IPv6 address. | | | |
|  | | | |
| Destination IP address information (octet v+1 to i) | | | |
| This field contains the IP multicast address used as destination address in related IP packets for identifying a multicast service associated with the source. | | | |
|  | | | |
| If the type of multicast MBS session ID indicates "Source specific IP multicast address for IPv4", the Destination IP address information in octet v+1 to octet v+4 contains an IPv4 address. If the type of multicast MBS session ID indicates "Source specific IP multicast address for IPv6", the Source IP address information in octet v+1 to octet v+16 contains an IPv6 address. | | | |
|  | | | |

#### 9.11.4.31 received MBS container

the purpose of the received MBS container information element is to indicate to the UE the information of the multicast MBS sessions that the network accepts or rejects the UE to join the information of the multicast MBS sessions that the UE is removed from or the information of the updated MBS service area

the received MBS container information element is coded as shown in figure 9.11.4.31.1 figure 9.11.4.31.2 figure 9.11.4.31.3 figure 9.11.4.31.4 figure 9.11.4.31.5 figure 9.11.4.31.6 figure 9.11.4.31.7 figure 9.11.4.31.8 figure 9.11.4.31.9 figure 9.11.4.31.10 figure 9.11.4.31.11 and table 9.11.4.31.1

the received MBS container is a type 6 information element with a minimum length of 9 octets and a maximum length of 65538 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Received MBS container IEI | | | | | | | | octet 1 |
| Length of Received MBS container contents | | | | | | | | octet 2  octet 3 |
| Received MBS information 1 | | | | | | | | octet 4  octet e |
| Received MBS information 2 | | | | | | | | octet (e+1)\*  octet l\* |
| … | | | | | | | | octet (l+1)\*  octet m\* |
| Received MBS information p | | | | | | | | octet (m+1)\*  octet n\* |

figure 9.11.4.31.1 received MBS container information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Rejection cause | | | MSAI | | MD | | | octet 4 |
| 0 | 0 | 0 | IPAT | MSCI | MTI | | IPAE | octet 5 |
| spare | | |  |  |
| TMGI | | | | | | | | octet 6  octet j |
| Source IP address information | | | | | | | | octet (j+1)\*  octet v\* |
| Destination IP address information | | | | | | | | octet (v+1)\*  octet k\* |
| MBS service area | | | | | | | | octet (k+1)\*  octet s\* |
| MBS timers | | | | | | | | octet (s+1)\*  octet i\* |
| MBS security container | | | | | | | | octet (i+1)\*  octet e\* |

figure 9.11.4.31.2 received MBS information

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| MBS TAI list | | | | | | | | Octet (k+1)\*  octet s\* |

figure 9.11.4.31.3 MBS service area for MBS service area indication = "MBS service area included as MBS TAI list"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| NR CGI list | | | | | | | | octet (k+1)\*  octet s\* |

figure 9.11.4.31.4 MBS service area for MBS service area indication = "MBS service area included as NR CGI list"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| MBS TAI list | | | | | | | | octet (k+1)\*  octet y\* |
| NR CGI list | | | | | | | | octet (y+1)\*  octet s\* |

figure 9.11.4.31.5 MBS service area for MBS service area indication = "MBS service area included as MBS TAI list and NR CGI list"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of NR CGI list contents | | | | | | | | octet (k+1)\* |
| NR CGI 1 | | | | | | | | octet (k+2)\*  octet (k+9)\* |
| NR CGI 2 | | | | | | | | octet (k+10)\*  octet (k+17)\* |
| … | | | | | | | | octet (k+18)\*  octet c\* |
| NR CGI w | | | | | | | | octet (c+1)\*  octet s\* |

figure 9.11.4.31.6 NR CGI list

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| NR Cell ID | | | | | | | | Octet (k+2)\* |
| octet (k+6)\* |
| MCC digit 2 | | | | MCC digit 1 | | | | octet (k+7)\* |
| MNC digit 3 | | | | MCC digit 3 | | | | octet (k+8)\* |
| MNC digit 2 | | | | MNC digit 1 | | | | octet (k+9)\* |

figure 9.11.4.31.7 NR CGI

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| MBS start time | | | | | | | | octet (s+1)\*  octet (s+6)\* | |

figure 9.11.4.31.8 MBS timers for MBS timer indication = "MBS start time"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| MBS back-off timer | | | | | | | | octet (s+1)\* | |

figure 9.11.4.31.9 MBS timers for MBS timer indication = "MBS back-off timer"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Number of MBS security keys sets | | | | | | | | Octet (i+1)\* |
| MBS security keys set 1 | | | | | | | | octet (i+2)\*  octet t\* |
| MBS security keys set 2 | | | | | | | | octet (t+1)\*  octet g\* |
| … | | | | | | | | octet (g+1)\*  octet v\* |
| MBS security keys set q | | | | | | | | octet (v+1)\*  octet e\* |

figure 9.11.4.31.10 MBS security container

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 0  spare | | | | | | | MTKI | Octet (i+2)\* |
| Key domain ID | | | | | | | | octet (i+3)\*  octet (i+5)\* |
| MSK ID | | | | | | | | octet (i+6)\*  octet (i+9)\* |
| MSK | | | | | | | | octet (i+10)\*  octet (i+25)\* |
| MTK ID | | | | | | | | octet (i+26)\*  octet (i+27)\* |
| Encrypted MTK | | | | | | | | octet (i+28)\*  octet (i+43)\* |

figure 9.11.4.31.11 MBS security keys set

table 9.11.4.31.1 received MBS container information element

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| MBS decision (MD) (bits 1 to 3 of octet 4) | | | | | |
| The MD indicates the network decision of the join requested by the UE, the network requests to remove the UE from the multicast MBS session or the network request to update the MBS service area or the security information of multicast MBS session. | | | | | |
| Bits | | | | | |
| **3** | **2** | **1** | |  | |
| 0 | 0 | 1 | | MBS service area update | |
| 0 | 1 | 0 | | MBS join is accepted | |
| 0 | 1 | 1 | | MBS join is rejected | |
| 1 | 0 | 0 | | Remove UE from multicast MBS session | |
| 1 | 0 | 1 | | MBS security information update | |
| All other values are unused in this version of the specification and interpreted as 000 if received. | | | | | |
|  | | | | | |
| If MD is set to "MBS join is rejected" or “Remove UE from multicast MBS session”, bits 6 to 8 of octet 4 shall contain the Rejection cause which indicates the reason of rejecting the MBS join request or the reason of removing the UE from multicast MBS session, respectively, otherwise bits 6 to 8 of octet 4 are spare and shall be coded as zero. | | | | | |
|  | | | | | |
| MBS service area indication (MSAI) (bits 4 and 5 of octet 4) | | | | | |
| The MSAI indicates whether and how the MBS service area is included in the IE. | | | | | |
| Bits | | | | | |
| **5** | **4** |  | | | |
| 0 | 0 | MBS service area not included | | | |
| 0 | 1 | MBS service area included as MBS TAI list | | | |
| 1 | 0 | MBS service area included as NR CGI list | | | |
| 1 | 1 | MBS service area included as MBS TAI list and NR CGI list | | | |
|  | | | | | |
| Rejection cause (bits 6 to 8 of octet 4) | | | | | |
| The Rejection cause indicates the reason of rejecting the join request or the reason of removing the UE from the MBS session. | | | | | |
| Bits | | | | | |
| **8** | **7** | **6** |  | |  |
| 0 | 0 | 0 |  | | No additional information provided |
| 0 | 0 | 1 |  | | Insufficient resources |
| 0 | 1 | 0 |  | | User is not authorized to use MBS service |
| 0 | 1 | 1 |  | | multicast MBS session has not started or will not start soon |
| 1 | 0 | 0 |  | | User is outside of local MBS service area |
| 1 | 0 | 1 |  | | Session context not found |
| 1 | 1 | 0 |  | | multicast MBS session is released |
| All other values are unused in this version of the specification and interpreted as 000 if received. | | | | | |
|  | | | | | |
| IP address existence (IPAE) (bit1 of octet 5) | | | | | |
| The IPAE indicates whether the Source IP address information and Destination IP address information are included in the IE or not. | | | | | |
| Bit | | | | | |
| **1** |  |  | | | |
| 0 |  | Source and destination IP address information not included | | | |
| 1 |  | Source and destination IP address information included | | | |
|  | | | | | |
| If IPAE is set to "Source and destination IP address information included", Source IP address information and Destination IP address information shall be included in the IE, otherwise Source IP address information and Destination IP address information shall not be included in the IE (NOTE 1). | | | | | |
|  | | | | | |
| MBS timer indication (MTI) (bits 2 and 3 of octet 5) | | | | | |
| The MTI indicates whether there is MBS timer included in the IE or not. | | | | | |
| Bit | | | | | |
| **3** | **2** |  | | | |
| 0 | 0 | No MBS timers included | | | |
| 0 | 1 | MBS start time included | | | |
| 1 | 0 | MBS back-off timer included | | | |
| All other values are unused in this version of the specification and interpreted as 00 if received | | | | | |
|  | | | | | |
| MBS security container indication (MSCI) (bit 4 of octet 5) | | | | | |
| The MSCI indicates whether the MBS security container is included in the IE or not | | | | | |
| Bit | | | | | |
| **4** | | | | | |
| 0 | MBS security container not included | | | | |
| 1 | MBS security container included | | | | |
| IP address type (IPAT) (bit 5 of octet 5) | | | | | |
| The IPAT indicates the type of the source IP address information and destination IP address information. This field is ignored when IPAE is set to "Source and destination IP address information not included". | | | | | |
| Bit | | | | | |
| **5** | | | | | |
| 0 | Source IP address information and destination IP address information are IPv4 | | | | |
| 1 | Source IP address information and destination IP address information are IPv6 | | | | |
| Bits 6 to 8 of octet 5 are spare and shall be coded as zero. | | | | | |
| TMGI (octets 6 to j) | | | | | |
| The TMGI is coded as described in subclause 10.5.6.13 in 3GPP TS 24.008 [12] starting from octet 2. The structure of the TMGI is defined in 3GPP TS 23.003 [4]. | | | | | |
|  | | | | | |
| Source IP address information (octet j+1 to v) | | | | | |
| This field contains the IP unicast address used as source address in IP packets for identifying the source of the multicast service. The value of this field is copied from the corresponding source IP address information in the requested MBS container. If the IPAT indicates "Source and destination IP address information are IPv4", the Source IP address information in octet j+1 to octet j+4 contains an IPv4 address. If the IPAT indicates "Source and destination IP address information are IPv6", the Source IP address information in octet j+1 to octet j+16 contains an IPv6 address | | | | | |
|  | | | | | |
| Destination IP address information (octet v+1 to k) | | | | | |
| This field contains the IP multicast address used as destination address in related IP packets for identifying a multicast service associated with the source. The value of this field is copied from the corresponding destination IP address information in the requested MBS container. If the IPAT indicates "Source and destination IP address information are IPv4", the Destination IP address information in octet v+1 to octet v+4 contains an IPv4 address. If the IPAT indicates "Source and destination IP address information are IPv6", the Destination IP address information in octet v+1 to octet v+16 contains an IPv6 address. | | | | | |
|  | | | | | |
| MBS service area (octet k+1 to s) | | | | | |
| The MBS service area contains the MBS TAI list, the NR CGI list or both, that identifies the service area(s) for a local MBS service. | | | | | |
|  | | | | | |
| MBS TAI list (octet k+1 to s) | | | | | |
| The MBS TAI list is coded as octet 2 and above of the 5GS tracking area identity list IE defined in subclause 9.11.3.9. | | | | | |
|  | | | | | |
| NR CGI (octet k+2 to k+9) | | | | | |
| The NR CGI globally identifies an NR cell. It contains the NR Cell ID and the PLMN ID of that cell. | | | | | |
|  | | | | | |
| NR Cell ID (octet k+2 to k+6) | | | | | |
| The NR Cell ID consists of 36 bits identifying an NR Cell ID as specified in subclause 9.3.1.7 of 3GPP TS 38.413 [31], in hexadecimal representation. Bit 8 of octet k+2 is the most significant bit and bit 5 of octet k+6 is the least significant bit. Bits 1 to 4 of octet k+6 are spare and shall be coded as zero. | | | | | |
| MCC, Mobile country code (octet k+7 and bits 1 to 4 octet k+8)  The MCC field is coded as in ITU-T Recommendation E.212 [42], annex A. | | | | | |
|  | | | | | |
| MNC, Mobile network code (bits 5 to 8 of octet k+8 and octet k+9)  The coding of this field is the responsibility of each administration but BCD coding shall be used. The MNC shall consist of 2 or 3 digits. If a network operator decides to use only two digits in the MNC, bits 5 to 8 of octet k+8 shall be coded as "1111". | | | | | |
|  | | | | | |
| The MCC and MNC digits are coded as octets 6 to 8 of the Temporary mobile group identity IE in figure 10.5.154 of 3GPP TS 24.008 [12]. | | | | | |
|  | | | | | |
| MBS start time (octets s+1 to s+6) | | | | | |
| The MBS start time is coded as described in subclause 10.5.3.9 in 3GPP TS 24.008 [12] starting from octet 2 till octet 7. | | | | | |
|  | | | | | |
| MBS back-off timer (octet s+1) | | | | | |
| The MBS back-off timer is coded as octet 3 described in subclause 10.5.7.4a in 3GPP TS 24.008 [12]. | | | | | |
|  | | | | | |
| MTK indication (MTKI) (bit1 of octet i+2) | | | | | |
| The MTKI indicates whether the MTK ID and Encrypted MTK are included in the MBS security keys set or not. | | | | | |
| Bit | | | | | |
| **1** | | | | | |
| 0 | MTK ID and Encrypted MTK not included | | | | |
| 1 | MTK ID and Encrypted MTK included | | | | |
|  | | | | | |
| Bits 2 to 8 of octet i+2 are spare and shall be coded as zero | | | | | |
|  | | | | | |
| Key domain ID (octet i+3 to i+5)  The key domain ID is 3 bytes long and is defined in 3GPP TS 33.246 [57] (NOTE 2). | | | | | |
|  | | | | | |
| MBS Service Key Identifier (MSK ID) (octets i+6 to i+9) | | | | | |
| The MSK ID is 4 bytes long and is defined in 3GPP TS 33.246 [57]. | | | | | |
|  | | | | | |
| MBS Service Key (MSK) (octets i+10 to i+25) | | | | | |
| The MSK is 16 bytes long and is defined in 3GPP TS 33.246 [57]. | | | | | |
|  | | | | | |
| MBS Traffic Key Identifier (MTK ID) (octets i+26 to i+27) | | | | | |
| The MTK ID is 2 bytes long and is defined in 3GPP TS 33.246 [57]. | | | | | |
|  | | | | | |
| Encrypted MBS Traffic Key (Encrypted MTK) (octets i+28 to i+43) | | | | | |
| The Encrypted MTK is 16 bytes long and contains the encrypted version of MTK using MSK as defined in 3GPP TS 33.246 [57]. | | | | | |
|  | | | | | |
| NOTE 1: The IPAE bit is not expected to be set to "Source and destination IP address information included" when the MBS decision (MD) indicates "Remove UE from multicast MBS session".  NOTE 2: As specified in annex W in 3GPP TS 33.501 [24], the UE should not try to use the MCC and MNC constructing the key domain ID in another context, e.g., the UE should not compare those MCC and MNC to parameters received from lower layers. | | | | | |

#### 9.11.4.32 PDU session pair ID

the purpose of the PDU session pair ID information element is to indicate a PDU session pair ID

the PDU session pair ID information element is coded as shown in figure 9.11.4.32.1 and table 9.11.4.32.1

the PDU session pair ID is a type 4 information element with a length of 3 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| PDU session pair ID IEI | | | | | | | | octet 1 |
| Length of PDU session pair ID IE | | | | | | | | octet 2 |
| PDU session pair ID | | | | | | | | octet 3 |

figure 9.11.4.32.1 PDU session pair ID information element

table 9.11.4.32.1 PDU session pair ID information element

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| PDU session pair ID (octet 3) | | | | | | | | | |
| Bits | | | | | | | | | |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |  |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  | PDU session pair ID 0 |
| to | | | | | | | |  | to |
| 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |  | PDU session pair ID 6 |
|  |  |  |  |  |  |  |  |  |  |
| All other values are reserved. | | | | | | | | | |

#### 9.11.4.33 RSN

the purpose of the RSN information element is to indicate an RSN

the RSN information element is coded as shown in figure 9.11.4.33.1 and table 9.11.4.33.1

the RSN is a type 4 information element with a length of 3 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| RSN IEI | | | | | | | | octet 1 |
| Length of RSN IE | | | | | | | | octet 2 |
| RSN | | | | | | | | octet 3 |

figure 9.11.4.33.1 RSN information element

table 9.11.4.33.1 RSN information element

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| RSN (octet 3) | | | | | | | | | |
| Bits | | | | | | | | | |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |  |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  | v1 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |  | v2 |
|  |  |  |  |  |  |  |  |  |  |
| All other values are spare and shall not be used by a UE compliant to the present version of this specification. | | | | | | | | | |

#### 9.11.4.34 ECS address

the purpose of the ECS address information element is to indicate the ECS address (either IPv4 address IPv6 address or FQDN) and the associated spatial validity condition

the ECS address information element is coded as shown in figure 9.11.4.34.1 figure 9.11.4.34.2 figure 9.11.4.34.3 figure 9.11.4.34.4 figure 9.11.4.34.5 figure 9.11.4.34.6 table 9.11.4.34.1 table 9.11.4.34.2 table 9.11.4.34.4 and table 9.11.4.34.5

the ECS address information element is a type 6 information element with minimum length of 8 octets and a maximum length of 65538 octets

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | | 4 | | 3 | | 2 | | 1 | |  | | |
| ECS address IEI | | | | | | | | | | | | | octet 1 | | |
| Length of ECS address contents | | | | | | | | | | | | | octet 2  octet 3 | | |
| Type of ECS address | | | | | Type of spatial validity condition | | | | | | | | octet 4 | | |
| ECS address | | | | | | | | | | | | | octet 5  octet a | | |
| Spatial validity condition contents | | | | | | | | | | | | | octet (a+1)\*  octet n\* | | |
| 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | | 0  Spare | | ESPILI | | EAMI | | Octet m\* | | |
| ECS authentication methods | | | | | | | | | | | | octet o\* | | |
| ECS supported PLMNs information list | | | | | | | | | | | | | | | octet p\*  octet w\* |

figure 9.11.4.34.1 ECS address information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of spatial validity condition contents | | | | | | | | octet (a+1)  octet (a+2) |
| Spatial validity information 1 | | | | | | | | octet b  octet c |
| Spatial validity information 2 | | | | | | | | octet (c+1)\*  octet d\* |
| … | | | | | | | | octet (d+1)\*  octet e\* |
| Spatial validity information N | | | | | | | | octet (e+1)\*  octet n\* |

figure 9.11.4.34.2 spatial validity condition contents

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | TLSGI | TLSAI | TLSCSCI | octet o\* |

figure 9.11.4.34.3 ECS authentication methods

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of ECS supported PLMNs information list contents | | | | | | | | octet p  octet (p+2) |
| Supported PLMN information 1 | | | | | | | | octet (p+3)  octet q |
| Supported PLMN information 2 | | | | | | | | octet (q+1)\*  octet u\* |
| … | | | | | | | | octet (u+1)\*  octet v\* |
| Supported PLMN information N | | | | | | | | octet (v+1)\*  octet w\* |

figure 9.11.4.34.4 ECS supported PLMNs information list contents

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of Supported PLMN information contents | | | | | | | | octet (q+1)  octet (q+3) |
| PLMN identity | | | | | | | | octet (q+4)  octet (q+6) |
| ECSP information 1 | | | | | | | | octet (q+7)\*  octet r\* |
| ECSP information 2 | | | | | | | | octet (r+1)\*  octet s\* |
| … | | | | | | | | octet (s+1)\*  octet t\* |
| ECSP information N | | | | | | | | octet (t+1)\*  octet u\* |

figure 9.11.4.34.5 supported PLMN information contents

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of ECSP identifier contents | | | | | | | | octet (r+1)  octet (r+2) |
| ECSP identifier | | | | | | | | octet (r+3)\*  octet s\* |

figure 9.11.4.34.6 ECSP information contents

table 9.11.4.34.1 ECS address information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Type of ECS address (octet 4, bit 1 to 4) | | | | |
| Bits | | | | |
| 4 | 3 | 2 | 1 |  |
| 0 | 0 | 0 | 0 | IPv4 |
| 0 | 0 | 0 | 1 | IPv6 |
| 0 | 0 | 1 | 0 | FQDN |
| 1 | 1 | 1 | 1 | Unspecified |
|  | | | | |
| All other values are spare. The receiving entity shall ignore an ECS address IE with type of ECS address containing a spare value. | | | | |
|  | | | | |
| Type of spatial validity condition (octet 4, bit 5 to 8) | | | | |
| Bits | | | | |
| 8 | 7 | 6 | 5 |  |
| 0 | 0 | 0 | 0 | No spatial validity condition |
| 0 | 0 | 0 | 1 | Geographical service area |
| 0 | 0 | 1 | 0 | Tracking area |
| 0 | 0 | 1 | 1 | Country-wide |
|  | | | | |
| All other values are spare. The receiving entity shall ignore a spatial validity condition with type of spatial validity condition containing an unknown value. | | | | |
|  | | | | |
| If the type of ECS address indicates IPv4, then the ECS address field contains an IPv4 address in octet 5 to octet 8. | | | | |
|  | | | | |
| If the type of ECS address indicates IPv6, then the ECS address field contains an IPv6 address in octet 5 to octet 20 and is encoded according to IETF RFC 4291 [66]. | | | | |
|  | | | | |
| If the type of ECS address indicates FQDN, then the ECS address field contains in octet 5 the length of FQDN value and in octet 6 to octet a an FQDN value encoded as defined in subclause 19.4.2 in 3GPP TS 23.003 [4]. | | | | |
|  | | | | |
| If the type of ECS address indicates unspecified, then the remaining fields of ECS address information element shall be passed to the upper layers. | | | | |
|  | | | | |
| Spatial validity condition contents (octet (a+1)\* to n\*) | | | | |
| The spatial validity condition contents contain a variable number of spatial validity condition information. | | | | |
|  | | | | |
| ECS authentication methods indicator (EAMI) (octet m\*, bit 1) | | | | |
| Bits | | | | |
| 1 |  |  |  |  |
| 0 |  |  |  | ECS authentication methods field is not included |
| 1 |  |  |  | ECS authentication methods field is included |
| If the EAMI bit is set to "ECS authentication methods field is included" then the ECS authentication methods field is included otherwise the ECS authentication methods field is not included. ECS authentication methods is an optional field and is included based on operator requirements. | | | | |
|  | | | | |
| ECS supported PLMNs information list indication (ESPILI) (octet m\*, bit 2)  Bits   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | 2 |  |  |  |  | | | 0 | ECS supported PLMNs information list field is not included | | | | | 1 | ECS supported PLMNs information list field is included | | | |   If the ESPILI bit is set to "ECS supported PLMNs information list field is included" then the ECS supported PLMNs information list field is included otherwise the ECS supported PLMNS information list field is not included.  ECS supported PLMNs information list (octet p\* to w\*)  The ECS supported PLMNs information list contains a variable number of supported PLMN information field. The supported PLMN information field is coded according to figure 9.11.4.34.5. | | | | | |

table 9.11.4.34.2 spatial validity condition contents

|  |
| --- |
| If the type of spatial validity condition of the ECS address indicates No spatial validity condition, then the spatial validity condition information field is empty. |
| If the type of spatial validity condition of the ECS address indicates geographical service area, then the spatial validity condition information field contains a geographical service area which is specified by geographical descriptions as defined in 3GPP TS 23.032 [4B]. |
|  |
| If the type of spatial validity condition of the ECS address indicates tracking area, then the spatial validity condition information field contains a TAI as defined in subclause 9.11.3.8 starting from octet 2. |
|  |
| If the type of spatial validity condition of the ECS address indicates country-wide, then the spatial validity condition information field contains an MCC as defined in in ITU-T Recommendation E.212 [42], annex A. The first MCC digit is coded in bit 1 to 4 of the octet b, the second MCC digit is coded in bit 5 to 8 of the octet b, and the third MCC digit is coded in bit 1 to 4 of the octet b+1. Bit 5 to bit 8 of the octet b+1 shall be padded with 1. If only two digits are used for for MCC, octet b+1 shall be padded with 1. |

table 9.11.4.34.3 ECS authentication methods contents

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ECS authentication methods (octet o\*) | | | | |
|  | | | | |
| TLS client server certificate indicator (TLSCSCI) (octet o\*, bit 1) | | | | |
| 0 |  |  |  | TLS client server certificate not supported |
| 1 |  |  |  | TLS client server certificate supported |
|  | | | | |
| TLS with AKMA indicator (TLSAI) (octet o\*, bit 2) | | | | |
| 0 |  |  |  | TLS with AKMA not supported |
| 1 |  |  |  | TLS with AKMA supported |
|  | | | | |
| TLS with GBA indicator (TLSGI) (octet o\*, bit 3) | | | | |
| 0 |  |  |  | TLS with GBA not supported |
| 1 |  |  |  | TLS with GBA supported |
|  | | | | |

table 9.11.4.34.4 supported PLMN information contents

|  |
| --- |
| PLMN identity:  The PLMN identity for which the EDN configuration information can be provided by the ECS. This is encoded as octet 3 to octet 5 in figure 9.11.3.85.1. |
| ECSP information:  The identifier of the ECSP(s) associated with the PLMN and whose information is available at the ECS. The ECSP information is coded according to figure 9.11.4.34.z. |

table 9.11.4.34.5 ECSP information contents

|  |
| --- |
| ECSP identifier  This field contains one ECSP identifier. The ECSP identifier is encoded as a UTF-8 string. |

#### 9.11.4.35 void

#### 9.11.4.36 N3QAI

the purpose of the N3QAI information element is to indicate a set of QoS parameters to be used by the UE for non-3GPP access network resource management behind the UE

the N3QAI information element is a type 6 information element with a minimum length of 9 octets the maximum length for the information element is 65538 octets

the N3QAI information element is coded as shown in figure 9.11.4.36.1 figure 9.11.4.36.2 figure 9.11.4.36.3 figure 9.11.4.36.4 and table 9.11.4.36.1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| N3QAI IEI | | | | | | | | octet 1 |
| Length of N3QAI contents | | | | | | | | octet 2  octet 3 |
| N3QAI 1 | | | | | | | | octet 4  octet u\* |
| N3QAI 2 | | | | | | | | octet (u+1)\*  octet v\* |
| ... | | | | | | | | octet (v+1)\*  octet w\* |
| N3QAI n | | | | | | | | octet (w+1)\*  octet x\* |

figure 9.11.4.36.1 N3QAI information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Number of QFIs | | | | | | | | octet 4 |
| List of QFIs | | | | | | | | octet 5  octet m |
| Number of N3QAI parameters | | | | | | | | octet (m+1) |
| N3QAI parameters list | | | | | | | | octet (m+2)  octet u\* |

figure 9.11.4.36.2 N3QAI

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| N3QAI parameter 1 | | | | | | | | octet (m+2)  octet n\* |
| N3QAI parameter 2 | | | | | | | | octet (n+1)\*  octet o\* |
| ... | | | | | | | | octet (o+1)\*  octet p\* |
| N3QAI parameter n | | | | | | | | octet (p+1)\*  octet u\* |

figure 9.11.4.36.3 N3QAI parameters list

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| N3QAI parameter identifier | | | | | | | | octet (m+2) |
| Length of N3QAI parameter contents | | | | | | | | octet (m+3) |
| N3QAI parameter contents | | | | | | | | octet (m+4)  octet n\* |

figure 9.11.4.36.4 N3QAI parameter

table 9.11.4.36.1 N3QAI information element

|  |
| --- |
| Number of QFIs (octet 4)  The number of QFIs field contains the binary coding for the number of QFIs associated with the same N3QAI parameters. This field is encoded in bits 8 through 1 of octet 4 where bit 8 is he most significant and bit 1 is the least significant bit.  List of QFIs (octet 5 to octet m)  This field indicates QoS flow(s) associated with the same N3QAI parameters. This field contains QFI values encoded as below:  Bits  8 7 6 5 4 3 2 1  0 0 0 0 0 0 0 0 Reserved  0 0 0 0 0 0 0 1 QFI 1  to  0 0 1 1 1 1 1 1 QFI 63  The other values are spare. If spare value is used, the UE shall ignore the value. |
| Number of N3QAI parameters (bits 8 to 1 of octet (m+1))  The number of N3QAI parameters field contains the binary coding for the number of N3QAI parameters in the N3QAI parameters list field. The number of N3QAI parameters field is encoded in bits 8 through 1 of octet (m+1) where bit 8 is the most significant and bit 1 is the least significant bit. |
| N3QAI parameters list (octets (m+2) to q\*)  The N3QAI parameters list field contains a variable number of N3QAI parameters.  Each N3QAI parameter included in the N3QAI parameters list is of variable length and consists of:  - a N3QAI parameter identifier (1 octet);  - the length of the N3QAI parameter contents (1 octet); and - the N3QAI parameter contents itself (variable number of octets).  The N3QAI parameter identifier field is used to identify each parameter included in the N3QAI parameters list and it contains the hexadecimal coding of the parameter identifier. Bit 8 of the parameter identifier field contains the most significant bit and bit 1 contains the least significant bit. In this version of the protocol, the following parameter identifiers are specified:  - 01H (5QI);  - 02H (GFBR uplink);  - 03H (GFBR downlink);  - 04H (MFBR uplink);  - 05H (MFBR downlink);  - 06H (Averaging window);  - 07H (Resource type);  - 08H (Priority level);  - 09H (Packet delay budget);  - 0AH (Packet error rate);  - 0BH (Maximum data burst volume); - 0CH (Maximum packet loss rate downlink);  - 0DH (Maximum packet loss rate uplink);  - 0EH (ARP); and  - 0FH (Periodicity).  If the N3QAI parameters list contains a N3QAI parameter identifier that is not supported by the receiving entity, the corresponding parameter shall be discarded.  The length of N3QAI parameter contents field contains the binary coded representation of the length of the parameter contents field. The first bit in transmission order is the most significant bit.  For the N3QAI parameter identifiers indicating "5QI", "GFBR uplink", "GFBR downlink", "MFBR uplink", "MFBR downlink", and "Averaging window", the format of the N3QAI parameter contents follows the table 9.11.4.12.1 of subclause 9.11.4.12 of this specification.  For the N3QAI parameter identifiers indicating "Resource type", "Priority level", "Packet delay budget", "Packet error rate", "Maximum data burst volume", "Maximum packet loss rate downlink", and "Maximum packet loss rate uplink", the format of the N3QAI parameter contents follows the table 9.3.1.1-2 of subclause 9.3.1.1 of 3GPP TS 24.502 [18].  When the N3QAI parameter identifier indicates "ARP", the N3QAI parameter contents field contains the binary representation of ARP that is one octet in length. The range of the ARP priority level is 1 to 15 with 1 as the highest priority as specified in subclause 5.7.2.2 of 3GPP TS.23.501 [8].  When the N3QAI parameter identifier indicates "Periodicity", the N3QAI parameter contents field contains the binary representation of the periodicity for the traffic with a unit of microsecond. (NOTE 1) |
|  |
| NOTE 1: The periodicity refers to the time interval between start of two data bursts for supporting consumer real time applications e.g., XR. |

#### 9.11.4.37 Non-3GPP delay budget

the purpose of the Non-3GPP delay budget information element is to indicate the non-3GPP delay budget for the non-3GPP network behind the UE to the network

the Non-3GPP delay budget information element is a type 6 information element with a minimum length of 8 octets the maximum length for the information element is 65538 octets

the Non-3GPP delay budget information element is coded as shown in figure 9.11.4.37.1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Non-3GPP delay budget IEI | | | | | | | | octet 1 |
| Length of non-3GPP delay budget contents | | | | | | | | octet 2  octet 3 |
| non-3GPP delay budget 1 | | | | | | | | octet 4  octet u\* |
| non-3GPP delay budget 2 | | | | | | | | octet u+1\*  octet v\* |
| ... | | | | | | | | octet v+1\*  octet w\* |
| non-3GPP delay budget n | | | | | | | | octet w+1\*  octet x\* |

figure 9.11.4.37.1 Non-3GPP delay budget information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Non-3GPP delay budget value | | | | | | | | octet 4  octet 5 |
| 0  spare | 0  spare | 0  spare | 0  spare | 0  spare | 0  spare | QFIPI | PFPI | octet 6 |
| Number of QFIs | | | | | | | | octet n\* |
| List of QFIs | | | | | | | | octet (n+1)\*  octet m\* |
| Packet filter list | | | | | | | | octet o\*  octet u\* |

figure 9.11.4.37.2 Non-3GPP delay budget

table 9.11.4.37.1 Non-3GPP delay budget information element

|  |  |
| --- | --- |
| The Non-3GPP delay budget value field contains the binary representation of the Non-3gpp delay budget in units of 0.5ms.  Bits  **8 7 6 5 4 3 2 1 8 7 6 5 4 3 2 1** 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 thru  1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | |
| Packet filter presence indicator (PFPI) (bit 1 of octet 6)  Bit  **1** | |
| 0 | Packet filter list associated with the Non-3GPP delay budget value is not present |
| 1 | Packet filter list associated with the Non-3GPP delay budget value is present |
|  | |
| QoS flow identifier presence indicator (QFIPI) (bit 2 of octet 6)  Bit  **2** | |
| 0 | QoS flow identifier associated with the Non-3GPP delay budget value is not present |
| 1 | QoS flow identifier associated with the Non-3GPP delay budget value is present |
|  | |
| Number of QFIs (octet n\*)  The number of QFIs field is present if QFIPI is set to 1. If QFIPI is not set to 1, this field shall not be included in the non-3GPP delay budget. The number of QFIs field contains the binary coding for the number of QFIs associated with the same non-3GPP delay budget value. This field is encoded in bits 8 through 1 of octet 4 where bit 8 is he most significant and bit 1 is the least significant bit. | |
|  | |
| List of QFIs (octet (n+1)\* to octet m\*)  The list of QFIs field is present if QFIPI is set to 1. If QFIPI is not set to 1, this field shall not be included in the non-3GPP delay budget. This field indicates QoS flow(s) associated with the same non-3GPP delay budget value. This field contains QFI values encoded as below  Bits  **8 7 6 5 4 3 2 1**  0 0 0 0 0 0 0 0 Reserved  0 0 0 0 0 0 0 1 QFI 1  to  0 0 1 1 1 1 1 1 QFI 63  The other values are spare. If spare value is used, the UE shall ignore the value. | |
|  | |
| Packet filter list (octet 7 to u)  The packet filter list is present if PFPI is set to 1. If not present, this field shall not be included in the non-3GPP delay budget. The encoding of the packet filter list follows the figure 9.11.4.13.4 and the table 9.11.4.13.1. | |
|  | |

#### 9.11.4.38 URSP rule enforcement reports

the purpose of the URSP rule enforcement reports information element is to provide one or more URSP rule enforcement reports to the network each URSP rule enforcement report includes all the connection capabilities contained in the traffic descriptor of each URSP rule associated to the PDU session

the URSP rule enforcement reports information element is coded as shown in figure 9.11.4.38.1 figure 9.11.4.38.2 and table 9.11.4.38.1

the URSP rule enforcement reports is a type 4 information element with a minimum length of 4 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| URSP rule enforcement reports IEI | | | | | | | | octet 1 |
| Length of URSP rule enforcement reports contents | | | | | | | | octet 2 |
| URSP rule enforcement report 1 | | | | | | | | octet 3  octet a\* |
| URSP rule enforcement report 2 | | | | | | | | octet (a+1)\*  octet b\* |
| … | | | | | | | | octet (b+1)\*  octet g\* |
| URSP rule enforcement report n | | | | | | | | octet (g+1)\*  octet h\* |

figure 9.11.4.38.1 URSP rule enforcement reports information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Number of connection capability identifiers | | | | | | | | octet 3 |
| Connection capability identifier 1 | | | | | | | | octet 4 |
| Connection capability identifier 2 | | | | | | | | octet 5\* |
| … | | | | | | | |  |
| Connection capability identifier n | | | | | | | | octet a\* |

figure 9.11.4.38.2 URSP rule enforcement report

table 9.11.4.38.1 URSP rule enforcement reports information element

|  |
| --- |
| URSP rule enforcement report (octet 3 to octet a) |
| The URSP rule enforcement report field contains all the connection capabilities contained in the traffic descriptor of one reported URSP rule. |
|  |
| Number of connection capability identifiers (octet 3) |
| The number of connection capability identifiers field indicates number of indicated connection capability identifiers in binary representation. The value of this field shall be set to at least one, and the receiving entity shall ignore the URSP rule enforcement reports IE with "Number of connection capability identifiers" field set to zero. |
|  |
| Connection capability identifier |
| Connection capability identifier is encoded as defined in 3GPP TS 24.526 [19] table 5.2.1. |

#### 9.11.4.39 protocol description

the purpose of the protocol description information element is to provide protocol description for UL PDU set handling to the UE

the protocol description information element is a type 6 information element with a minimum length of 6 octets

the protocol description information element is coded as shown in figure 9.11.4.39.1 figure 9.11.4.39.2 figure 9.11.4.39.3 figure 9.11.4.39.4 and table 9.11.4.39.1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Protocol description IEI | | | | | | | | octet 1 |
| Length of Protocol description contents | | | | | | | | octet 2  octet 3 |
| Protocol description 1 | | | | | | | | octet 4  octet u |
| Protocol description 2 | | | | | | | | octet (u+1)\*  octet w\* |
| ... | | | | | | | |  |
| Protocol description n | | | | | | | | octet (w+1)\*  octet s\* |

figure 9.11.4.39.1 protocol description information element

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | | 6 | | 5 | | 4 | 3 | 2 | 1 |  |
| Length of protocol description | | | | | | | | | | | octet 4  octet 5 |
| QoS Rule Identifier (QRI) | | | | | | | | | | | octet 6 |
| 0 | | 0 | PILPI | HEIPI | | Transport Protocol | | | | | octet 7\* |
| Spare | | Spare |
| RTP header extension type | | | | | | | | | | | octet 8\* |
| RTP header extension id | | | | | | | | | | | octet 9\* |
| RTP payload information list | | | | | | | | | | | octet 10\*  octet u\* |

figure 9.11.4.39.2 protocol description

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of RTP payload information list | | | | | | | | octet 10  octet 11 |
| RTP payload information 1 | | | | | | | | octet 12  octet o |
| RTP payload information 2 | | | | | | | | octet (o+1)\*  octet p\* |
| ... | | | | | | | |  |
| RTP payload information m | | | | | | | | octet q\*  octet r\* |

figure 9.11.4.39.3 RTP payload information list

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| RTP payload format | | | | | | | | octet 12 |
| Number of RTP payload type | | | | | | | | octet 13 |
| RTP payload type 1 | | | | | | | | octet 14 |
| RTP payload type 2 | | | | | | | | octet 15\* |
| ... | | | | | | | |  |
| RTP payload type t | | | | | | | | octet (13+t)\* |

figure 9.11.4.39.4 RTP payload information

table 9.11.4.39.1 protocol description information element

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Length of protocol description (octet 4 and octet 5) (see NOTE 1) | | | | | | | | | | |
| The length of protocol description field indicates the length of the protocol description entry. | | | | | | | | | | |
|  | | | | | | | | | | |
| QoS Rule Identifier (QRI) (octet 6) | | | | | | | | | | |
| The QoS Rule Identifier (QRI) field contains the QoS rule identifier as specified in subclause 9.11.4.13. Each protocol description entry is associated with the QoS rule identified by the QRI field. | | | | | | | | | | |
|  | | | | | | | | | | |
| Transport Protocol (octet 7, bits 1 to 4)  The Transport Protocol field indicates the transport protocol used by the media flow, e.g., RTP or SRTP as specified in 3GPP TS 26.522 [69]. | | | | | | | | | | |
| Bits | | | | | | | | | | |
| **4** | | **3** | | **2** | **1** |  | | | | |
| 0 | | 0 | | 0 | 1 | RTP | | | | |
| 0 | | 0 | | 1 | 0 | SRTP | | | | |
| All other values are spare. | | | | | | | | | | |
|  | | | | | | | | | | |
| RTP header extension information presence indicator (HEIPI) (bit 5 of octet 7) | | | | | | | | | | |
| The HEIPI field indicates whether the RTP header extension information (RTP header extension type field and RTP header extension id field) is included in the IE or not. | | | | | | | | | | |
| Bit | | | | | | | | | | |
| **5** |  | |  | | | | | | | |
| 0 |  | | RTP header extension information not included | | | | | | | |
| 1 |  | | RTP header extension information included | | | | | | | |
|  | | | | | | | | | | |
| RTP payload information list presence indicator (PILPI) (bit 6 of octet 7) | | | | | | | | | | |
| The PILPI field indicates whether the RTP payload information list is included in the IE or not. | | | | | | | | | | |
| Bit | | | | | | | | | | |
| **6** | | | | | | | | | | |
| 0 | |  | | RTP payload information list not included | | | | | | |
| 1 | |  | | RTP payload information list included | | | | | | |
|  | | | | | | | | | | |
| RTP header extension type (octet 8) | | | | | | | | | | |
| The RTP header extension type field contains the RTP header extension type, i.e the RTP Header Extension for PDU Set Marking as specified in subclause 4.2 of 3GPP TS 26.522 [69]. | | | | | | | | | | |
| Bits | | | | | | | | | | |
| **8** | | **7** | | **6** | **5** | **4** | **3** | **2** | **1** | |
| 0 | | 0 | | 0 | 0 | 0 | 0 | 0 | 1 | RTP Header Extension for PDU Set Marking |
| All other values are spare. | | | | | | | | | | |
|  | | | | | | | | | | |
| RTP header extension id (octet 9) | | | | | | | | | | |
| The RTP header extension id field contains the RTP header extension id which is coded as binary representation of an integer between 1(inclusive) and 255(inclusive) as defined in IETF RFC 8285 [70]. | | | | | | | | | | |
|  | | | | | | | | | | |
| RTP payload information list (octets 10 to u) (see NOTE 2) | | | | | | | | | | |
| The RTP payload information list contains the RTP payload information for the RTP stream, which can be used to derive the PDU set information. | | | | | | | | | | |
|  | | | | | | | | | | |
| RTP payload format (octet 12) | | | | | | | | | | |
|  | | | | | | | | | | |
| Bits | | | | | | | | | | |
| **8** | | **7** | | **6** | **5** | **4** | **3** | **2** | **1** | |
| 0 | | 0 | | 0 | 0 | 0 | 0 | 0 | 1 | RTP payload format for H.264/AVC codec as specified in subclause A.2.2 of 3GPP TS 26.522 [69] |
| 0 | | 0 | | 0 | 0 | 0 | 0 | 1 | 0 | RTP payload format for H.265/HEVC codec as specified in subclause A.2.2 of 3GPP TS 26.522 [69] |
| All other values are spare and not used. | | | | | | | | | | |
|  | | | | | | | | | | |
| RTP payload type (octet 14) | | | | | | | | | | |
| The RTP payload type field indicates the RTP or SRTP payload type, it contains the binary representation of an integer between 1(inclusive) and 127(inclusive). The other values are spare. If spare value is used, the UE shall ignore the value. | | | | | | | | | | |
|  | | | | | | | | | | |
| NOTE 1: If the value of the length of protocol description field is set to 1, the protocol description entry is deleted for the associated QoS rule. If the value of the length of protocol description field is greater than 1, the protocol description entry is added or replaced for the associated QoS rule.  NOTE 2: In this release of the specification, the RTP payload information list contains only one RTP payload information entry. | | | | | | | | | | |

#### 9.11.4.40 ECN marking for L4S indication

the purpose of the ECN marking for L4S indication information element is to provide ECN marking for L4S indication to the 5G-RG

the ECN marking for L4S indication information element is a type 4 information element with a minimum length of 2 octets

the ECN marking for L4S indication information element is coded as shown in figure 9.11.4.40.1 and table 9.11.4.40.1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| ECN marking for L4S indication IEI | | | | | | | | octet 1 |
| Length of ECN marking for L4S indication contents | | | | | | | | octet 2 |
| QoS rule identifier 1 | | | | | | | | octet 3\* |
| QoS rule identifier 2 | | | | | | | | octet 4\* |
| ... | | | | | | | | ... |
| QoS rule identifier n | | | | | | | | octet n\* |

figure 9.11.4.40.1 ECN marking for L4S indication information element

table 9.11.4.40.1 ECN marking for L4S indication information element

|  |
| --- |
| Length of ECN marking for L4S indication content (octet 2) (see NOTE) |
| The length of ECN marking for L4S indication field indicates the length of the ECN marking for L4S indication entry. |
|  |
| QoS rule identifier (QRI) (octet 3) |
|  |
| The QoS Rule Identifier (QRI) field contains the QoS rule identifier as specified in subclause 9.11.4.13. The ECN marking for L4S indication entry only contains the QRI(s) required to perform the ECN marking for L4S for 5G-RG. |
|  |
| NOTE: If the value of the length of ECN marking for L4S indication field is set to 1, the ECN marking for L4S indication entry is deleted for all the QoS rules. If the value of the length of ECN marking for L4S indication field is greater than 1, the ECN marking for L4S indication entry is either added or deleted for the associated QoS rule(s). |

## 9.12 3GPP specific coding information defined within present document

### 9.12.1 serving network name (SNN)

the serving network name (SNN) is used

- in the network name field of the AT\_KDF\_INPUT attribute defined in IETF RFC 5448 [40];

- in KAUSF derivation function as specified in 3GPP TS 33.501 [24] annex A; and

- in RES\* and XRES\* derivation function as specified in 3GPP TS 33.501 [24] annex a

SNN shall contain a UTF-8 string without terminating null characters

SNN is of maximum length of 1020 octets

SNN consists of SNN-service-code and SNN-network-identifier delimited by a colon

SNN-network-identifier identifies the serving PLMN or the serving SNPN

MCC and MNC in the SNN-PLMN-ID are MCC and MNC of the serving PLMN if the MNC of the serving PLMN has two digits then a zero is added at the beginning

MCC and MNC in the SNN-SNPN-ID are MCC and MNC of the serving SNPN if the MNC of the serving SNPN has two digits then a zero is added at the beginning

SNN-NID contains an NID in hexadecimal digits

ABNF syntax of SNN is specified in table 9.12.1.1

table 9.12.1.1 ABNF syntax of SNN

SNN = SNN-service-code ":" SNN-network-identifier

SNN-service-code = %x35.47 ; "5G"

SNN-network-identifier = SNN-PLMN-ID / SNN-SNPN-ID

SNN-PLMN-ID = SNN-mnc-string SNN-mnc-digits "." SNN-mcc-string SNN-mcc-digits "." SNN-3gppnetwork-string "." SNN-org-string ; applicable when not operating in SNPN access operation mode

SNN-SNPN-ID = SNN-mnc-string SNN-mnc-digits "." SNN-mcc-string SNN-mcc-digits "." SNN-3gppnetwork-string "." SNN-org-string ":" SNN-NID ; applicable when operating in SNPN access operation mode

SNN-mnc-digits = DIGIT DIGIT DIGIT ; MNC of the PLMN ID

SNN-mcc-digits = DIGIT DIGIT DIGIT ; MCC of the PLMN ID

SNN-mnc-string = %x6d.6e.63 ; "mnc" in lower case

SNN-mcc-string = %x6d.63.63 ; "mcc" in lower case

SNN-3gppnetwork-string = %x33.67.70.70.6e.65.74.77.6f.72.6b ; "3gppnetwork" in lower case

SNN-org-string = %x6f.72.67 ; "org" in lower case

SNN-NID = 11SNN-hexadecimal-digit ; NID in hexadecimal digits

SNN-hexadecimal-digit = DIGIT / %x41 / %x42 / %x43 / %x44 / %x45 / %x46

NOTE SNN-service-code allows for distinguishing of ANID specified in 3GPP TS 24.302 [16] and SNN as either of SNN or ANID can be carried in the AT\_KDF\_INPUT attribute

EXAMPLE 1 in case of a PLMN if PLMN ID contains MCC = 234 and MNC = 15 SNN is 5G:mnc015.mcc234.3gppnetwork.org

EXAMPLE 2 in case of an SNPN if SNPN ID contains a PLMN ID of MCC = 234 and MNC = 15 and an NID of 123456ABCDEH SNN is 5G:mnc015.mcc234.3gppnetwork.org:123456ABCDE

# 10 list of system parameters

## 10.1 general

the description of timers in the following tables should be considered a brief summary the precise details are found in clauses 4 to 6 which should be considered the definitive descriptions

## 10.2 timers of 5GS mobility management

timers of 5GS mobility management are shown in table 10.2.1 and table 10.2.2

NOTE timers T3324 T3346 T3245 and T3247 are defined in 3GPP TS 24.008 [12] timers T3444 T3445 T3447 and T3448 are defined in 3GPP TS 24.301 [15]

table 10.2.1 timers of 5GS mobility management – UE side

| TIMER NUM. | TIMER VALUE | STATE | CAUSE OF START | NORMAL STOP | ON  EXPIRY |
| --- | --- | --- | --- | --- | --- |
| T3502 | Default 12 min.  NOTE 1 | 5GMM-DEREGISTERED 5GMM-REGISTERED | At registration failure and the attempt counter is equal to 5 | Transmission of REGISTRATION REQUEST message | Initiation of the registration procedure, if still required |
| T3510 | 15s  NOTE 7  NOTE 8  In WB-N1/CE mode, 85s  For access via a satellite NG-RAN cell, 27s  NOTE 12 | 5GMM-REGISTERED-INITIATED | Transmission of REGISTRATION REQUEST message | REGISTRATION ACCEPT message received or REGISTRATION REJECT message received | Start T3511 or T3502 as specified in subclause 5.5.1.2.7 if T3510 expired during registration procedure for initial registration.  Start T3511 or T3502 as specified in subclause 5.5.1.3.7 if T3510 expired during the registration procedure for mobility and periodic registration update |
| T3511 | 10s | 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION  5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE  5GMM-REGISTERED.NORMAL-SERVICE or 5GMM-REGISTERED.NON-ALLOWED-SERVICE | At registration failure due to lower layer failure, T3510 timeout or registration rejected with other 5GMM cause values than those treated in subclause 5.5.1.2.5 for initial registration or subclause 5.5.1.3.5 for mobility and periodic registration | Transmission of REGISTRATION REQUEST message  5GMM-CONNECTED mode entered (NOTE 5) | Retransmission of the REGISTRATION REQUEST message, if still required |
| T3512 | Default 54 min  NOTE 1  NOTE 2 | 5GMM-REGISTERED | In 5GMM-REGISTERED, when 5GMM-CONNECTED mode is left and if the NW does not indicate support for strictly periodic registration timer as specified in subclause 5.3.7.  If the network indicates support for strictly periodic registration timer, T3512 is started after the successful completion of registration update procedure. T3512 is restarted if it expires in 5GMM-CONNECTED mode as specified in subclause 5.3.7. | When entering state 5GMM-DEREGISTERED  When entering 5GMM-CONNECTED mode if the NW does not indicate support for strictly periodic registration timer as specified in subclause 5.3.7. | In 5GMM-IDLE mode, Initiation of the periodic registration procedure if the UE is not registered for emergency services.  In 5GMM-CONNECTED mode, restart the timer T3512.  Locally deregister if the UE is registered for emergency services |
| T3516 | 30s  NOTE 7  NOTE 8  In WB-N1/CE mode, 48s For access via a satellite NG-RAN cell, 35s  NOTE 12 | 5GMM-REGISTERED-INITIATED  5GMM-REGISTERED  5GMM-DEREGISTERED-INITIATED  5GMM-SERVICE-REQUEST-INITIATED | RAND and RES\* stored as a result of an 5G authentication challenge | SECURITY MODE COMMAND message received  SERVICE REJECT message received  REGISTRATION ACCEPT message received  AUTHENTICATION REJECT message received  AUTHENTICATION FAILURE message sent  5GMM-DEREGISTERED, 5GMM-NULL or  5GMM-IDLE mode entered | Delete the stored RAND and RES\* |
| T3517 | (a) 5s for case h) in subclause 5.6.1.1; or  (b) 15s for cases other than h) in subclause 5.6.1.1  NOTE 7  NOTE 8  NOTE 10  In WB-N1/CE mode, 61s For access via a satellite NG-RAN cell, 27s  NOTE 12 | 5GMM-SERVICE-REQUEST-INITIATED | Transmission of SERVICE REQUEST message, or CONTROL PLANE SERVICE REQUEST message | (a) Indication from the lower layers that the UE has changed to S1 mode or E-UTRA connected to 5GCN for case h) in subclause 5.6.1.1; or  (b) SERVICE ACCEPT message received, or  SERVICE REJECT message received for cases other than h) in subclause 5.6.1.1  see subclause 5.6.1.4.2 | Abort the procedure |
| T3519 | 60s  NOTE 7  NOTE 8  In WB-N1/CE mode, 90s For access via a satellite NG-RAN cell, 65s  NOTE 12 | 5GMM-REGISTERED-INITIATED  5GMM-REGISTERED  5GMM-DEREGISTERED-INITIATED  5GMM-SERVICE-REQUEST-INITIATED (NOTE 6) | Transmission of IDENTITY RESPONSE message, REGISTRATION REQUEST message, or DEREGISTRATION REQUEST message with freshly generated SUCI | REGISTRATION ACCEPT message with new 5G-GUTI received  CONFIGURATION UPDATE COMMAND message with new 5G-GUTI received DEREGISTRATION ACCEPT message | Delete stored SUCI |
| T3520 | 15s  NOTE 7  NOTE 8  In WB-N1/CE mode, 33s For access via a satellite NG-RAN cell, 20s  NOTE 12 | 5GMM-REGISTERED-INITIATED  5GMM-REGISTERED  5GMM-DEREGISTERED-INITIATED  5GMM-SERVICE-REQUEST-INITIATED | Transmission of AUTHENTICATION FAILURE message with any of the 5GMM cause #20, #21, #26 or #71  Transmission of AUTHENTICATION RESPONSE message with an EAP-response message after detection of an error as described in subclause 5.4.1.2.2.4 | AUTHENTICATION REQUEST message received or AUTHENTICATION REJECT message received  or  SECURITY MODE COMMAND message received  when entering 5GMM-IDLE mode  indication of transmission failure of AUTHENTICATION FAILURE message from lower layers | On first expiry during a 5G AKA based primary authentication and key agreement procedure, the UE should consider the network as false and follow item g of subclause 5.4.1.3.7, if the UE is not registered for emergency services.  On first expiry during a 5G AKA based primary authentication and key agreement procedure, the UE will follow subclause 5.4.1.3.7 under "For items c, d, e and f:", if the UE is registered for emergency services.  On first expiry during an EAP based primary authentication and key agreement procedure, the UE should consider the network as false and follow item e of subclause 5.4.1.2.4.5, if the UE is not registered for emergency services.  On first expiry during an EAP based primary authentication and key agreement procedure, the UE will follow subclause 5.4.1.2.4.5 under "For item e:", if the UE is registered for emergency services |
| T3521 | 15s  NOTE 7  NOTE 8  In WB-N1/CE mode, 45s For access via a satellite NG-RAN cell, 27s  NOTE 12 | 5GMM-DEREGISTERED-INITIATED | Transmission of DEREGISTRATION REQUEST message when de-registration procedure is not due to a "switch off" | DEREGISTRATION ACCEPT message received | Retransmission of DEREGISTRATION REQUEST message |
| T3525 | Default 60s  NOTE 3  NOTE 7  NOTE 8  In WB-N1/CE mode, default 120s  For access via a satellite NG-RAN cell, default 72s  NOTE 12 | 5GMM-REGISTERED.NORMAL-SERVICE or 5GMM-REGISTERED.NON-ALLOWED-SERVICE | T3517 expires and service request attempt counter is greater than or equal to 5 | When entering state other than 5GMM-REGISTERED.NORMAL-SERVICE state or 5GMM-REGISTERED.NON-ALLOWED-SERVICE,  or  UE camped on a new PLMN other than the PLMN on which timer started,  Or  UE camped on a new SNPN other than the SNPN on which timer was started,  or  User-plane resources established with the network | The UE may initiate service request procedure |
| T3540 | 10s  NOTE 7 (applicable to case f) in subclause 5.3.1.3)  NOTE 8  In WB-N1/CE mode, 34s (applicable to case f) in subclause 5.3.1.3)  NOTE 11  For access via a satellite NG-RAN cell, default 22s (applicable to case f) in subclause 5.3.1.3)  NOTE 12  NOTE 13  NOTE 14 | 5GMM-DEREGISTERED  5GMM-REGISTERED | REGISTRATION REJECT message or DEREGISTRATION REQUEST message received with any of the 5GMM cause #3, #6, #7, #11, #12, #13, #15, #27, #31, #36, #62, #72, #73, #74, #75, #76 or #78  SERVICE REJECT message received with any of the 5GMM cause #3, #6, #7, #11, #12, #13, #15, #27, #36, #72, #73, #74, #75, #76 or #78.  REGISTRATION ACCEPT message received as described in subclause 5.3.1.3 case b) and case h)  SERVICE ACCEPT message received as described in subclause 5.3.1.3 case f)  AUTHENTICATION REJECT message received  DEREGISTRATION ACCEPT message received as described in subclause 5.3.1.3 case k) | N1 NAS signalling connection released  PDU sessions have been set up except for the case the UE has set Request type to "NAS signalling connection release" in the UE request type IE in the REGISTRATION REQUEST message as described in subclause 5.3.1.3 case b)  Other use cases see subclause 5.3.1.3 | Release the NAS signalling connection for the cases a), a1), b), c), d), e), f), g), h), i), j), k), l) as described in subclause 5.3.1.3 |
| 5GMM-REGISTERED | CONFIGURATION UPDATE COMMAND message received as described in subclause 5.3.1.3 case e) and h)  SERVICE ACCEPT message received as described in subclause 5.3.1.3 case i) | N1 NAS signalling connection released Other use cases see subclause 5.3.1.3 | Release the NAS signalling connection for the case e) as described in subclause 5.3.1.3 and perform a new registration procedure as described in subclause 5.5.1.3.2  Release the NAS signalling connection for the case h) and i) as described in subclause 5.3.1.3 |
| 5GMM-DEREGISTERED  5GMM-DEREGISTERED.NORMAL-SERVICE  5GMM-REGISTERED.NON-ALLOWED-SERVICE | REGISTRATION REJECT message received with the 5GMM cause #9 or #10  SERVICE REJECT message received with the 5GMM cause #9, #10 or #28 | Release the NAS signalling connection for the cases c) and d) as described in subclause 5.3.1.3 and initiation of the registration procedure as specified in subclause 5.5.1.2.2 or 5.5.1.3.2 |
| Non-3GPP de-registration timer | Default 54 min.  NOTE 1  NOTE 2  NOTE 4 | All 5GMM state over non-3GPP access except 5GMM-DEREGISTERED over non-3GPP access | Entering 5GMM-IDLE mode over non-3GPP access | N1 NAS signalling connection over non-3GPP access established or when entering state 5GMM-DEREGISTERED over non-3GPP access | Implicitly de-register the UE for non-3GPP access on 1st expiry |
| T3526 | NOTE 9 | 5GMM-DEREGISTERED 5GMM-REGISTERED | Rejected S-NSSAI with rejection cause "S-NSSAI not available due to maximum number of UEs reached" received. | Associated S-NSSAI in the rejected NSSAI for the maximum number of UEs reached as specified in subclause 4.6.2.2 deleted. | Remove the S-NSSAI in the rejected NSSAI for the maximum number of UEs reached associated with the T3526 timer. |
| T3527 | 15s | 5GMM-REGISTERED.NORMAL-SERVICE | Transmission of RELAY KEY REQUEST message  Transmission of RELAY AUTHENTICATION RESPONSE message | RELAY KEY REJECT message received or  RELAY AUTHENTICATION REQUEST message received or  RELAY KEY ACCEPT message received | Retransmission of RELAY KEY REQUEST message |
| NOTE 1: The value of this timer is provided by the network operator during the registration procedure.  NOTE 2: The default value of this timer is used if the network does not indicate a value in the REGISTRATION ACCEPT message and the UE does not have a stored value for this timer.  NOTE 3: The value of this timer is UE implementation specific, with a minimum value of 60 seconds if not in NB-N1 mode and if not in WB-N1/CE mode.  NOTE 4: If the T3346 value received in the mobility management messages is greater than the value of the non-3GPP de-registration timer, the UE sets the non-3GPP de-registration timer value to be 4 minutes greater than the value of timer T3346.  NOTE 5: The conditions for which this applies are described in subclause 5.5.1.3.7.  NOTE 6: The conditions for which this applies to the 5GMM-SERVICE-REQUEST-INITIATED state are described in subclause 5.4.1.3.7 case c) and case d).  NOTE 7: In NB-N1 mode, the timer value shall be calculated as described in subclause 4.17.  NOTE 8: In WB-N1 mode, if the UE supports CE mode B and operates in either CE mode A or CE mode B, then the timer value is as described in this table for the case of WB-N1/CE mode (see subclause 4.19).  NOTE 9: The value of this timer is provided by the network operator during the registration procedure or the generic UE configuration update procedure along with the rejected S-NSSAI with rejection cause "S-NSSAI not available due to maximum number of UEs reached". The default value of this timer is implementation specific with a minimum value of 12 minutes and used if the network does not provide a value in the REGISTRATION ACCEPT message, the REGISTRATION REJECT message, or the CONFIGURATION UPDATE COMMAND message along with the rejected S-NSSAI with rejection cause "S-NSSAI not available due to maximum number of UEs reached".  NOTE 10: Based on implementation, the timer may be set to a value between 250ms and 15s when the MUSIM UE indicates "NAS signalling connection release" in the UE request type IE of the SERVICE REQUEST message or CONTROL PLANE SERVICE REQUEST message.  NOTE 11: Based on implementation, the timer may be set to a value between 250ms and 10s when the MUSIM UE not in NB-N1 mode or WB-N1 mode indicated "NAS signalling connection release" or "Rejection of paging" in the UE request type IE of the SERVICE REQUEST message or CONTROL PLANE SERVICE REQUEST message; or indicated "NAS signalling connection release" in the UE request type IE of the REGISTRATION REQUEST message.  NOTE 12: In satellite NG-RAN access, this value shall only be selected when satellite NG-RAN RAT type is NR(MEO) or NR(GEO).  NOTE 13: If the timer is started due the reception of a 5GMM reject cause triggering a PLMN selection according to 3GPP TS 23.122 [5] or a search for a suitable cell in another tracking area according to 3GPP TS 38.304 [28], the UE may start the timer with an implementation specific value which is lower than the value described in this table.  NOTE 14: For a UE configured for high priority access in selected PLMN or SNPN, the timer value shall be implementation specific but shall be less than 5 seconds. | | | | | |

table 10.2.2 timers of 5GS mobility management – AMF side

| TIMER NUM. | TIMER VALUE | STATE | CAUSE OF START | NORMAL STOP | ON  EXPIRY |
| --- | --- | --- | --- | --- | --- |
| T3513  NOTE 7  NOTE 9 | NOTE 4 | 5GMM-REGISTERED | Paging procedure initiated | Paging procedure completed as specified in subclause 5.6.2.2.1 | Network dependent |
| T3522  NOTE 6  NOTE 8 | 6s  In WB-N1/CE mode, 24s  For access via a satellite NG-RAN cell, 11s  NOTE 12 | 5GMM-DEREGISTERED-INITIATED | Transmission of DEREGISTRATION REQUEST message | DEREGISTRATION ACCEPT message received | Retransmission of DEREGISTRATION REQUEST message |
| T3550  NOTE 6  NOTE 8 | 6s  In WB-N1/CE mode, 18s  For access via a satellite NG-RAN cell, 11s  NOTE 12 | 5GMM-COMMON-PROCEDURE-INITIATED | Transmission of REGISTRATION ACCEPT message as specified in subclause 5.5.1.2.4 and 5.5.1.3.4 | REGISTRATION COMPLETE message received | Retransmission of REGISTRATION ACCEPT message |
| T3555  NOTE 6  NOTE 8 | 6s  In WB-N1/CE mode, 24s  For access via a satellite NG-RAN cell, 11s  NOTE 12 | 5GMM-REGISTERED | Transmission of CONFIGURATION UPDATE COMMAND message with "acknowledgement requested" set in the Acknowledgement bit of the Configuration update indication IE | CONFIGURATION UPDATE COMPLETE message received | Retransmission of CONFIGURATION UPDATE COMMAND message |
| T3560  NOTE 6  NOTE 8 | 6s  In WB-N1/CE mode, 24s  For access via a satellite NG-RAN cell, 11s  NOTE 12 | 5GMM-COMMON-PROCEDURE-INITIATED | Transmission of AUTHENTICATION REQUEST message  Transmission of SECURITY MODE COMMAND message | AUTHENTICATION RESPONSE message received  AUTHENTICATION FAILURE message received  SECURITY MODE COMPLETE message received  SECURITY MODE REJECT message received | Retransmission of AUTHENTICATION REQUEST message or SECURITY MODE COMMAND message |
| T3565  NOTE 6  NOTE 8 | 6s  In WB-N1/CE mode, 24s For access via a satellite NG-RAN cell, 11s  NOTE 12 | 5GMM-REGISTERED | Transmission of NOTIFICATION message | SERVICE REQUEST message received  CONTROL PLANE SERVICE REQUEST message received  NOTIFICATION RESPONSE message received  REGISTRATION REQUEST  Message received  DEREGISTRATION REQUEST message received  NGAP UE context resume request message as specified in 3GPP TS 38.413 [31] received | Retransmission of NOTIFICATION message |
| T3570  NOTE 6  NOTE 8 | 6s  In WB-N1/CE mode, 24s  For access via a satellite NG-RAN cell, 11s  NOTE 12 | 5GMM-COMMON-PROCEDURE-INITIATED | Transmission of IDENTITY REQUEST message | IDENTITY RESPONSE message received | Retransmission of IDENTITY REQUEST message |
| T3575  NOTE 6  NOTE 8 | 15s  In WB-N1/CE mode, 60s  For access via a satellite NG-RAN cell, 27s  NOTE 12 | 5GMM-REGISTERED | Transmission of NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message | NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE message received | Retransmission of NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message |
| Active timer | NOTE 10 | All except 5GMM-DEREGISTERED | Entering 5GMM-IDLE mode after indicating MICO mode activation to the UE with an active timer value. | N1 NAS signalling  connection established | Activate MICO mode for the UE. |
| Implicit de-registration timer | NOTE 2 | All except 5GMM-DEREGISTERED | The mobile reachable timer expires while the network is in 5GMM-IDLE mode  Entering 5GMM-IDLE mode over 3GPP access if the MICO mode is activated and strictly periodic monitoring timer is not running  The strictly periodic monitoring timer expires while the network is in 5GMM-IDLE mode | N1 NAS signalling connection established | Implicitly de-register the UE on 1st expiry |
| Mobile reachable timer | NOTE 1 | All except 5GMM-DEREGISTERED | Entering 5GMM-IDLE mode | N1 NAS signalling connection established | Network dependent, but typically paging is halted on 1st expiry, and start implicit de-registration timer, if the UE is not registered for emergency services.  Implicitly de-register the UE which is registered for emergency services |
| Non-3GPP implicit de-registration timer | NOTE 3 | All except 5GMM-DEREGISTERED | Entering 5GMM-IDLE mode over non-3GPP access | N1 NAS signalling connection over non-3GPP access established | Implicitly de-register the UE for non-3GPP access on 1s expiry |
| Strictly periodic monitoring timer | NOTE 5 | All except 5GMM-DEREGISTERED | At the successful completion of registration update procedure if strictly periodic registration timer indication is supported as specified in subclause 5.3.7. | Entering 5GMM-DEREGISTERED. | In 5GMM-IDLE mode, start implicit de-registration timer as specified in subclause 5.3.7.  In 5GMM-CONNECTED mode, Strictly periodic monitoring timer is started again as specified in subclause 5.3.7. |
| Implementation specific timer for onboarding services | NOTE 11 | 5GMM-REGISTERED | At the successful completion of initial registration for onboarding services in SNPN or initial registration for the UE which the subscription is only for configuration of SNPN subscription parameters in PLMN via the user plane or successful completion of registration procedure for mobility and periodic registration update if the implementation specific timer for onboarding services is not running and:  - the UE is registered for onboarding services in SNPN; or  - the UE's subscription only allows for configuration of SNPN subscription parameters in PLMN via the user plane. | DEREGISTRATION REQUEST message received. | Network-initiated de-registration procedure performed |
| NOTE 1: The default value of this timer is 4 minutes greater than the value of timer T3512. If the UE is registered for emergency services, the value of this timer is set equal to the value of timer T3512. If the T3346 value provided in the mobility management messages is greater than the value of the timer T3512, the AMF sets the mobile reachable timer and the implicit de-registration timer such that the sum of the timer values is greater than the value of timer T3346.  NOTE 2: The value of this timer is network dependent. If MICO is activated, the default value of this timer is 4 minutes greater than the value of timer T3512.  NOTE 3: The value of this timer is network dependent. The default value of this timer is 4 minutes greater than the non-3GPP de-registration timer. If the T3346 value provided in the mobility management messages is greater than the value of the non-3GPP de-registration timer, the AMF sets the non-3GPP implicit de-registration timer value to be 8 minutes greater than the value of timer T3346.  NOTE 4: The value of this timer is network dependent.  NOTE 5: The value of this timer is the same as the value of timer T3512.  NOTE 6: In NB-N1 mode, the timer value shall be calculated as described in subclause 4.17.  NOTE 7: In NB-N1 mode, the timer value shall be calculated by using an NAS timer value which is network dependent.  NOTE 8: In WB-N1 mode, if the UE supports CE mode B and operates in either CE mode A or CE mode B, then the timer value is as described in this table for the case of WB-N1/CE mode (see subclause 4.19).  NOTE 9: In WB-N1 mode, if the UE supports CE mode B, then the timer value shall be calculated by using an NAS timer value which value is network dependent.  NOTE 10: If the AMF includes timer T3324 in the REGISTRATION ACCEPT message and if the UE is not registered for emergency services, the value of this timer is equal to the value of timer T3324.  NOTE 11: The value of this timer needs to be large enough to allow a UE to complete the configuration of one or more entries of the "list of subscriber data" and considering that configuration of SNPN subscription parameters in PLMN via the user plane or onboarding services in SNPN involves third party entities outside of the operator's network.  NOTE 12: In satellite NG-RAN access, this value shall only be selected when satellite NG-RAN RAT type is NR(MEO) or NR(GEO). | | | | | |

## 10.3 timers of 5GS session management

timers of 5GS session management are shown in table 10.3.1 and table 10.3.2

NOTE timer T3396 is defined in 3GPP TS 24.008 [12]

table 10.3.1 timers of 5GS session management – UE side

| TIMER NUM. | TIMER VALUE | STATE | CAUSE OF START | NORMAL STOP | ON  THE 1st, 2nd, 3rd, 4th EXPIRY (NOTE 1) |
| --- | --- | --- | --- | --- | --- |
| T3580  NOTE 4  NOTE 5 | 16s  In WB-N1/CE mode, 24s  For access via a satellite NG-RAN cell, 21s  NOTE 7 | PDU SESSION ACTIVE PENDING | Transmission of PDU SESSION ESTABLISHMENT REQUEST message | PDU SESSION ESTABLISHMENT ACCEPT message received or  PDU SESSION ESTABLISHMENT REJECT message received or  PDU SESSION ESTABLISHMENT REQUEST message received in a DL NAS TRANSPORT message with 5GMM cause #22, #28, #65. #67, #69, #90, #91 or #92 | Retransmission of PDU SESSION ESTABLISHMENT REQUEST message |
| T3581  NOTE 4  NOTE 5 | 16s  In WB-N1/CE mode, 24s  For access via a satellite NG-RAN cell, 21s  NOTE 7 | PDU SESSION MODIFICATION PENDING | Transmission of PDU SESSION MODIFICATION REQUEST message | PDU SESSION MODIFICATION COMMAND message with the same PTI is received or PDU SESSION MODIFICATION REJECT message received or  PDU SESSION MODIFICATION REQUEST message received in a DL NAS TRANSPORT message with 5GMM cause #22, #28. #67, #69, or #90 | Retransmission of PDU SESSION MODIFICATION REQUEST message |
| T3582  NOTE 4  NOTE 5 | 16s  In WB-N1/CE mode, 24s  For access via a satellite NG-RAN cell, 21s  NOTE 7 | PDU SESSION INACTIVE PENDING | Transmission of PDU SESSION RELEASE REQUEST message | PDU SESSION RELEASE COMMAND message with the same PTI is received or PDU SESSION RELEASE REJECT message received | Retransmission of PDU SESSION RELEASE REQUEST message |
| T3583 | Default 1 min.  NOTE 2 | PDU SESSION ACTIVE | UE creates or updates a derived QoS rule | UE deletes the derived QoS rule (see subclause 6.2.5.1.4.5) | On 1st expiry: Deletion of the derived QoS rule |
| T3584 | NOTE 3 | PDU SESSION ACTIVE PENDING  PDU SESSION MODIFICATION PENDING  PDU SESSION ACTIVE or PDU SESSION INACTIVE PENDING | PDU SESSION ESTABLISHMENT REJECT, PDU SESSION MODIFICATION REJECT, or PDU SESSION RELEASE COMMAND received with 5GSM cause #67 and with a timer value for T3584  PDU SESSION ESTABLISHMENT REQUEST, or PDU SESSION MODIFICATION REQUEST received in a DL NAS TRANSPORT message with 5GMM cause #67 and with a timer value for T3584 (see subclause 5.4.5.3.3) | PDU SESSION RELEASE COMMAND message (see NOTE 6) or PDU SESSION MODIFICATION COMMAND message or PDU SESSION AUTHENTICATION COMMAND message or DEREGISTRATION REQUEST message with the De-registration type IE indicating "re-registration required" or  REGISTRATION ACCEPT message or  CONFIGURATION UPDATE COMMAND message (see subclause 4.6.2.2) | None |
| T3585 | NOTE 3 | PDU SESSION ACTIVE PENDING  PDU SESSION MODIFICATION PENDING  PDU SESSION ACTIVE or PDU SESSION INACTIVE PENDING | PDU SESSION ESTABLISHMENT REJECT, PDU SESSION MODIFICATION REJECT, or PDU SESSION RELEASE COMMAND received with 5GSM cause #69 and with a timer value for T3585  PDU SESSION ESTABLISHMENT REQUEST, or PDU SESSION MODIFICATION REQUEST received in a DL NAS TRANSPORT message with 5GMM cause #69 and with a timer value for T3585(see subclause 5.4.5.3.3) | PDU SESSION RELEASE COMMAND message (see NOTE 6) or PDU SESSION MODIFICATION COMMAND message or PDU SESSION AUTHENTICATION COMMAND message or DEREGISTRATION REQUEST message with the De-registration type IE indicating "re-registration required" or  REGISTRATION ACCEPT message or  CONFIGURATION UPDATE COMMAND message (see subclause 4.6.2.2) | None |
| Back-off timer |  |  | defined in 3GPP TS 24.008 [12] |  |  |
| T3586 NOTE 4  NOTE 5 | 8s  In WB-N1/CE mode, 16s  For access via a satellite NG-RAN cell, 13s  NOTE 7 | PDU SESSION ACTIVE | REMOTE UE REPORT message sent | REMOTE UE REPORT RESPONSE message received | On the 1st and 2nd expiry, retransmission of REMOTE UE REPORT message  On the 3rd expiry, the procedure is aborted (see subclause 6.6.2.4). |
| T3587 | NOTE 8 | PDU SESSION ACTIVE | PDU SESSION MODIFICATION COMMAND message or PDU SESSION ESTABLISHMENT ACCEPT message received with Received MBS information that includes MBS decision set to "MBS join is rejected" and Rejection cause set to "multicast MBS session has not started or will not start soon" and an MBS back-off timer value | None | Initiating a request to join the multicast MBS session associated with the PDU session if still needed |
| NOTE 1: Typically, the procedures are aborted on the fifth expiry of the relevant timer. Exceptions are described in the corresponding procedure description.  NOTE 2: The network may provide the value of this timer applicable to the derived QoS rules of a specific PDU session as RQ timer value in the PDU SESSION ESTABLISHMENT ACCEPT message and PDU SESSION MODIFICATION COMMAND message. The maximum value of the timer is 30 min. If the network indicates a value greater than the maximum value, then the UE shall use the maximum value.  NOTE 3: The value of this timer is provided by the network.  NOTE 4: In NB-N1 mode, then the timer value shall be calculated as described in subclause 4.18.  NOTE 5: In WB-N1 mode, if the UE supports CE mode B and operates in either CE mode A or CE mode B, then the timer value is as described in this table for the case of WB-N1/CE mode (see subclause 4.20).  NOTE 6: If the PDU SESSION RELEASE COMMAND message includes the Back-off timer value IE where the timer value indicates neither zero nor deactivated and the 5GSM cause is not #39, the UE then starts the timer with the value provided in the Back-off timer value IE after stopping the existing timer (see subclause 6.3.3.3).  NOTE 7: In satellite NG-RAN access, this value shall only be selected when satellite NG-RAN RAT type is NR(MEO) or NR(GEO).  NOTE 8: The value of this timer is provided by the network in the Received MBS container IE (see subclause 6.3.2.3, subclause 6.4.1.3 and subclause 9.11.4.31). | | | | | |

NOTE 1 the back-off timer is used to describe a logical model of the required UE behaviour this model does not imply any specific implementation e.g as a timer of timestamp

NOTE 2 reference to back-off timer in this section can either refer to use of timer T3396 or to use of a different packet system specific timer within the UE whether the UE uses T3396 as a back-off timer or it uses different packet system specific timers as back-off timers is left up to UE implementation

table 10.3.2 timers of 5GS session management – SMF side

| TIMER NUM. | TIMER VALUE | STATE | CAUSE OF START | NORMAL STOP | ON  THE 1st, 2nd, 3rd, 4th EXPIRY (NOTE 1) |
| --- | --- | --- | --- | --- | --- |
| T3590  NOTE 3  NOTE 4 | 15s  In WB-N1/CE mode, 23s  For access via a satellite NG-RAN cell, 21s  NOTE 5 | PROCEDURE TRANSACTION PENDING | Transmission of PDU SESSION AUTHENTICATION COMMAND message | PDU SESSION AUTHENTICATION COMPLETE message received | Retransmission of PDU SESSION AUTHENTICATION COMMAND message |
| T3591  NOTE 3  NOTE 4 | 16s  In WB-N1/CE mode, 24s  For access via a satellite NG-RAN cell, 22s  NOTE 5 | PDU SESSION MODIFICATION PENDING | Transmission of PDU SESSION MODIFICATION COMMAND message | PDU SESSION MODIFICATION COMPLETE message received or PDU SESSION MODIFICATION COMMAND REJECT message received | Retransmission of PDU SESSION MODIFICATION COMMAND message |
| T3592  NOTE 3  NOTE 4 | 16s  In WB-N1/CE mode, 24s  For access via a satellite NG-RAN cell, 22s  NOTE 5 | PDU SESSION INACTIVE PENDING | Transmission of PDU SESSION RELEASE COMMAND message | PDU SESSION RELEASE COMPLETE message received or  N1 SM delivery skipped indication received | Retransmission of PDU SESSION RELEASE COMMAND message |
| T3593  NOTE 3  NOTE 4 | Default  60s  (NOTE 2) | PDU SESSION MODIFICATION PENDING | Reception of PDU SESSION MODIFICATION COMPLETE message for transmitted PDU SESSION MODIFICATION COMMAND message where the PDU SESSION MODIFICATION COMMAND message included 5GSM cause #39 | PDU SESSION RELEASE REQUEST message received | Network-requested PDU session release procedure performed |
| T3594  NOTE 3  NOTE 4 | 15s  In WB-N1/CE mode, 23s  For access via a satellite NG-RAN cell, 21s  NOTE 5 | PROCEDURE TRANSACTION PENDING | Transmission of SERVICE-LEVEL AUTHENTICATION COMMAND message | SERVICE-LEVEL AUTHENTICATION COMPLETE message received | Retransmission of SERVICE-LEVEL AUTHENTICATION COMMAND message |
| NOTE 1: Typically, the procedures are aborted on the fifth expiry of the relevant timer. Exceptions are described in the corresponding procedure description.  NOTE 2: If the PDU Session Address Lifetime value is sent to the UE in the PDU SESSION MODIFICATION COMMAND message then timer T3593 shall be started with the same value, otherwise it shall use a default value.  NOTE 3: In NB-N1 mode, the timer value shall be calculated as described in subclause 4.18.  NOTE 4: In WB-N1 mode, if the UE supports CE mode B and operates in either CE mode A or CE mode B, then the timer value is as described in this table for the case of WB-N1/CE mode (see subclause 4.20).  NOTE 5: In satellite NG-RAN access, this value shall only be selected when satellite NG-RAN RAT type is NR(MEO) or NR(GEO). | | | | | |

## 10.4 void

# A.1 causes related to UE identification

cause #3 – illegal UE

this 5GMM cause is sent to the UE when the network refuses service to the UE either because an identity of the UE is not acceptable to the network or because the UE does not pass the authentication check

cause #6 – illegal ME

this 5GMM cause is sent to the UE if the ME used is not acceptable to the network e.g on the prohibited list

cause #9 – UE identity cannot be derived by the network

this 5GMM cause is sent to the UE when the network cannot derive the UE's identity from the 5G-GUTI or 5G-S-TMSI because of e.g no matching identity/context in the network failure to validate the UE's identity due to integrity check failure of the received message

cause #10 – implicitly de-registered

this 5GMM cause is sent to the UE either if the network has implicitly de-registered the UE e.g after the implicit de-registration timer has expired or if the 5GMM context data related to the subscription does not exist in the AMF e.g because of a AMF restart or because of a registration request for mobility or registration update is routed to a new AMF

# A.2 cause related to subscription options

cause #5 – PEI not accepted

this cause is sent to the UE if the network does not accept an initial registration procedure for emergency services using a PEI

cause #7 – 5GS services not allowed

this 5GMM cause is sent to the UE when it is not allowed to operate 5GS services

cause #11 – PLMN not allowed

this 5GMM cause is sent to the UE if it requests service or if the network initiates a de-registration request in a PLMN where the UE by subscription or due to operator determined barring is not allowed to operate

this 5GMM cause can also be sent to the UE when the disaster condition is no longer being applicable in the current location of the UE

cause #12 – tracking area not allowed

this 5GMM cause is sent to the UE if it requests service or if the network initiates a de-registration request in a tracking area where the HPLMN or SNPN determines that the UE by subscription is not allowed to operate

NOTE 1 if 5GMM cause #12 is sent to a roaming subscriber the subscriber is denied service even if other PLMNs are available on which registration was possible

cause #13 – roaming not allowed in this tracking area

this 5GMM cause is sent to a UE which requests service or if the network initiates a de-registration request in a tracking area of a PLMN or SNPN which by subscription offers roaming to that UE but not in that tracking area

this 5GMM cause can also be sent to the UE when the disaster condition is no longer being applicable in the current location of the UE

cause #15 – no suitable cells in tracking area

this 5GMM cause is sent to the UE if it requests service or if the network initiates a de-registration request in a tracking area where the UE by subscription is not allowed to operate but when it should find another allowed tracking area in the same PLMN or an equivalent PLMN or the same SNPN or an equivalent SNPN

NOTE 2 cause #15 and cause #12 differ in the fact that cause #12 does not trigger the UE to search for another allowed tracking area on the same PLMN or SNPN

cause #27 – N1 mode not allowed

this 5GMM cause is sent to the UE if it requests service or if the network initiates a de-registration request in a PLMN or SNPN where the UE by subscription or operator policy is not allowed to operate in N1 mode

cause #31 – redirection to EPC required

this 5GMM cause is sent to the UE if it requests service in a PLMN where the UE by operator policy is not allowed in 5GCN and redirection to EPC is required

cause #36 – IAB-node operation not authorized

this 5GMM cause is sent to the UE if a UE operating as an IAB-node requests service or if the network initiates a de-registration procedure in a PLMN or SNPN where the UE by subscription is not authorized for IAB operation

cause #72 – Non-3GPP access to 5GCN not allowed

this 5GMM cause is sent to the UE if it requests accessing 5GCN over non-3GPP access in a PLMN or SNPN where the UE by subscription is not allowed to access 5GCN over non-3GPP access

cause #74 – temporarily not authorized for this SNPN

this 5GMM cause is sent to the UE if it requests access or if the network initiates a de-registration procedure in a cell belonging to an SNPN for which the UE has no subscription to operate or for which the UE is not allowed to operate onboarding services

cause #75 – permanently not authorized for this SNPN

this 5GMM cause is sent to the UE if it requests access or if the network initiates a de-registration procedure in a cell belonging to an SNPN with a globally-unique SNPN identity for which the UE either has no subscription to operate the UE's subscription has expired or the UE is not allowed to operate onboarding services

cause #76 – not authorized for this CAG or authorized for CAG cells only

this 5GMM cause is sent to the UE if the UE requests access or de-registration

i) in a CAG cell with a CAG-ID which is not authorized based on the UE's "allowed CAG list" for the PLMN; or

ii) in a non-CAG cell wherein the UE is only allowed to access 5GS via CAG cells

cause #77 – wireline access area not allowed

this 5GMM cause is sent to the 5G-RG or the W-AGF acting on behalf of the FN-CRG (or on behalf of the N5GC device) if the 5G-RG or the W-AGF acting on behalf of the FN-CRG (or on behalf of the N5GC device) request accessing 5GCN over a wireline access network belonging to a wireline access area where the 5G-RG or the W-AGF acting on behalf of the FN-CRG (or on behalf of the N5GC device) are not allowed by subscription to access the 5GCN over the wireline access

cause #79 – UAS services not allowed

this 5GMM cause is sent to the UE to indicate that the request of UAS services is not allowed

cause #80 – disaster roaming for the determined PLMN with disaster condition not allowed

this 5GMM cause is sent by the network in a PLMN where the UE has requested registration for disaster roaming service for the determined PLMN with disaster condition but the AMF determines that it does not support providing disaster roaming services to the UE for the determined PLMN with disaster condition as roaming agreement for disaster roaming services with HPLMN of the UE does not exist or the determined PLMN with disaster condition is a forbidden PLMN of the UE

cause #94 – user plane positioning not authorized

this 5GMM cause is sent to the UE if it requests the user plane positioning where the UE by subscription is not authorized for user plane positioning

# A.3 causes related to PLMN or SNPN specific network failures and congestion/authentication failures

cause #20 – MAC failure

this 5GMM cause is sent to the network if the USIM detects that the MAC in the AUTHENTICATION REQUEST message is not fresh

cause #21 – synch failure

this 5GMM cause is sent to the network if the USIM detects that the SQN in the AUTHENTICATION REQUEST message is out of range

cause #22 – congestion

this 5GMM cause is sent to the UE because of congestion in the network (e.g no channel facility busy/congested etc.)

cause #23 – UE security capabilities mismatch

this 5GMM cause is sent to the network if the UE detects that the UE security capability does not match the one sent back by the network

cause #24 – security mode rejected unspecified

this 5GMM cause is sent to the network if the security mode command is rejected by the UE for unspecified reasons

cause #26 – Non-5G authentication unacceptable

this 5GMM cause is sent to the network in N1 mode if the "separation bit" in the AMF field of AUTN is set to 0 in the AUTHENTICATION REQUEST message (see 3GPP TS 33.501 [24])

cause #28 – restricted service area

this 5GMM cause is sent to the UE if it requests service in a tracking area of the 3GPP access or in an area of the wireline access which is a part of the UE's non-allowed area or is not a part of the UE's allowed area

cause #43 – LADN not available

this 5GMM cause is sent to the UE if the user-plane resources of the PDU session are not established when the UE is located outside the LADN service area

cause #62 – no network slices available

this 5GMM cause is sent by the network if there are no available network slices allowed for use by the UE

NOTE network does not send this cause in REGISTRATION REJECT message if the UE does not include a requested NSSAI in the REGISTRATION REQUEST message in that case if the UE is not registered for onboarding services in SNPN the network uses other causes (e.g #13 #15 etc.) based on the subscription

cause #65 – maximum number of PDU sessions reached

this 5GMM cause is used by the network to indicate that the procedure requested by the UE was rejected as the network has reached the maximum number of simultaneously active PDU sessions for the UE

cause #67 – insufficient resources for specific slice and DNN

this 5GMM cause is sent by the network to indicate that the requested service cannot be provided due to insufficient resources for specific slice and DNN

cause #69 – insufficient resources for specific slice

this 5GMM cause is sent by the network to indicate that the requested service cannot be provided due to insufficient resources for specific slice

cause #71 – ngKSI already in use

this 5GMM cause is sent to the network in N1 mode if the ngKSI value received in the AUTHENTICATION REQUEST message is already associated with one of the 5G security contexts stored in the UE

cause #73 – serving network not authorized

this 5GMM cause is sent to the UE if the UE initiates registration towards a serving network and the serving network fails to be authorized by the UE's home network

cause #78 –PLMN not allowed to operate at the present UE location

this 5GMM cause is sent to the UE to indicate that the PLMN is not allowed to operate at the present UE location

NOTE this cause is only applicable for satellite NG-RAN access

cause #81 – selected N3IWF is not compatible with the allowed NSSAI

this 5GMM cause is sent by the network to indicate that the requested service cannot be provided due to the selected N3IWF is not compatible with the allowed NSSAI

cause #82 – selected TNGF is not compatible with the allowed NSSAI

this 5GMM cause is sent by the network to indicate that the requested service cannot be provided due to the selected TNGF is not compatible with the allowed NSSAI

cause #90 – payload was not forwarded

this 5GMM cause is sent by the network to indicate that the requested service cannot be provided because payload could not be forwarded by AMF

cause #91 – DNN not supported or not subscribed in the slice

this 5GMM cause is sent by the network to indicate that the requested service cannot be provided because payload could not be forwarded by AMF because the DNN is not supported or not subscribed in the slice selected by the network if the UE did not indicate a slice or the DNN is not supported or not subscribed in the slice indicated by the UE

cause #92 – insufficient user-plane resources for the PDU session

this 5GMM cause is sent by the network to indicate that the requested service cannot be provided due to insufficient user-plane resources for the PDU session

cause #93 – onboarding services terminated

this 5GMM cause is sent by the network if the network initiates a de-registration procedure because the onboarding services are terminated

# A.4 causes related to invalid messages

cause #95 – semantically incorrect message

this 5GMM cause is used to report receipt of a message with semantically incorrect contents

cause #96 – invalid mandatory information

this cause 5GMM indicates that the equipment sending this 5GMM cause has received a message with a non-semantical mandatory IE error

cause #97 – message type non-existent or not implemented

this 5GMM cause indicates that the equipment sending this 5GMM cause has received a message with a message type it does not recognize either because this is a message not defined or defined but not implemented by the equipment sending this 5GMM cause

cause #98 – message type not compatible with protocol state

this 5GMM cause indicates that the equipment sending this 5GMM cause has received a message not compatible with the protocol state

cause #99 – information element non-existent or not implemented

this 5GMM cause indicates that the equipment sending this 5GMM cause has received a message which includes information elements not recognized because the information element identifier is not defined or it is defined but not implemented by the equipment sending the 5GMM cause however the information element is not required to be present in the message in order for the equipment sending the 5GMM cause to process the message

cause #100 – conditional IE error

this 5GMM cause indicates that the equipment sending this cause has received a message with conditional IE errors

cause #101 – message not compatible with protocol state

this 5GMM cause indicates that a message has been received which is incompatible with the protocol state

cause #111 – protocol error unspecified

this 5GMM cause is used to report a protocol error event only when no other 5GMM cause in the protocol error class applies

# B.1 causes related to nature of request

cause #8 – operator determined barring

this 5GSM cause is used by the network to indicate that the requested service was rejected by the SMF due to operator determined barring

cause #26 – insufficient resources

this 5GSM cause is used by the UE or by the network to indicate that the requested service cannot be provided due to insufficient resources

cause #27 – missing or unknown DNN

this 5GSM cause is used by the network to indicate that the requested service was rejected by the external DN because the DNN was not included although required or if the DNN could not be resolved

cause #28 – unknown PDU session type

this 5GSM cause is used by the network to indicate that the requested service was rejected by the external DN because the requested PDU session type could not be recognised or is not allowed

cause #29 – user authentication or authorization failed

this 5GSM cause is used by the network to indicate that the requested service was rejected by the external DN due to a failed user authentication revoked by the external DN or rejected by 5GCN due to a failed user authentication or authorization

cause #31 – request rejected unspecified

this 5GSM cause is used by the network or by the UE to indicate that the requested service or operation or the request for a resource was rejected due to unspecified reasons

cause #32 – service option not supported

this 5GSM cause is used by the network when the UE requests a service which is not supported by the PLMN

cause #33 – requested service option not subscribed

this 5GSM cause is sent when the UE requests a service option for which it has no subscription

cause #35 – PTI already in use

this 5GSM cause is used by the network to indicate that the PTI included by the UE is already in use by another active UE requested procedure for this UE

cause #36 – regular deactivation

this 5GSM cause is used to indicate a regular UE or network initiated release of PDU session resources

cause #37 – 5GS QoS not accepted

this 5GSM cause is used by the network if the new 5GS QoS that was indicated in the UE request cannot be accepted

cause #38 – network failure

this 5GSM cause is used by the network to indicate that the requested service was rejected due to an error situation in the network

cause #39 – reactivation requested

this 5GSM cause is used by the network to request a PDU session reactivation

cause #41 – semantic error in the TFT operation

this 5GSM cause is used by the UE to indicate a semantic error in the TFT operation included in the request

cause #42 – syntactical error in the TFT operation

this 5GSM cause is used by the UE to indicate a syntactical error in the TFT operation included in the request

cause #43 – invalid PDU session identity

this 5GSM cause is used by the network or the UE to indicate that the PDU session identity value provided to it is not a valid value or the PDU session identified by the PDU session identity IE in the request or the command is not active

cause #44 – semantic errors in packet filter(s)

this 5GSM cause is used by the network or the UE to indicate that the requested service was rejected due to one or more semantic errors in packet filter(s) of the QoS rule included in the request

cause #45 – syntactical error in packet filter(s)

this 5GSM cause is used by the network or the UE to indicate that the requested service was rejected due to one or more syntactical errors in packet filter(s) of the QoS rule included in the request

cause #46 – out of LADN service area

this 5GSM cause is used by the network to indicate the UE is out of the LADN service area

cause #47 – PTI mismatch

this 5GSM cause is used by the network or UE to indicate that the PTI provided to it does not match any PTI in use

cause #50 – PDU session type IPv4 only allowed

this 5GSM cause is used by the network to indicate that only PDU session type IPv4 is allowed for the requested IP connectivity

cause #51 – PDU session type IPv6 only allowed

this 5GSM cause is used by the network to indicate that only PDU session type IPv6 is allowed for the requested IP connectivity

cause #54 – PDU session does not exist

this 5GSM cause is used by the network at handover of a PDU session between non-3GPP access and 3GPP access or at interworking of a PDN connection from non-3GPP access network connected to EPC or from E-UTRAN connected to EPC to a PDU session to indicate that the network does not have any information about the requested PDU session

cause #57 – PDU session type IPv4v6 only allowed

this 5GSM cause is used by the network to indicate that only PDU session types IPv4 IPv6 or IPv4v6 are allowed for the requested IP connectivity

cause #58 – PDU session type unstructured only allowed

this 5GSM cause is used by the network to indicate that only PDU session type unstructured is allowed for the requested DN connectivity

cause #59 – unsupported 5QI value

this 5GSM cause is used by the network if the 5QI indicated in the UE request cannot be supported

cause #61 – PDU session type ethernet only allowed

this 5GSM cause is used by the network to indicate that only PDU session type ethernet is allowed for the requested DN connectivity

cause #67 – insufficient resources for specific slice and DNN

this 5GSM cause is by the network to indicate that the requested service cannot be provided due to insufficient resources for specific slice and DNN or maximum group data rate on a 5G VN group identified by a specific slice and DNN has been exceeded

cause #68 – not supported SSC mode

this 5GSM cause is used by the network to indicate that the requested SSC mode is not supported

cause #69 – insufficient resources for specific slice

this 5GSM cause is used by the network to indicate that the requested service cannot be provided due to insufficient resources for specific slice maximum number of PDU sessions on a specific slice has been already reached data rate on a specific slice has been exceeded or UE-Slice-MBR has been exceeded

cause #70 – missing or unknown DNN in a slice

this 5GSM cause is used by the network to indicate that the requested service was rejected by the external DN because the DNN was not included although required or if the DNN could not be resolved in the slice

cause #81 – invalid PTI value

this 5GSM cause is used by the network or UE to indicate that the PTI provided to it is invalid for the specific 5GSM message

cause #82 – maximum data rate per UE for user-plane integrity protection is too low

this 5GSM cause is used by the network to indicate that the requested service cannot be provided because the maximum data rate per UE for user-plane integrity protection is too low

cause #83 – semantic error in the QoS operation

this 5GSM cause is used by the network or the UE to indicate that the requested service was rejected due to a semantic error in the QoS operation included in the request

cause #84 – syntactical error in the QoS operation

this 5GSM cause is used by the network or the UE to indicate that the requested service was rejected due to a syntactical error in the QoS operation included in the request

cause #85 – invalid mapped EPS bearer identity

this 5GSM cause is used by the network or the UE to indicate that the mapped EPS bearer identity value provided to it is not a valid value or the mapped EPS bearer identified by the mapped EPS bearer identity does not exist

cause #86 – UAS services not allowed

this 5GSM cause is used by the network to indicate that the requested UAS services are not allowed

# B.2 protocol errors (e.g. unknown message)

cause #95 – semantically incorrect message

this 5GSM cause is used to report receipt of a message with semantically incorrect contents

cause #96 – invalid mandatory information

this 5GSM cause indicates that the equipment sending this 5GSM cause has received a message with a non-semantical mandatory IE error

cause #97 – message type non-existent or not implemented

this 5GSM cause indicates that the equipment sending this 5GSM cause has received a message with a message type it does not recognize either because this is a message not defined or defined but not implemented by the equipment sending this 5GSM cause

cause #98 – message type not compatible with protocol state

this 5GSM cause indicates that the equipment sending this 5GSM cause has received a message not compatible with the protocol state

cause #99 – information element non-existent or not implemented

this 5GSM cause indicates that the equipment sending this 5GSM cause has received a message which includes information elements not recognized because the information element identifier is not defined or it is defined but not implemented by the equipment sending the 5GSM cause however the information element is not required to be present in the message in order for the equipment sending the 5GSM cause to process the message

cause #100 – conditional IE error

this 5GSM cause indicates that the equipment sending this cause has received a message with conditional IE errors

cause #101 – message not compatible with protocol state

this 5GSM cause indicates that a message has been received which is incompatible with the protocol state

cause #111 – protocol error unspecified

this 5GSM cause is used to report a protocol error event only when no other 5GSM cause in the protocol error class applies

# C.1 storage of 5GMM information for UEs not operating in SNPN access operation mode

the following 5GMM parameters shall be stored on the USIM if the corresponding file or file extension is present

a) 5G-GUTI;

b) last visited registered TAI;

c) 5GS update status;

d) 5G NAS security context parameters from a full native 5G NAS security context (see 3GPP TS 33.501 [24]);

e) KAUSF and KSEAF (see 3GPP TS 33.501 [24]);

f) SOR counter (see subclause 9.11.3.51); and

g) UE parameter update counter (see subclause 9.11.3.53A);

the UE may support multiple records of NAS security context storage for multiple registration (see 3GPP TS 31.102 [22]) if the UE supports multiple records of NAS security context storage for multiple registration the first 5G security context of one access shall be stored in record 1 of the 5G NAS security context USIM file for that access and the second 5G security context of that access shall be stored in record 2 of the same file the presence and format of corresponding files on the USIM is specified in 3GPP TS 31.102 [22]

if the corresponding file or file extension is not present on the USIM these 5GMM parameters are stored in a non-volatile memory in the ME together with the SUPI from the USIM these 5GMM parameters can only be used if the SUPI from the USIM matches the SUPI stored in the non-volatile memory; else the UE shall delete the 5GMM parameters

upon power up or when a USIM is inserted if KAUSF is stored on the USIM but the SOR counter and the UE parameter update counter are not present on the USIM the UE may delete the KAUSF and associated 5G security context that are stored at the USIM and set the KSI value of ngKSI to '111' (see 3GPP TS 33.501 [24])

NOTE the above handling can be used to prevent a stored CounterSoR and CounterUPU being associated with the wrong KAUSF further criteria for deleting the security information are left to the UE implementation

the following 5GMM parameters shall be stored in a non-volatile memory in the ME together with the SUPI from the USIM

- configured NSSAI(s);

- NSSRG information;

- S-NSSAI time validity information;

- S-NSSAI location validity information;

- on-demand NSSAI;

- NSSAI inclusion mode(s);

- MPS indicator;

- MCS indicator;

- operator-defined access category definitions;

- network-assigned UE radio capability IDs;

- "CAG information list" if the UE supports CAG;

- signalled URSP (see 3GPP TS 24.526 [19]) and for each URSP rule of the signalled URSP a UPSI of a UE policy section in which the URSP rule was received;

- SOR-CMCI;

- one or more lists of type "list of PLMN(s) to be used in disaster condition" if the UE supports MINT;

- disaster roaming wait range if the UE supports MINT;

- disaster return wait range if the UE supports MINT;

- indication of whether disaster roaming is enabled in the UE;

- indication of 'applicability of "lists of PLMN(s) to be used in disaster condition" provided by a VPLMN';

- VPS URSP configuration;

- indication of whether interworking without N26 interface is supported;

- signalled ProSeP (see 3GPP TS 24.555 [19F]);

- signalled V2XP (see 3GPP TS 24.588 [19C]);

- signalled A2XP (see 3GPP TS 24.578 [61]); and

- signalled RSLPP (see 3GPP TS 24.514 [62])

the following 5GMM parameters should be stored in a non-volatile memory in the ME together with the SUPI from the USIM

- allowed NSSAI(s); and

- partially allowed NSSAI(s)

the following 5GMM parameters may be stored in a non-volatile memory in the ME together with the SUPI from the USIM

- N3AN node configuration information of HPLMN signalled ANDSP (see 3GPP TS 24.526 [19])

each configured NSSAI consists of S-NSSAI(s) stored together with a PLMN identity if it is associated with a PLMN the UE shall store the S-NSSAI(s) of the HPLMN if the UE is in the VPLMN the UE shall also store the configured NSSAI for the current PLMN and any necessary mapped S-NSSAI(s) the configured NSSAI(s) can only be used if the SUPI from the USIM matches the SUPI stored in the non-volatile memory of the ME; else the UE shall delete the configured NSSAI(s) a configured NSSAI may be associated with NSSRG information S-NSSAI location validity information S-NSSAI time validity information NSAG information and on-demand NSSAI

each NSSAI inclusion mode is associated with a PLMN identity and access type the NSSAI inclusion mode(s) can only be used if the SUPI from the USIM matches the SUPI stored in the non-volatile memory of the ME; else the UE shall delete the NSSAI inclusion mode(s)

the MPS indicator is stored together with a PLMN identity of the PLMN that provided it and is valid in that RPLMN or equivalent PLMN the MPS indicator can only be used if the SUPI from the USIM matches the SUPI stored in the non-volatile memory of the ME else the UE shall delete the MPS indicator

the MCS indicator is stored together with a PLMN identity of the PLMN that provided it and is valid in that RPLMN or equivalent PLMN the MCS indicator can only be used if the SUPI from the USIM matches the SUPI stored in the non-volatile memory of the ME else the UE shall delete the MCS indicator

Operator-defined access category definitions are stored together with a PLMN identity of the PLMN that provided them and is valid in that PLMN or equivalent PLMN the operator-defined access category definitions can only be used if the SUPI from the USIM matches the SUPI stored in the non-volatile memory of the ME else the UE shall delete the operator-defined access category definitions the maximum number of stored operator-defined access category definitions is UE implementation dependent

each network-assigned UE radio capability ID is stored together with a PLMN identity of the PLMN that provided it as well as a mapping to the corresponding UE radio configuration and is valid in that PLMN a network-assigned UE radio capability ID can only be used if the SUPI from the USIM matches the SUPI stored in the non-volatile memory of the ME else the UE shall delete the network-assigned UE radio capability ID the UE shall be able to store at least the last 16 received network-assigned UE radio capability IDs there shall be only one network-assigned UE radio capability ID stored for a given combination of PLMN identity and UE radio configuration and any existing UE radio capability ID shall be deleted when a new UE radio capability ID is added for the same combination of PLMN identity and UE radio configuration if the UE receives a network-assigned UE radio capability ID with a version ID value different from the value included in the network-assigned UE radio capability ID(s) stored at the UE for the serving PLMN the UE may delete these stored network-assigned UE radio capability ID(s)

the allowed NSSAI(s) can be stored in a non-volatile memory in the ME together with the SUPI from the USIM allowed NSSAI consists of S-NSSAI(s) stored together with a PLMN identity if it is associated with a PLMN if the allowed NSSAI is stored then the UE shall store the S-NSSAI(s) of the HPLMN if the UE is in the VPLMN the UE shall also store the allowed NSSAI for the serving PLMN and any necessary mapping of the allowed NSSAI for the serving PLMN to the S-NSSAI(s) of the HPLMN the allowed NSSAI(s) can only be used if the SUPI from the USIM matches the SUPI stored in the non-volatile memory of the ME; else the UE shall delete the allowed NSSAI(s)

the partially allowed NSSAI(s) can be stored as allowed NSSAI(s) in a non-volatile memory in the ME together with the SUPI from the USIM partially allowed NSSAI consists of allowed S-NSSAI(s) and for each S-NSSAI a list of TAs for which the S-NSSAI is allowed together with a PLMN identity

if the UE is registered for emergency services the UE shall not store the 5GMM parameters described in this annex on the USIM or in non-volatile memory instead the UE shall temporarily store these parameters locally in the ME and the UE shall delete these parameters when the UE is deregistered from emergency services (e.g before registering for normal service)

if the UE is configured for ecall only mode as specified in 3GPP TS 31.102 [22] the UE shall not store the 5GMM parameters described in this annex on the USIM or in non-volatile memory instead the UE shall temporarily store these parameters locally in the ME and the UE shall delete these parameters when the UE enters 5GMM-DEREGISTERED.eCALL-INACTIVE state the UE is switched-off or the USIM is removed

the "CAG information list" can only be used if the SUPI from the USIM matches the SUPI stored in the non-volatile memory of the ME; else the UE shall delete the "CAG information list"

the handling of the SOR-CMCI stored in the non-volatile memory in the ME is specified in 3GPP TS 23.122 [5]

each "list of PLMN(s) to be used in disaster condition" is stored together with the PLMN identity of the PLMN that provided it the stored lists of type "list of PLMN(s) to be used in disaster condition" can only be used if the SUPI from the USIM matches the SUPI stored in the non-volatile memory of the ME; else the UE shall delete the lists of type "list of PLMN(s) to be used in disaster condition" the UE shall store at least the "list of PLMN(s) to be used in disaster condition" provided by the HPLMN or EHPLMN if the 'applicability of "lists of PLMN(s) to be used in disaster condition" provided by a VPLMN' is set to "true" the UE should also store the "list of PLMN(s) to be used in disaster condition" provided by the VPLMN the maximum number of stored lists of type "list of PLMN(s) to be used in disaster condition" provided by a PLMN other than the HPLMN or EHPLMN is UE implementation dependent

the disaster roaming wait range can only be used if the SUPI from the USIM matches the SUPI stored in the non-volatile memory of the ME; else the UE shall delete the disaster roaming wait range

the disaster return wait range can only be used if the SUPI from the USIM matches the SUPI stored in the non-volatile memory of the ME; else the UE shall delete the disaster return wait range

the indication of whether disaster roaming is enabled in the UE can only be used if the SUPI from the USIM matches the SUPI stored in the non-volatile memory of the ME; else the UE shall delete the indication of whether disaster roaming is enabled in the UE

the indication of 'applicability of "lists of PLMN(s) to be used in disaster condition" provided by a VPLMN' can only be used if the SUPI from the USIM matches the SUPI stored in the non-volatile memory of the ME; else the UE shall delete the indication of 'applicability of "lists of PLMN(s) to be used in disaster condition" provided by a VPLMN'

the indication of whether interworking without N26 interface is supported is stored together with a PLMN identity of the PLMN that provided it and is valid in that RPLMN or equivalent PLMN the indication of whether interworking without N26 interface is supported can only be used if the SUPI from the USIM matches the SUPI stored in the non-volatile memory of the ME else the UE shall delete the indication of whether interworking without N26 interface is supported

the N3AN node configuration information of HPLMN signalled ANDSP can only be used if the SUPI from the USIM matches the SUPI stored in the non-volatile memory of the ME else the UE shall delete the N3AN node configuration information of HPLMN signalled ANDSP

# C.2 storage of 5GMM information for UEs operating in SNPN access operation mode

the 5GMM information for UEs operating in SNPN access operation mode and not registering or registered for the onboarding service in SNPN are stored according to the following conditions

- if the UE does not support access to an SNPN using credentials from a credentials holder and equivalent SNPNs the following 5GMM parameters shall be stored per subscribed SNPN in a non-volatile memory in the ME together with the subscriber identifier associated with the SNPN identity of the SNPN in the "list of subscriber data" configured in the ME (see 3GPP TS 23.122 [5]) or with the SUPI from the USIM if no subscriber identifier is configured in the entry of the "list of subscriber data" associated with the SNPN identity and the UE has a valid USIM;and

- if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the following 5GMM parameters shall be stored in a non-volatile memory in the ME per

i) the subscribed SNPN together with the subscriber identifier associated with the selected entry in the "list of subscriber data" configured in the ME (see 3GPP TS 23.122 [5]) or with the SUPI from the USIM if no subscriber identifier is configured in the selected entry of the "list of subscriber data" configured in the ME and the UE has a valid USIM; or

ii) if the UE supports access to an SNPN using credentials from a credentials holder the PLMN subscription together with the SUPI from the USIM which is associated with the PLMN subscription

a) 5G-GUTI;a1) NID of the registered SNPN;

b) last visited registered TAI;

c) 5GS update status;

d) 5G NAS security context parameters from a full native 5G NAS security context (see 3GPP TS 33.501 [24]);

e) KAUSF and KSEAF (see 3GPP TS 33.501 [24]);

f) UE parameter update counter (see subclause 9.11.3.53A);

g) configured NSSAI(s);

g1) NSSRG information;

g2) S-NSSAI time validity information;

g3) S-NSSAI location validity information;

g4) on-demand NSSAI;

h) NSSAI inclusion mode(s);

i) MPS indicator;

j) MCS indicator;

k) operator-defined access category definitions;

l) network-assigned UE radio capability IDs;

m) zero or more instances of signalled URSP (see 3GPP TS 24.526 [19]) each associated with a non-subscribed SNPN or the subscribed SNPN which provided the URSP and for each URSP rule of the signalled URSP a UPSI of a UE policy section in which the URSP rule was received;

m1) zero or more instances of pre-configured URSP rules (see 3GPP TS 24.526 [19]) each associated with the subscribed SNPN or the HPLMN which provided the URSP;

n) optionally a non-subscribed SNPN signalled URSP handling indication indicating whether the UE is allowed to accept URSP signalled by non-subscribed SNPNs;

o) "permanently forbidden SNPNs" list;

o1) "permanently forbidden SNPNs for access for localized services in SNPN" list;

p) "temporarily forbidden SNPNs" list;

p1) "temporarily forbidden SNPNs for access for localized services in SNPN" list;

q) SOR counter (see subclause 9.11.3.51);

r) SOR-CMCI;

s) optionally the SNPN selection parameters associated with the PLMN subscription (see 3GPP TS 23.122 [5] subclause 4.9.3.0); and

t) signalled ProSeP (see 3GPP TS 24.555 [19F])

the 5GMM information for UEs operating in SNPN access operation mode and registering or registered for the onboarding service in SNPN are stored as follows

a) 5G-GUTI;

b) last visited registered TAI;

c) 5GS update status;

d) 5G NAS security context parameters from a full native 5G NAS security context (see 3GPP TS 33.501 [24]);

e) KAUSF and KSEAF (see 3GPP TS 33.501 [24]);

f) UE parameter update counter (see subclause 9.11.3.53A);

g) network-assigned UE radio capability IDs;

h) "permanently forbidden SNPNs for onboarding services in SNPN" list; and

i) "temporarily forbidden SNPNs for onboarding services in SNPN" list

the 5GMM information for UEs operating in SNPN access operation mode are stored according to the following conditions

- if the UE does not support access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the following 5GMM parameters should be stored per subscribed SNPN in a non-volatile memory in the ME together with the subscriber identifier associated with the SNPN identity of the SNPN in the "list of subscriber data" configured in the ME (see 3GPP TS 23.122 [5]) or with the SUPI from the USIM if no subscriber identifier is configured in the entry of the "list of subscriber data" associated with the SNPN identity and the UE has a valid USIM; and

- if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the following 5GMM parameters should be stored in a non-volatile memory in the ME per

i) the subscribed SNPN together with the subscriber identifier associated with the selected entry in the "list of subscriber data" configured in the ME (see 3GPP TS 23.122 [5]) or with the SUPI from the USIM if no subscriber identifier is configured in the selected entry of the "list of subscriber data" configured in the ME and the UE has a valid USIM; or

ii) if the UE supports access to an SNPN using credentials from a credentials holder the PLMN subscription together with the SUPI from the USIM which is associated with the PLMN subscription

1. allowed NSSAI(s)

the 5GMM information for UEs operating in SNPN access operation mode are stored according to the following conditions

- if the UE does not support access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the following 5GMM parameters may be stored per subscribed SNPN in a non-volatile memory in the ME together with the subscriber identifier associated with the SNPN identity of the SNPN in the "list of subscriber data" configured in the ME (see 3GPP TS 23.122 [5]) or with the SUPI from the USIM if no subscriber identifier is configured in the entry of the "list of subscriber data" associated with the SNPN identity and the UE has a valid USIM; and

- if the UE supports access to an SNPN using credentials from a credentials holder equivalent SNPNs or both the following 5GMM parameters may be stored in a non-volatile memory in the ME per

i) the subscribed SNPN together with the subscriber identifier associated with the selected entry in the "list of subscriber data" configured in the ME (see 3GPP TS 23.122 [5]) or with the SUPI from the USIM if no subscriber identifier is configured in the selected entry of the "list of subscriber data" configured in the ME and the UE has a valid USIM; or

ii) if the UE supports access to an SNPN using credentials from a credentials holder the PLMN subscription together with the SUPI from the USIM which is associated with the PLMN subscription

a) the N3AN node configuration information of subscribed SNPN signalled ANDSP (see 3GPP TS 24.526 [19])

if the 5GMM parameters are associated with the PLMN subscription then the 5GMM parameters can only be used if the SUPI from the USIM which is associated with the selected PLMN subscription matches the SUPI stored in the non-volatile memory; else the UE shall delete the 5GMM parameters

if the 5GMM parameters are associated with the subscribed SNPN of the entry in the "list of subscriber data" then the 5GMM parameters can only be used if the subscriber identifier of the selected entry of the "list of subscriber data" matches the subscriber identifier stored in the non-volatile memory or if the subscriber identifier from the USIM matches the subscriber identifier stored in the non volatile memory no subscriber identifier is configured in the selected entry of the "list of subscriber data" configured in the ME and the UE has a valid USIM

each configured NSSAI consists of S-NSSAI(s) stored together with an SNPN identity if it is associated with an SNPN a configured NSSAI may be associated with NSSRG information S-NSSAI time validity information S-NSSAI location validity information NSAG information and on-demand NSSAI

each NSSAI inclusion mode is associated with an SNPN identity and access type

the MPS indicator is stored together with an SNPN identity of the SNPN that provided it and is valid in that registered SNPN or equivalent SNPN

the MCS indicator is stored together with an SNPN identity of the SNPN that provided it and is valid in that registered SNPN or equivalent SNPN

Operator-defined access category definitions are stored together with an SNPN identity of the SNPN that provided them and are valid in that SNPN or equivalent SNPN the maximum number of stored operator-defined access category definitions is UE implementation dependent

each network-assigned UE radio capability ID is stored together with an SNPN identity of the SNPN that provided it as well as a mapping to the corresponding UE radio configuration and is valid in that SNPN the UE shall be able to store at least the last 16 received network-assigned UE radio capability IDs there shall be only one network-assigned UE radio capability ID stored for a given combination of SNPN identity and UE radio configuration and any existing UE radio capability ID shall be deleted when a new UE radio capability ID is added for the same combination of SNPN identity and UE radio configuration if the UE receives a network-assigned UE radio capability ID with a version ID value different from the value included in the network-assigned UE radio capability ID(s) stored at the UE for the serving SNPN the UE may delete these stored network-assigned UE radio capability ID(s)

the handling of the SOR-CMCI stored in the non-volatile memory in the ME is specified in 3GPP TS 23.122 [5]

the allowed NSSAI(s) can be stored in a non-volatile memory in the ME allowed NSSAI consists of S-NSSAI(s) stored together with an SNPN identity if it is associated with an SNPN

the partially allowed NSSAI(s) can be stored as allowed NSSAI(s) in a non-volatile memory in the ME partially allowed NSSAI consists of S-NSSAI(s) and a list of TAs for which the S-NSSAI is allowed stored together with an SNPN identity if it is associated with an SNPN

# D.1 general

## D.1.1 overview

the UE provides the PCF with a list of one or more stored UE policy section identifiers (UPSIs) during the UE-initiated UE state indication procedure the UPSI is composed of two parts

a) a PLMN ID part containing

1) the PLMN ID for the PLMN; or

2) the PLMN ID part of the SNPN identity for the SNPN;

of the PCF which provides the UE policies; and

b) a UE policy section code (UPSC) containing a value assigned by the PCF

during the UE-initiated UE state indication procedure the UE also provides the PCF with the UE policy related capabilities such as the UE's support for ANDSP the UE's support for URSP provisioning in EPS and the UE's OS id

during the network-requested UE policy management procedure the PCF provides the UE with one or more UE policy sections containing UE policies the UE processes the received UE policy sections each identified by the UPSI received from the PCF and informs the PCF of the result

in the present annex the condition that the PLMN ID part of the UPSI is referring to the HPLMN shall be considered as fulfilled only if the PLMN ID is equal to the HPLMN code derived from the IMSI

NOTE this is also applicable if the UE has a non-empty EHPLMN list even if the EHPLMN list does not include the PLMN ID derived from the IMSI

the UE can also request the PCF to provide V2XP as specified in 3GPP TS 24.587 [19B]

the UE can also request the PCF to provide ProSeP as specified in 3GPP TS 24.554 [19E]

the UE can also request the PCF to provide A2XP as specified in 3GPP TS 24.577 [60]

the UE can also request the PCF to provide RSLPP as specified in 3GPP TS 24.514 [62]

## D.1.2 principles of PTI handling for UE policy delivery service procedures

when the PCF or the UE initiates a procedure it shall include a valid PTI value in the message header of the command message or the request message when the UE initiates a procedure the UE shall use a PTI value in range between 01H and 77H when the PCF initiates a procedure the PCF shall use a PTI value in range between 80H and FEH

when the PCF initiates a transaction related procedure (i.e a procedure consisting of more than one message and the messages are related) it shall include a valid PTI value in the message header of the command message

if a response message is sent as result of a received command or request message the UE or the PCF shall include in the response message the PTI value received within the received command or request message (see examples in figure D.1.2.1 figure D.1.2.2 and figure D.1.2.3)

if a command message is sent as result of a received request message the PCF shall include in the command message the PTI value received with the request message (see examples in figure D.1.2.3)

figure D.1.2.1 Network-requested transaction related procedure

figure D.1.2.2 UE-requested transaction related procedure rejected by the network

figure D.1.2.3 UE-requested transaction related procedure triggering a network-requested transaction related procedure

NOTE in earlier versions of this protocol the UE can include in the response message a PTI value which is not the same as the one received within the command message and therefore the PCF could not associate the response message from the UE to the command message sent

# D.2 procedures

## D.2.1 Network-requested UE policy management procedure

### D.2.1.1 general

the purpose of the network-requested UE policy management procedure is to enable the network to

a) add one or more new UE policy sections to the UE;

b) modify one or more UE policy sections stored at the UE; or

c) delete one or more UE policy sections stored at the UE;

and optionally to enable the HPLMN or the subscribed SNPN to provide a UE accessing the subscribed SNPN or the HPLMN with a non-subscribed SNPN signalled URSP handling indication indicating whether the UE is allowed to accept URSP signalled by non-subscribed SNPNs

### D.2.1.2 Network-requested UE policy management procedure initiation

in order to initiate the network-requested UE policy management procedure the PCF shall

a) if the network-requested UE policy management procedure is triggered by the UE-requested V2X policy provisioning procedure as specified in 3GPP TS 24.587 [19B] the UE-requested ProSe policy provisioning procedure as specified in 3GPP TS 24.554 [19E] or the UE-requested A2X policy provisioning procedure as specified in 3GPP TS 24.577 [60] then set the PTI IE to the PTI value of the received UE POLICY PROVISIONING REQUEST message of the UE-requested V2X policy provisioning procedure the UE-requested ProSe policy provisioning procedure or the UE-requested A2X policy provisioning procedure otherwise allocate a PTI value currently not used and set the PTI IE to the allocated PTI value;

b) encode the information about the UE policy sections to be added modified or deleted in a UE policy section management list IE as specified in subclause D.6.2 and include it in a MANAGE UE POLICY COMMAND message;

c) if the PCF is a PCF of the HPLMN or the subscribed SNPN optionally include the UE policy network classmark IE in a MANAGE UE POLICY COMMAND message and set the non-subscribed SNPN signalled URSP handling indication of the UE policy network classmark IE to "UE is not allowed to accept URSP signalled by non-subscribed SNPNs" or "UE is allowed to accept URSP signalled by non-subscribed SNPNs";

c1) if the UE supports VPS URSP optionally encode the information about entries of VPS URSP configuration to be added modified or deleted in the VPS URSP configuration IE as specified in subclause D.6.8 and include it in a MANAGE UE POLICY COMMAND message;

d) send the MANAGE UE POLICY COMMAND message to the UE via the AMF as specified in 3GPP TS 23.502 [9]; and

e) start timer T3501 (see example in figure D.2.1.2.1)

NOTE the PCF starts a different timer T3501 for each PTI value

figure D.2.1.2.1 Network-requested UE policy management procedure

upon receipt of the MANAGE UE POLICY COMMAND message with a PTI value currently not used by a network-requested UE policy management procedure for each instruction included in the UE policy section management list IE the UE shall

a) store the received UE policy section of the instruction if the UE has no stored UE policy section associated with the same UPSI as the UPSI associated with the instruction;

b) replace the stored UE policy section with the received UE policy section of the instruction if the UE has a stored UE policy section associated with the same UPSI as the UPSI associated with the instruction; or

c) delete the stored UE policy section if the UE has a stored UE policy section associated with the same UPSI as the UPSI associated with the instruction and the UE policy section of the instruction is empty;

additionally if the UE policy network classmark IE is included in the MANAGE UE POLICY COMMAND message and

a) the UE has an empty EHPLMN list or the EHPLMN list is not present and the UE's RPLMN is the HPLMN;

b) the UE has a non-empty EHPLMN list and the UE's RPLMN is an EHPLMN; or

c) the UE's RSNPN is the subscribed SNPN

the UE shall delete the non-subscribed SNPN signalled URSP handling indication stored for the selected entry of "list of subscriber data" or the selected PLMN subscription if any and store the non-subscribed SNPN signalled URSP handling indication received in the UE policy network classmark IE for the selected entry of "list of subscriber data" or the selected PLMN subscription

if the UE supports the VPS URSP and the VPS URSP configuration is included in the MANAGE UE POLICY COMMAND message

a) if the replacement type field of the received VPS URSP configuration indicates "full list of tuples" the UE shall delete the stored VPS URSP configuration if any; and

b) if the received VPS URSP configuration contains one or more tuples

1) if the UE does not have the stored VPS URSP configuration the UE shall store the received VPS URSP configuration except zero or more tuples with no UPSCs; or

2) otherwise

i) for each tuple with a tuple ID in the stored VPS URSP configuration

A) if a tuple with the tuple ID is in the received VPS URSP configuration and contains

- no UPSCs the UE shall delete the tuple with the tuple ID from the stored VPS URSP configuration; or

- one or more UPSCs the UE shall replace the tuple with the tuple ID in the stored VPS URSP configuration with the tuple with the tuple ID from the received VPS URSP configuration; or

B) if no tuple with the tuple ID is in the received VPS URSP configuration the UE shall keep the tuple with the tuple ID in the stored VPS URSP configuration; and

ii) for each tuple with a tuple ID in the received VPS URSP configuration if no tuple with the tuple ID is in the stored VPS URSP configuration and

A) the tuple with the tuple ID in the received VPS URSP configuration contains no UPSCs the UE shall ignore the tuple with the tuple ID in the received VPS URSP configuration; or

B) the tuple with the tuple ID in the received VPS URSP configuration contains one or more UPSCs the UE shall add the tuple with the tuple ID from the received VPS URSP configuration to the stored VPS URSP configuration

the UE may continue storing a received UE policy section for a PLMN or SNPN when the UE registers in another PLMN or SNPN if necessary the UE may delete UE policy sections stored for a PLMN other than the RPLMN and the HPLMN or for an SNPN other than the registered SNPN and the subscribed SNPN before storing the new received UE policy sections

when storing a UE policy section received from an SNPN the UE shall associate the NID of that SNPN with the UPSI of the stored UE policy section

NOTE the maximum number of UE policy sections for PLMNs or SNPNs other than the HPLMN and the RPLMN or the registered SNPN and the subscribed SNPN that the UE can store and how the UE selects the UE policy sections to be deleted are up to the UE implementation

### D.2.1.3 Network-requested UE policy management procedure accepted by the UE

if all instructions included in the UE policy section management list IE were executed successfully by the UE the UE shall

a) create a MANAGE UE POLICY COMPLETE message including the PTI value received within the MANAGE UE POLICY COMMAND message; and

b) transport the MANAGE UE POLICY COMPLETE message using the NAS transport procedure as specified in subclause 5.4.5

upon receipt of the MANAGE UE POLICY COMPLETE message the PCF shall stop timer T3501 the PCF should ensure that the PTI value assigned to this procedure is not released immediately

NOTE the way to achieve this is implementation dependent for example the PCF can ensure that the PTI value assigned to this procedure is not released during the time equal to or greater than the default value of timer T3501

### D.2.1.4 Network-requested UE policy management procedure not accepted by the UE

if the UE could not execute all instructions included in the UE policy section management list IE successfully the UE shall

a) set the PTI IE to the PTI value received within the MANAGE UE POLICY COMMAND message and encode the results by including

1) the UPSI associated with the instructions which could not be executed successfully;

2) the failed instruction order set to order of the instruction in the UE policy section management sublist of the received UE policy section management list IE which could not be executed successfully; and

3) the cause of the failure

in the UE policy section management result IE as specified in subclause D.6.3 and include it in a MANAGE UE POLICY COMMAND REJECT message and

b) transport the MANAGE UE POLICY COMMAND REJECT message using the NAS transport procedure as specified in subclause 5.4.5

upon receipt of the MANAGE UE POLICY COMMAND REJECT message the PCF shall stop timer T3501 any instruction that was included in the UE policy section management list IE but not indicatedin the UE policy section management result IE of the received MANAGE UE POLICY COMMAND REJECT message shall be considered as successfully executed

the PCF should ensure that the PTI value assigned to this procedure is not released immediately

NOTE the way to achieve this is implementation dependent for example the PCF can ensure that the PTI value assigned to this procedure is not released during the time equal to or greater than the default value of timer T3501

upon receipt of the notification from the AMF that the UE is not reachable the PCF shall stop the T3501

### D.2.1.5 abnormal cases on the network side

the following abnormal cases can be identified

a) T3501 expired

the PCF shall on the first expiry of the timer T3501 retransmit the MANAGE UE POLICY COMMAND message and shall reset and start timer T3501 this retransmission is repeated four times i.e on the fifth expiry of timer T3501 the PCF shall abort the procedure and release the allocated PTI

### D.2.1.6 abnormal cases in the UE

the following abnormal cases can be identified

a) receipt of an instruction associated with a UPSI which has a PLMN ID part that is not equal to the PLMN ID of the UE's HPLMN and the instruction contains a UE policy part with a UE policy part type set to "URSP" for a UE not operating in SNPN access operation mode or receipt of an instruction associated with a UPSI which has a PLMN ID part that is not equal to the PLMN ID part of the selected SNPN and the instruction contains a UE policy part with a UE policy part type set to "URSP" for a UE operating in SNPN access operation mode

the UE shall set the UE policy delivery service cause to #111 "Protocol error unspecified" for the instruction in the UE policy section management result IE of the MANAGE UE POLICY COMMAND REJECT message

b) receipt of an instruction associated with a UPSI which has a PLMN ID part that is not equal to the PLMN ID of the UE's HPLMN or the UE's RPLMN and the instruction contains a UE policy part with a UE policy part type set to "ANDSP" for a UE not operating in SNPN access operation mode or receipt of an instruction associated with a UPSI which has a PLMN ID part that is not equal to the PLMN ID part of the subscribed SNPN or the UE's RSNPN and the instruction contains a UE policy part with a UE policy part type set to "ANDSP" for a UE operating in SNPN access operation mode

the UE shall set the UE policy delivery service cause to #111 "Protocol error unspecified" for the instruction in the UE policy section management result IE of the MANAGE UE POLICY COMMAND REJECT message

c) transmission failure of the MANAGE UE POLICY COMPLETE message indication from lower layers

the UE shall not diagnose an error and consider the network-requested UE policy management procedure is complete

NOTE 1 considering the network-requested UE policy management procedure is complete as the result of this abnormal case does not cause the UE to revert the execution of the successfully executed instructions included in the MANAGE UE POLICY COMMAND message

d) transmission failure of the MANAGE UE POLICY COMMAND REJECT message indication from lower layers

the UE shall not diagnose an error and consider the network-requested UE policy management procedure is complete

NOTE 2 considering the network-requested UE policy management procedure is complete as the result of this abnormal case does not cause the UE to revert the execution of the successfully executed instructions included in the MANAGE UE POLICY COMMAND message

e) receipt of a MANAGE UE POLICY COMMAND message with a PTI set to the same value as the PTI of a previously received MANAGE UE POLICY COMMAND message

the UE shall discard the message and retransmit the MANAGE UE POLICY COMMAND COMPLETE or MANAGE UE POLICY COMMAND REJECT message transmitted in response to the previously received MANAGE UE POLICY COMMAND message

NOTE 3 the way to achieve this is UE implementation dependent for example the UE can assume that on the fifth expiry of timer T3501 the PCF will abort the procedure and that the PTI value assigned to the procedure will be released

f) receipt of an instruction associated with a UPSI which has a PLMN ID part that is equal to the PLMN ID part of the selected SNPN the instruction contains a UE policy part with a UE policy part type set to "URSP" UE's RSNPN is a non-subscribed SNPN and

1) the UE has a stored non-subscribed SNPN signalled URSP handling indication for the selected entry of "list of subscriber data" or the selected PLMN subscription indicating that the UE is not allowed to accept URSP signalled by non-subscribed SNPNs; or

2) the UE does not have a stored non-subscribed SNPN signalled URSP handling indication for the selected entry of "list of subscriber data" or the selected PLMN subscription and the non-subscribed SNPN signalled URSP handling indication preconfigured in the selected entry of "list of subscriber data" or the selected PLMN subscription indicates that the UE is not allowed to accept URSP signalled by non-subscribed SNPNs;

for a UE operating in SNPN access operation mode

the UE shall set the UE policy delivery service cause to #111 "Protocol error unspecified" for the instruction in the UE policy section management result IE of the MANAGE UE POLICY COMMAND REJECT message

## D.2.2 UE-initiated UE state indication procedure

### D.2.2.1 general

the purpose of the UE-initiated UE state indication procedure is

a) to deliver the UPSI(s) of the UE policy section(s) which are

- identified by a UPSI with the PLMN ID part indicating the HPLMN or the selected PLMN and stored in the UE if any; or

- identified by a UPSI with the PLMN ID part indicating the PLMN ID part of the SNPN identity of the selected SNPN and associated with the NID of the selected SNPN and stored in the UE if any;

b) to indicate whether UE supports ANDSP;

c) to indicate whether UE supports URSP provisioning in EPS;

c1) to indicate whether UE supports VPS URSP;

d) to indicate whether UE supports reporting URSP rule enforcement; and

e) to deliver the UE's one or more OS IDs;

to the PCF

### D.2.2.2 UE-initiated UE state indication procedure initiation

in order to initiate the UE-initiated UE state indication procedure the UE shall create a UE STATE INDICATION message the UE

a) shall allocate a PTI value currently not used and set the PTI IE to the allocated PTI value;

b) if not operating in SNPN access operation mode shall include the UPSI(s) of the UE policy section(s) which are identified by a UPSI with the PLMN ID part indicating the HPLMN or the selected PLMN available in the UE in the UPSI list IE if any;

NOTE 1 if the UE does not have any UE policy section which is identified by a UPSI with the PLMN ID part indicating the HPLMN or the selected PLMN the UE sets the length of UPSI list contents field in the UPSI list IE to zero

c) if operating in SNPN access operation mode shall include UPSI(s) of the UE policy section(s) which are identified by a UPSI

- with the PLMN ID part indicating the MCC and MNC of the selected SNPN; and

- associated with the NID of the selected SNPN;

available in the UE in the UPSI list IE if any;

NOTE 2 if the UE does not have any UE policy section which is identified by a UPSI with the PLMN ID part indicating the MCC and MNC of the selected SNPN and associated with the NID of the selected SNPN the UE sets the length of UPSI list contents field in the UPSI list IE to zero

d) shall specify whether the UE supports ANDSP in the UE policy classmark IE;

e) shall specify whether the UE supports URSP provisioning in EPS in the UE policy classmark IE;

NOTE 3 ANDSP and URSP are specified in 3GPP TS 24.526 [19]

e1) if the UE supports VPS URSP shall set the SVPSU bit to "VPS URSP supported by the UE" in the UE policy classmark IE;

f) if the UE supports reporting URSP rule enforcement shall set the SupportRURE bit to "Reporting URSP rule enforcement supported by the UE"; and

g) may include the UE's one or more OS IDs in the UE OS id IE

the UE shall send the UE STATE INDICATION message (see example in figure D.2.2.2.1) the UE shall transport the created UE STATE INDICATION message using the registration procedure (see subclause 5.5.1)

figure D.2.2.2.1 UE-initiated UE state indication procedure

### D.2.2.3 UE-initiated UE state indication procedure accepted by the network

upon receipt of the UE STATE INDICATION message the PCF shall operate as described in 3GPP TS 23.502 [9] and 3GPP TS 29.525 [21]

### D.2.2.4 abnormal cases on the network side

apart from the case described in subclause D.2.2.3 no abnormal cases have been identified

# D.3 UE policy re-assembly at the UE

when the UE needs to apply ANDSP as specified in 3GPP TS 24.502 [18] the UE shall consider all UE policy parts with ANDSP contents currently stored at the UE

when the UE needs to apply URSP as specified in 3GPP TS 24.526 [19] the UE shall consider all UE policy parts with URSP contents currently stored at the UE

a) if the UE supports VPS URSP then

1) the UE shall consider as VPS URSP of the RPLMN all UE policy parts with URSP contents currently stored at the UE which are a part of one or more UE policy sections identified by a UPSI

i) with the PLMN ID part indicating the HPLMN; and

ii) with UPSC indicated in a tuple of the stored VPS URSP configuration such that the tuple contains the network descriptor with a network descriptor entry containing

A) the network descriptor entry type field set to "one or more VPLMNs" and the network descriptor entry value field containing PLMN ID of the RPLMN of an access if the UE is registered via one or both accesses and the RPLMN of each access is a VPLMN;

B) the network descriptor entry type field set to "one or more MCCs" and the network descriptor entry value field containing MCC of the PLMN ID of the RPLMN of an access if the UE is registered via one or both accesses and the RPLMN of each access is a VPLMN; or

C) the network descriptor entry type field set to "any VPLMN" if the UE is registered via one or both accesses and the RPLMN of each access is a VPLMN;

2) the UE shall consider as VPS URSP of the equivalent PLMN of the RPLMN all UE policy parts with URSP contents currently stored at the UE which are a part of one or more UE policy sections identified by a UPSI

i) with the PLMN ID part indicating the HPLMN; and

ii) with UPSC indicated in a tuple of the stored VPS URSP configuration such that the tuple contains the network descriptor with a network descriptor entry containing

A) the network descriptor entry type field set to "one or more VPLMNs" and the network descriptor entry value field containing PLMN ID of an equivalent PLMN if the UE is registered via one or both accesses the RPLMN of each access is a VPLMN and the equivalent PLMN is a VPLMN;

B) the network descriptor entry type field set to "one or more MCCs" and the network descriptor entry value field containing MCC of the PLMN ID of an equivalent PLMN if the UE is registered via one or both accesses the RPLMN of each access is a VPLMN and the equivalent PLMN is a VPLMN; or

C) the network descriptor entry type field set to "any VPLMN" if the UE is registered via one or both accesses the RPLMN of each access is a VPLMN and an equivalent PLMN is a VPLMN; and

3) the UE shall consider as PG URSP all UE policy parts with URSP contents currently stored at the UE except zero or more UE policy parts if any which are a part of one or more UE policy sections identified by a UPSI

i) with the PLMN ID part indicating the HPLMN; and

ii) with UPSC indicated in any tuple of the stored VPS URSP configuration; and

b) the UE shall consider all UE policy parts with URSP contents currently stored at the UE as the signalled URSP

when the UE needs to apply V2XP as specified in 3GPP TS 24.588 [19C] the UE shall consider all UE policy parts with V2XP contents currently stored at the UE

when the UE needs to apply ProSeP as specified in 3GPP TS 24.555 [19F] the UE shall consider all UE policy parts with ProSeP contents currently stored at the UE

when the UE needs to apply A2XP as specified in 3GPP TS 24.578 [61] the UE shall consider all UE policy parts with A2XP contents currently stored at the UE

when the UE needs to apply RSLPP as specified in 3GPP TS 24.514 [62] the UE shall consider all UE policy parts with RSLPP contents currently stored at the UE

# D.4 void

# D.5 message functional definition and contents

## D.5.1 manage UE policy command

### D.5.1.1 message definition

the MANAGE UE POLICY COMMAND message is sent by the PCF to the UE to request the UE to manage UE policy sections see table D.5.1.1.1

message type MANAGE UE POLICY COMMAND

significance dual

direction network to UE

table D.5.1.1.1 MANAGE UE POLICY COMMAND message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | PTI | Procedure transaction identity  9.6 | M | V | 1 |
|  | MANAGE UE POLICY COMMAND message identity | UE policy delivery service message type  D.6.1 | M | V | 1 |
|  | UE policy section management list | UE policy section management list  D.6.2 | M | LV-E | 11-65533 |
| 42 | UE policy network classmark | UE policy network classmark  D.6.7 | O | TLV | 3-5 |
| 70 | VPS URSP configuration | VPS URSP configuration  D.6.8 | O | TLV-E | 3-65533 |
| NOTE: The total length of the MANAGE UE POLICY COMMAND message content cannot exceed 65535 octets (see Payload container contents maximum length as specified in subclause 9.11.3.39.1). | | | | | |

### D.5.1.2 UE policy network classmark

the UE policy network classmark is included when the PCF of a PLMN or an SNPN intends to provide the UE with information about the policy aspects of the network

### D.5.1.3 VPS URSP configuration

the VPS URSP configuration IE is included when the PCF of a PLMN intends to provide the UE with the VPS URSP configuration

## D.5.2 manage UE policy complete

### D.5.2.1 message definition

the MANAGE UE POLICY COMPLETE message is sent by the UE to the PCF to report that all received instructions have been successfully executed at the UE see table D.5.2.1.1

message type MANAGE UE POLICY COMPLETE

significance dual

direction UE to network

table D.5.2.1.1 MANAGE UE POLICY COMPLETE message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | PTI | Procedure transaction identity  9.6 | M | V | 1 |
|  | MANAGE UE POLICY COMPLETE message identity | UE policy delivery service message type  D.6.1 | M | V | 1 |

## D.5.3 manage UE policy command reject

### D.5.3.1 message definition

the MANAGE UE POLICY COMMAND REJECT message is sent by the UE to the PCF to report that one or more instructions could not be successfully executed at the UE see table D.5.3.1.1

message type MANAGE UE POLICY COMMAND REJECT

significance dual

direction UE to network

table D.5.3.1.1 MANAGE UE POLICY COMMAND REJECT message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | PTI | Procedure transaction identity  9.6 | M | V | 1 |
|  | MANAGE UE POLICY COMMAND REJECT message identity | UE policy delivery service message type  D.6.1. | M | V | 1 |
|  | UE policy section management result | UE policy section management result  D.6.3 | M | LV-E | 11-65533 |
| NOTE: The total length of the MANAGE UE POLICY COMMAND REJECT message content cannot exceed 65535 octets (see Payload container contents maximum length as specified in subclause 9.11.3.39.1). | | | | | |

## D.5.4 UE state indication

### D.5.4.1 message definition

the UE STATE INDICATION message is sent by the UE to the PCF

a) to deliver the UPSI(s) of the UE policy section(s) stored in the UE;

b) to indicate whether the UE supports ANDSP;

c) to indicate whether the UE supports URSP provisioning in EPS in the UE policy classmark IE;

c1) to indicate whether the UE supports VPS URSP;

c2) to indicate whether the UE supports reporting URSP rule enforcement; and

d) to deliver the UE's one or more OS IDs;

see table D.5.4.1.1

message type UE STATE INDICATION

significance dual

direction UE to network

table D.5.4.1.1 UE STATE INDICATION message content

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IEI | Information Element | Type/Reference | Presence | Format | Length |
|  | PTI | Procedure transaction identity  9.6 | M | V | 1 |
|  | UE STATE INDICATION message identity | UE policy delivery service message type  D.6.1 | M | V | 1 |
|  | UPSI list | UPSI list  D.6.4 | M | LV-E | 2-65531 |
|  | UE policy classmark | UE policy classmark  D.6.5 | M | LV | 2-4 |
| 41 | UE OS Id | OS Id  D.6.6 | O | TLV | 18-242 |
| NOTE: The total length of the UE STATE INDICATION message content cannot exceed 65535 octets (see Payload container contents maximum length as specified in subclause 9.11.3.39.1). | | | | | |

# D.6 information elements coding

## D.6.1 UE policy delivery service message type

table D.6.1.1 UE policy delivery service message type

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bits | | | | | | | | | | |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |  |  |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |  | Reserved |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |  | | MANAGE UE POLICY COMMAND message |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |  | | MANAGE UE POLICY COMPLETE message |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |  | | MANAGE UE POLICY COMMAND REJECT message |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |  | | UE STATE INDICATION message |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |  | | UE POLICY PROVISIONING REQUEST message (see NOTE) |
| 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |  | | UE POLICY PROVISIONING REJECT message (see NOTE) |
|  | | | | | | | | | | |
| All other values are reserved | | | | | | | | | | |
| NOTE: Coding of UE POLICY PROVISIONING REQUEST message and UE POLICY PROVISIONING REJECT message are specified in 3GPP TS 24.587 [19B]. Usage of UE POLICY PROVISIONING REQUEST message and UE POLICY PROVISIONING REJECT message for V2X policy is specified in 3GPP TS 24.587 [19B]. Usage of UE POLICY PROVISIONING REQUEST message and UE POLICY PROVISIONING REJECT message for ProSeP policy is specified in 3GPP TS 24.554 [19E]. Usage of UE POLICY PROVISIONING REQUEST message and UE POLICY PROVISIONING REJECT message for A2X policy is specified in 3GPP TS 24.577 [60]. Usage of UE POLICY PROVISIONING REQUEST message and UE POLICY PROVISIONING REJECT message for RSLPP policy is specified in 3GPP TS 24.514 [62]. | | | | | | | | | | |

## D.6.2 UE policy section management list

the purpose of the UE policy section management list information element is to transfer from the PCF to the UE a list of instructions to be performed at the UE for management of UE policy section stored at the UE

the UE policy section management list information element is coded as shown in figure D.6.2.1 figure D.6.2.2 figure D.6.2.3 figure D.6.2.4 figure D.6.2.5 figure D.6.2.6 figure D.6.2.7 and table D.6.2.1

the UE policy section management list information element has a minimum length of 12 octets and a maximum length of 65534 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| UE policy section management list IEI | | | | | | | | octet 1 |
| Length of UE policy section management list contents | | | | | | | | octet 2  octet 3 |
| UE policy section management list contents | | | | | | | | octet 4  octet z |

figure D.6.2.1 UE policy section management list information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| UE policy section management sublist (PLMN 1) | | | | | | | | octet 4  octet a |
| UE policy section management sublist (PLMN 2) | | | | | | | | octet (a+1)\*  octet b\* |
| … | | | | | | | | octet (b+1)\*  …  octet c\* |
| UE policy section management sublist (PLMN N) | | | | | | | | octet (c+1)\*  octet z\* |

figure D.6.2.2 UE policy section management list contents

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of UE policy section management sublist | | | | | | | | octet d  octet d+1 |
|  | | | | MCC digit 1 | | | | octet d+2 |
| MCC digit 2 | | | |
|  | | | | MCC digit 3 | | | | octet d+3 |
| MNC digit 3 | | | |
|  | | | | MNC digit 1 | | | | octet d+4 |
| MNC digit 2 | | | |
| UE policy section management sublist contents | | | | | | | | octet d+5  octet y |

figure D.6.2.3 UE policy section management sublist

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Instruction 1 | | | | | | | | octet d+5  octet e |
| Instruction 2 | | | | | | | | octet (e+1)\*  octet f\* |
| … | | | | | | | | octet (f+1)\*  …  octet g\* |
| Instruction N | | | | | | | | octet (g+1)\*  octet e\* |

figure D.6.2.4 UE policy section management sublist contents

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Instruction contents length | | | | | | | | octet d+5  octet d+6 |
| UPSC | | | | | | | | octet d+7  octet d+8 |
| UE policy section contents | | | | | | | | octet (d+9)\*  octet k\* |

figure D.6.2.5 instruction

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| UE policy part 1 | | | | | | | | octet l  octet m |
| UE policy part 2 | | | | | | | | octet (m+1)\*  octet n\* |
| … | | | | | | | | octet (n+1)\*  …  octet o\* |
| UE policy part N | | | | | | | | octet (o+1)\*  octet p\* |

figure D.6.2.6 UE policy section contents

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| UE policy part contents length | | | | | | | | octet q  octet q+1 |
| 0 | 0 | 0 | 0 | UE policy part type | | | | octet q+2 |
| Spare | | | |
| UE policy part contents | | | | | | | | octet q+3  octet r |

figure D.6.2.7 UE policy part

table D.6.2.1 UE policy section management list information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Value part of the UE policy section management list information element (octets 4 to z) | | | | |
|  | | | | |
| The value part of the UE policy section management list information element consists of one or several UE policy section management sublists. | | | | |
|  | | | | |
| UE policy section management sublist: | | | | |
|  | | | | |
| Length of UE policy section management sublist (octets d to d+1) | | | | |
|  | | | | |
| This field contains the binary encoding of the length of the UE policy section management sublist in units of octets. | | | | |
|  | | | | |
| MCC, Mobile country code (octet d+2, and bits 4 to 1 of octet d+3) | | | | |
|  | | | | |
| The MCC field is coded as in ITU-T Recommendation E.212 [42], annex A. | | | | |
|  | | | | |
| MNC, Mobile network code (bits 8 to 5 of octet d+3, and octet d+4) | | | | |
|  | | | | |
| The coding of this field is the responsibility of each administration but BCD coding shall be used. The MNC shall consist of 2 or 3 digits. If a network operator decides to use only two digits in the MNC, MNC digit 3 shall be coded as "1111". (NOTE 1) | | | | |
|  | | | | |
| UE policy section management sublist contents (octets d+5 to y) | | | | |
|  | | | | |
| The UE policy section management sublist contents consist of one or several instructions. | | | | |
|  | | | | |
| Instruction: | | | | |
|  | | | | |
| Instruction contents length (octets d+5 to d+6) | | | | |
|  | | | | |
| This field contains the binary encoding of the instruction contents length in units of octets. | | | | |
|  | | | | |
| UPSC (octets d+7 to d+8) | | | | |
|  | | | | |
| This field contains the binary encoding of the UPSC. The value of the UPSC is set by the PCF. | | | | |
|  | | | | |
| UE policy section contents (octets d+9 to k) | | | | |
|  | | | | |
| The UE policy section contents consist of one or several UE policy parts. | | | | |
|  | | | | |
| UE policy part: | | | | |
|  | | | | |
| UE policy part contents length (octets q to q+1) | | | | |
|  | | | | |
| This field contains the binary encoding of the UE policy part contents length in units of octets (NOTE 2). | | | | |
|  | | | | |
| UE policy part type (bits 4 to 1 of octet q+2) | | | | |
| Bits | | | | |
| 4 | 3 | 2 | 1 |  |
| 0 | 0 | 0 | 0 | Reserved |
| 0 | 0 | 0 | 1 | URSP |
| 0 | 0 | 1 | 0 | ANDSP |
| 0 | 0 | 1 | 1 | V2XP |
| 0 | 1 | 0 | 0 | ProSeP |
| 0 | 1 | 0 | 1 | A2XP |
| 0 | 1 | 1 | 0 | RSLPP |
| All other values are reserved. | | | | |
|  | | | | |
| Bits 8 to 5 of octet q+2 are spare and shall be coded as zero. | | | | |
|  | | | | |
| UE policy part contents (octets q+3 to r) | | | | |
|  | | | | |
| This field contains a UE policy part encoded as specified in 3GPP TS 24.526 [19] for the UE policy part type field set to "URSP" or "ANDSP", in 3GPP TS 24.588 [19C] for the UE policy part type field set to "V2XP", in 3GPP TS 24.555 [19F] for the UE policy part type field set to "ProSeP" and in 3GPP TS 24.514 [62] for the UE policy part type field set to "RSLPP" and in 3GPP TS 24.578 [61] for the UE policy part type field set to "A2XP" respectively. | | | | |
|  | | | | |
| NOTE 1: When the PCF is in an SNPN, the PCF shall include the PLMN ID part of the SNPN identity in the UE policy section management sublist. | | | | |
|  | | | | |
| NOTE 2: The UE policy part contents length indicates the length of the value part of the UE policy part field (i.e. octet q+2 to octet r). | | | | |
|  | | | | |

## D.6.3 UE policy section management result

the purpose of the UE policy section management result information element is to transfer from the UE to the PCF information about instructions for UE policy section management which the UE could not execute successfully

the UE policy section management result information element is coded as shown in figure D.6.3.1 figure D.6.3.2 figure D.6.3.3 figure D.6.3.4 figure D.6.3.5 and table D.6.3.1

the UE policy section management result information element has a minimum length of 12 octets and a maximum length of 65534 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| UE policy section management result IEI | | | | | | | | octet 1 |
| Length of UE policy section management result contents | | | | | | | | octet 2  octet 3 |
| UE policy section management result contents | | | | | | | | octet 4  octet z |

figure D.6.3.1 UE policy section management result information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| UE policy section management subresult (PLMN 1) | | | | | | | | octet 4  octet a |
| UE policy section management subresult (PLMN 2) | | | | | | | | octet (a+1)\*  octet b\* |
| … | | | | | | | | octet (b+1)\*  …  octet c\* |
| UE policy section management subresult (PLMN N) | | | | | | | | octet (c+1)\*  octet z\* |

figure D.6.3.2 UE policy section management result contents

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Number of results | | | | | | | | octet d |
|  | | | | MCC digit 1 | | | | octet d+1 |
| MCC digit 2 | | | |
|  | | | | MCC digit 3 | | | | octet d+2 |
| MNC digit 3 | | | |
|  | | | | MNC digit 1 | | | | octet d+3 |
| MNC digit 2 | | | |
| UE policy section management subresult contents | | | | | | | | octet d+4  octet y |

figure D.6.3.3 UE policy section management subresult

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Result 1 | | | | | | | | octet d+4  octet d+8 |
| Result 2 | | | | | | | | octet (d+9)\*  octet (d+13)\* |
| … | | | | | | | | Octet (d+14)\*  …  octet e\* |
| Result N | | | | | | | | Octet (e+1)\*  octet (e+5)\* |

figure D.6.3.4 UE policy section management subresult contents

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| UPSC | | | | | | | | octet f  octet f+1 |
| Failed instruction order | | | | | | | | octet f+2  octet f+3 |
| Cause | | | | | | | | octet f+4 |

figure D.6.3.5 result

table D.6.3.1 UE policy section management result information element

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Value part of the UE policy section management result information element (octets 4 to z) | | | | | | | | | |
|  | | | | | | | | | |
| The value part of the UE policy section management result information element consists of one or several UE policy section management subresults. | | | | | | | | | |
|  | | | | | | | | | |
|  | | | | | | | | | |
| UE policy section management subresult: | | | | | | | | | |
|  | | | | | | | | | |
| Number of results (octet d) | | | | | | | | | |
|  | | | | | | | | | |
| This field contains the binary encoding of number of results included in the UE policy section management subresult. | | | | | | | | | |
|  | | | | | | | | | |
| MCC, Mobile country code (octet d+1, and bits 4 to 1 of octet d+2) | | | | | | | | | |
|  | | | | | | | | | |
| The MCC field is coded as in ITU-T Recommendation E.212 [42], annex A. | | | | | | | | | |
|  | | | | | | | | | |
| MNC, Mobile network code (bits 8 to 5 of octet d+2, and octet d+3) | | | | | | | | | |
|  | | | | | | | | | |
| The coding of this field is the responsibility of each administration but BCD coding shall be used. The MNC shall consist of 2 or 3 digits. If a network operator decides to use only two digits in the MNC, MNC digit 3 shall be coded as "1111". (NOTE) | | | | | | | | | |
|  | | | | | | | | | |
| UE policy section management subresult contents (octets d+4 to y) | | | | | | | | | |
| The UE policy section management subresult contents consist of one or several results. | | | | | | | | | |
|  | | | | | | | | | |
| Result (octet f to f+4) | | | | | | | | | |
|  | | | | | | | | | |
| UPSC (octet f to f+1) | | | | | | | | | |
|  | | | | | | | | | |
| This field contains the binary encoding of the UPSC. The value of the UPSC is set by the PCF | | | | | | | | | |
|  | | | | | | | | | |
| Failed instruction order (octets f+2 to f+3) | | | | | | | | | |
|  | | | | | | | | | |
| This field contains the binary encoding of the order of the instruction in the UE policy section management sublist contents as specified in Figure D.6.2.4, which could not be executed successfully. The value of failed instruction order set to one indicates that the first instruction in the UE policy section management sublist contents could not be executed successfully. | | | | | | | | | |
|  | | | | | | | | | |
| Cause (octet f+4) | | | | | | | | | |
| Bits | | | | | | | | | |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |  |
| 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 |  | Protocol error, unspecified |
| The receiving entity shall treat any other value as 0110 1111, "Protocol error, unspecified". | | | | | | | | | |
| NOTE: The UE operating in the SNPN access operation mode shall include the PLMN ID part of the SNPN identity of the SNPN in the UE policy section management subresult. | | | | | | | | | |
|  | | | | | | | | | |

## D.6.4 UPSI list

the purpose of the UPSI list information element is to transfer from the UE to the PCF a list of UPSIs

the UPSI list information element is coded as shown in figure D.6.4.1 figure D.6.4.2 and table D.6.4.1

the UPSI list information element has a minimum length of 3 octets and a maximum length of 65532 octets

NOTE a PCF implementing a previous version of the present specification will expect the UPSI list information element to have a minimum length of 10 octets and could be unable to decode a UPSI list information element with a length of 3 octets i.e a UPSI list information element not containing any UPSI

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| UPSI list IEI | | | | | | | | octet 1 |
| Length of UPSI list contents | | | | | | | | octet 2  octet 3 |
| UPSI sublist (PLMN 1) | | | | | | | | octet 4\*  octet a\* |
| UPSI sublist (PLMN 2) | | | | | | | | octet a+1\*  octet b\* |
| … | | | | | | | | octet b+1\*  octet c\* |
| UPSI sublist (PLMN N) | | | | | | | | octet c+1\*  octet z\* |

figure D.6.4.1 UPSI list information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of UPSI sublist | | | | | | | | octet d  octet d+1 |
| MCC digit 2 | | | | MCC digit 1 | | | | octet d+2 |
| MNC digit 3 | | | | MCC digit 3 | | | | octet d+3 |
| MNC digit 2 | | | | MNC digit 1 | | | | octet d+4 |
| UPSC 1 | | | | | | | | octet d+5  octet d+6 |
| UPSC 2 | | | | | | | | octet d+7\*  octet d+8\* |
| … | | | | | | | | octet d+9\*  octet e\* |
| UPSC M | | | | | | | | octet e+1\*  octet e+2\* |

figure D.6.4.2 UPSI sublist

table D.6.4.1 UPSI list information element

|  |
| --- |
| Length of UPSI list contents (octets 2 to 3) |
|  |
| This field indicates the length of the UPSI list contents. If no UPSIs are included in the UPSI list, the UE shall set the length of UPSI list contents to zero. |
|  |
| MCC, Mobile country code (octet d+2, and bits 4 to 1 of octet d+3) |
|  |
| The MCC field is coded as in ITU-T Recommendation E.212 [42], annex A. |
|  |
| MNC, Mobile network code (bits 8 to 5 of octet d+3, and octet d+4) |
|  |
| The coding of this field is the responsibility of each administration but BCD coding shall be used. The MNC shall consist of 2 or 3 digits. If a network operator decides to use only two digits in the MNC, MNC digit 3 shall be coded as "1111".  (NOTE) |
|  |
| UPSC (octets d+5 to d+6) |
|  |
| This field contains the binary encoding of the UPSC. The value of the UPSC is set by the PCF. |
|  |
| NOTE: The UE operating in the SNPN access operation mode shall include the PLMN ID part of the SNPN identity in the UPSI sublist. |
|  |

## D.6.5 UE policy classmark

the purpose of the UE policy classmark information element is to provide the network with information about the policy aspects of the UE

the UE policy classmark information element is coded as shown in figure D.6.5.1 and table D.6.5.1

the UE policy classmark is a type 4 information element with a minimum length of 3 octets and a maximum length of 5 octets

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | | 7 | | 6 | | 5 | | 4 | | 3 | | 2 | | 1 | |  | |
| Policy information IEI | | | | | | | | | | | | | | | | octet 1 | |
| Length of Policy information contents | | | | | | | | | | | | | | | | octet 2 | |
| 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | SupportRURE | | SVPSU | | EPSURSP | | SupportANDSP | | octet 3 | |
| 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | octet 4\* -5\* | |
| Spare | | | | | | | | | | | | | | | |

figure D.6.5.1 UE policy classmark information element

table D.6.5.1 UE policy classmark information element

|  |  |
| --- | --- |
| Support of ANDSP by the UE (SupportANDSP) (octet 3, bit 1) | |
| Bit | |
| 1 |  |
| 0 | ANDSP not supported by the UE |
| 1 | ANDSP supported by the UE |
|  | |
| Support of URSP provisioning in EPS by the UE (EPSURSP) (octet 3, bit 2) (see NOTE) | |
| Bit | |
| **2** |  |
| 0 | URSP provisioning in EPS not supported by the UE |
| 1 | URSP provisioning in EPS supported by the UE |
|  |  |
| Support of VPS URSP (SVPSU) (octet 3, bit 3) | |
| Bit | |
| **3** |  |
| 0 | VPS URSP not supported by the UE |
| 1 | VPS URSP supported by the UE |
| Support of Reporting URSP Rule Enforcement by the UE (SupportRURE) (octet 3, bit 4)  Bit  **4** | |
| 0 | Reporting URSP rule enforcement not supported by the UE |
| 1 | Reporting URSP rule enforcement supported by the UE |
|  |  |
| All other bits in octet 3 to 5 are spare and shall be coded as zero, if the respective octet is included in the information element. | |
| NOTE: This indicator shall be ignored by an EPS receiving entity as the UE in EPS providing UE STATE INDICATION message, supports URSP provisioning in EPS. | |
|  | |

## D.6.6 UE OS id

the purpose of the UE OS id information element is to provide the network with information about the OS of the UE

the UE OS id information element is coded as shown in figure D.6.6.1 and table D.6.6.1

the UE OS id is a type 4 information element with a minimum length of 18 octet and a maximum length of 242 octets

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |  | |
| OS Id IEI | | | | | | | | | octet 1 | |
| Length of OS Id information contents | | | | | | | | | octet 2 | |
| OS Id\_1 | | | | | | | | | octets 3 - 18 | |
| … | | | | | | | | | … | |
| OS Id\_15 | | | | | | | | | octets 227\* -242\* | |

figure D.6.6.1 UE OS id information element

table D.6.6.1 UE OS id information element

|  |
| --- |
| OS Id: |
| The OS Id is coded as a sequence of a sixteen octet OS Id value field. The OS Id value field is defined as Universally Unique IDentifier (UUID) as specified in IETF RFC 4122 [35A]. |

## D.6.7 UE policy network classmark

the purpose of the UE policy network classmark information element is to provide the UE with information about the policy aspects of the network

the UE policy network classmark information element is coded as shown in figure D.6.7.1 and table D.6.7.1

the UE policy network classmark is a type 4 information element with a minimum length of 3 octets and a maximum length of 5 octets

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | | 7 | | 6 | | 5 | | 4 | | 3 | | 2 | | 1 | |  | |
| UE policy network classmark IEI | | | | | | | | | | | | | | | | octet 1 | |
| Length of UE policy network classmark contents | | | | | | | | | | | | | | | | octet 2 | |
| 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | 0 Spare | | 0 Spare | | NSSUI | | octet 3 | |
| 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | octet 4\* -5\* | |
| Spare | | | | | | | | | | | | | | | |

figure D.6.7.1 UE policy network classmark information element

table D.6.7.1 UE policy network classmark information element

|  |  |  |
| --- | --- | --- |
| Non-subscribed SNPN signalled URSP handling indication (NSSUI) (octet 3, bit 1) (see NOTE) | | |
| Bits | | |
| 1 |  |  |
| 0 |  | UE is allowed to accept URSP signalled by non-subscribed SNPNs |
| 1 |  | UE is not allowed to accept URSP signalled by non-subscribed SNPNs |
|  | | |
| All other bits in octet 3 to 5 are spare and shall be coded as zero, if the respective octet is included in the information element. | | |
| NOTE: Receiving UE shall ignore this bit, if i) UE has an empty or non-present EHPLMN list and the bit is received from the RPLMN which is not the HPLMN, ii) UE has non-empty EHPLMN list and the bit is received from the RPLMN which is not an EHPLMN or iii) the bit is received from the RSNPN which is not the subscribed SNPN. | | |

## D.6.8 VPS URSP configuration

the purpose of the VPS URSP configuration information element is to transfer the VPS URSP configuration from the PCF to the UE the VPS URSP configuration contains zero or more tuples each tuple contains the tuple ID identifying the tuple the network descriptor identifying one or more VPLMNs and zero or more UPSCs of HPLMN's UE policy sections which contain solely one or more UE policy parts with the UE policy part type set to "URSP" such that the URSP rules in those one or more UE policy parts are applicable to the VPLMN and its equivalent PLMN

the VPS URSP configuration information element is coded as shown in figure D.6.8.1 figure D.6.8.2 figure D.6.8.3 figure D.6.8.4 figure D.6.8.5 figure D.6.8.6 figure D.6.8.7 figure D.6.8.8 figure D.6.8.9 and table D.6.8.1

the VPS URSP configuration is type 6 information element with a minimum length of 3 octets and a maximum length of 65533 octets

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| VPS URSP configuration IEI | | | | | | | | octet 1 |
| Length of VPS URSP configuration contents | | | | | | | | octet 2  octet 3 |
| 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | 0  Spare | RT | | octet 4 |
| Tuple 1 | | | | | | | | octet 5\*  octet a\* |
| Tuple 2 | | | | | | | | octet (a+1)\*  octet b\* |
| … | | | | | | | | octet (b+1)\*  octet c\* |
| Tuple N | | | | | | | | octet (c+1)\*  octet z\* |

figure D.6.8.1 VPS URSP configuration information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of tuple contents | | | | | | | | octet a+1  octet a+2 |
| Tuple ID | | | | | | | | octet a+3 |
| Network descriptor | | | | | | | | octet a+4  octet e |
| UPSC 1 | | | | | | | | octet (e+1)\*  octet (e+2)\* |
| UPSC 2 | | | | | | | | octet (e+3)\*  octet (e+4)\* |
| … | | | | | | | | octet (e+5)\*  octet (e+n\*2e-2)\* |
| UPSC n | | | | | | | | octet (e+n\*2-1)\*  octet (e+n\*2)\* = octet b\* |

figure D.6.8.2 tuple

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Number of network descriptor entries | | | | | | | | octet a+4 |
| Network descriptor entry 1 | | | | | | | | octet (a+5)  octet f |
| Network descriptor entry 2 | | | | | | | | octet (f+1)\*  octet g\* |
| ... | | | | | | | | octet (g+1)\*  octet h\* |
| Network descriptor entry m | | | | | | | | octet (h+1)\*  octet e\* |

figure D.6.8.3 network descriptor

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Network descriptor entry type | | | | | | | | octet f+1 |
| Network descriptor entry value | | | | | | | | octet (f+2)\*  octet g\* |

figure D.6.8.4 network descriptor entry

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Number of PLMN IDs | | | | | | | | octet (f+2) |
| PLMN ID 1 | | | | | | | | octet (f+3)  octet (f+5) |
| PLMN ID 2 | | | | | | | | octet (f+6)\*  octet (f+8)\* |
| ... | | | | | | | |  |
| PLMN ID m | | | | | | | | octet (m\*3+f)\*  octet (m\*3+f+2)\* = octet g\* |

figure D.6.8.5 network descriptor entry value for network descriptor entry type set to "one or more VPLMNs"

|  |  |  |
| --- | --- | --- |
| MCC digit 2 | MCC digit 1 | octet f+6 |
| MNC digit 3 | MCC digit 3 | octet f+7 |
| MNC digit 2 | MNC digit 1 | octet f+8 |

figure D.6.8.6 PLMN ID

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Number of MCCs | | | | | | | | octet (f+2) |
| MCC pair 1 | | | | | | | | octet (f+3)  octet (f+5) |
| MCC pair 2 | | | | | | | | octet (f+6)\*  octet (f+8)\* |
| ... | | | | | | | |  |
| MCC pair m | | | | | | | | octet (m\*3+f)\*  octet (m\*3+f+2)\* |
| Odd MCC | | | | | | | | octet (m\*3+f+3)\*  octet (m\*3+f+4)\* = octet g\* |

figure D.6.8.7 network descriptor entry value for network descriptor entry type set to "one or more MCCs"

|  |  |  |
| --- | --- | --- |
| MCC 1 digit 2 | MCC 1 digit 1 | octet f+6 |
| MCC 2 digit 3 | MCC 1 digit 3 | octet f+7 |
| MCC 2 digit 2 | MCC 2 digit 1 | octet f+8 |

figure D.6.8.8 MCC pair

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| MCC digit 2 | | | | MCC digit 1 | octet (m\*3+f+3) |
| 0  Spare | 0  Spare | 0  Spare | 0  Spare | MCC digit 3 | octet (m\*3+f+4) = octet g |

figure D.6.8.9 odd MCC

table D.6.8.1 VPS URSP configuration information element

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Replacement type (octet 4, bits 1 and 2) | | | | | | | | | |
| Bits | | | | | | | | | |
| **2** | **1** |  |  |  |  | | | | |
| 0 | 1 |  |  |  | per-tuple replacement | | | | |
| 1 | 0 |  |  |  | full list of tuples | | | | |
| All other values are reserved. | | | | | | | | | |
|  | | | | | | | | | |
| Tuple ID (octet a+3) | | | | | | | | | |
| This field contains the binary encoding of the tuple ID. The value of the tuple ID is set by the PCF. | | | | | | | | | |
|  | | | | | | | | | |
| Network descriptor entry type (octet f+1) | | | | | | | | | |
| Bits | | | | | | | | | |
| **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |  |  |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |  | one or more VPLMNs |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |  | one or more MCCs |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |  | any VPLMN |
| All other values are reserved. | | | | | | | | | |
|  | | | | | | | | | |
| If the network descriptor entry type field is set to "one or more VPLMNs" or "one or more MCCs", then the network descriptor entry value field is present. If the network descriptor entry type field is set to "any VPLMN", then the network descriptor entry value field is absent. | | | | | | | | | |
|  | | | | | | | | | |
| Number of PLMN IDs (octet (f+2) of the network descriptor entry value for network descriptor entry type set to "one or more VPLMNs") | | | | | | | | | |
| The number of PLMN IDs field indicates the number of the PLMN IDs in the network descriptor entry value field. | | | | | | | | | |
|  | | | | | | | | | |
| MCC, Mobile country code (octet f+6 and bits 4 to 1 of octet f+7 of the PLMN ID, octet f+6 and bits 4 to 1 of octet f+7 of the MCC pair, and octet f+8 and bits 8 to 5 of octet f+7 of the MCC pair, octet m\*3+f+3 and bits 4 to 1 of m\*3+f+4 of the odd MCC) | | | | | | | | | |
| The MCC field is coded as in ITU-T Recommendation E.212 [42], annex A. | | | | | | | | | |
|  | | | | | | | | | |
| MNC, Mobile network code (bits 8 to 5 of octet f+7, and octet f+8) | | | | | | | | | |
| The coding of this field is the responsibility of each administration but BCD coding shall be used. The MNC shall consist of 2 or 3 digits. If a network operator decides to use only two digits in the MNC, MNC digit 3 shall be coded as "1111". | | | | | | | | | |
|  | | | | | | | | | |
| Number of MCCs (octet (f+2) of the network descriptor entry value for network descriptor entry type set to "one or more MCCs") | | | | | | | | | |
| The number of MCCs field indicates the number of the MCCs in the network descriptor entry value field. If the number of MCCs field is an odd value, then the odd MCC field is present otherwise the odd MCC field is absent. | | | | | | | | | |
|  | | | | | | | | | |
| UPSC (octets e+3 to e+4) | | | | | | | | | |
| This field contains the binary encoding of the UPSC of an UPSI of a UE policy section of the HPLMN (see NOTE), which contains solely one or more UE policy parts with the UE policy part type set to "URSP", such that the URSP rules in those one or more UE policy parts are applicable to the VPLMN and its equivalent PLMN. | | | | | | | | | |
|  | | | | | | | | | |
| NOTE: PLMN ID of the UPSI is not indicated. | | | | | | | | | |

# D.7 timers of UE policy delivery service

timers of UE policy delivery service are shown in table D.7.1

table D.7.1 timers of UE policy delivery service – PCF side

| TIMER NUM. | TIMER VALUE | CAUSE OF START | NORMAL STOP | ON  THE 1st, 2nd, 3rd, 4th EXPIRY |
| --- | --- | --- | --- | --- |
| T3501 | NOTE 1 | Transmission of MANAGE UE POLICY COMMAND | MANAGE UE POLICY COMMAND COMPLETE or MANAGE UE POLICY COMMAND REJECT message received | Retransmission of MANAGE UE POLICY COMMAND message |
| NOTE 1: The value of this timer is network dependent. | | | | |

# D.8 handling of unknown unforeseen and erroneous UPDS data

## D.8.1 general

the procedures specified in the subclause apply to those messages which pass the checks described in this subclause

this subclause also specifies procedures for the handling of unknown unforeseen and erroneous UPDS data by the receiving entity these procedures are called "error handling procedures" but in addition to providing recovery mechanisms for error situations they define a compatibility mechanism for future extensions of the UPDS

subclauses D.8.1 to D.8.8 shall be applied in order of precedence

detailed error handling procedures in the network are implementation dependent and may vary from PLMN to PLMN however when extensions of UPDS are developed networks are assumed to have the error handling which is indicated in this subclause as mandatory ("shall") and that is indicated as strongly recommended ("should")

also the error handling of the network is only considered as mandatory or strongly recommended when certain thresholds for errors are not reached during a dedicated connection

for definition of semantical and syntactical errors see 3GPP TS 24.007 [11] subclause 11.4.2

## D.8.2 message too short or too long

### D.8.2.1 message too short

when a message is received that is too short to contain a complete message type information element that message shall be ignored c.f 3GPP TS 24.007 [11]

### D.8.2.2 message too long

the maximum size of a UE policy delivery service message is 65535 octets

## D.8.3 unknown or unforeseen procedure transaction identity

### D.8.3.1 procedure transaction identity

the following network procedures shall apply for handling an unknown erroneous or unforeseen PTI received in a UPDS message

a) in case the network receives a MANAGE UE POLICY COMPLETE message or MANAGE UE POLICY COMMAND REJECT message in which the PTI value is an assigned or unassigned value that does not match any PTI in use the network shall ignore the UPDS message

b) in case the network receives a UPDS message in which the PTI value is a reserved value the network shall ignore the UPDS message

the following UE procedures shall apply for handling an unknown erroneous or unforeseen PTI received in a UPDS message

a) in case the UE receives a UPDS message in which the PTI value is a reserved value the UE shall ignore the UPDS message

## D.8.4 unknown or unforeseen message type

if the UE or the network receives a UPDS message with message type not defined for the UPDS or not implemented by the receiver it shall ignore the UPDS message

NOTE a message type not defined for the UPDS in the given direction is regarded by the receiver as a message type not defined for the UPDS see 3GPP TS 24.007 [11]

if the UE receives a message not compatible with the UPDS state the UE shall ignore the UPDS message

if the network receives a message not compatible with the UPDS state the network actions are implementation dependent

## D.8.5 Non-semantical mandatory information element errors

### D.8.5.1 common procedures

when on receipt of a message

a) an "imperative message part" error; or

b) a "missing mandatory IE" error

is diagnosed or when a message containing

a) a syntactically incorrect mandatory IE;

b) an IE with an IEI unknown in the message but encoded as "comprehension required" (see 3GPP TS 24.007 [11]); or

c) an out of sequence IE encoded as "comprehension required" (see 3GPP TS 24.007 [11]) is received

the UE shall ignore the UPDS message;

the network shall proceed as follows

the network shall

1) try to treat the message (the exact further actions are implementation dependent); or

2) ignore the message

## D.8.6 unknown and unforeseen IEs in the non-imperative message part

### D.8.6.1 IEIs unknown in the message

the UE shall ignore all IEs unknown in a message which are not encoded as "comprehension required" (see 3GPP TS 24.007 [11])

the network shall take the same approach

### D.8.6.2 out of sequence IEs

the UE shall ignore all out of sequence IEs in a message which are not encoded as "comprehension required" (see 3GPP TS 24.007 [11])

the network should take the same approach

### D.8.6.3 repeated IEs

if an information element with format t TV TLV or TLV-E is repeated in a message in which repetition of the information element is not specified in subclause D.5 the UE shall handle only the contents of the information element appearing first and shall ignore all subsequent repetitions of the information element when repetition of information elements is specified the UE shall handle only the contents of specified repeated information elements if the limit on repetition of information elements is exceeded the UE shall handle the contents of information elements appearing first up to the limit of repetitions and shall ignore all subsequent repetitions of the information element

the network should follow the same procedures

## D.8.7 Non-imperative message part errors

this category includes

a) syntactically incorrect optional IEs; and

b) conditional IE errors

### D.8.7.1 syntactically incorrect optional IEs

the UE shall treat all optional IEs that are syntactically incorrect in a message as not present in the message

the network shall take the same approach

### D.8.7.2 conditional IE errors

when upon receipt of a UPDS message the UE diagnoses a "missing conditional IE" error or an "unexpected conditional IE" error or when it receives a UPDS message containing at least one syntactically incorrect conditional IE the UE shall ignore the message

when the network receives a message and diagnoses a "missing conditional IE" error or an "unexpected conditional IE" error or when it receives a message containing at least one syntactically incorrect conditional IE the network shall either

a) try to treat the message (the exact further actions are implementation dependent); or

b) ignore the message

## D.8.8 messages with semantically incorrect contents

when a message with semantically incorrect contents is received the UE shall perform the foreseen reactions of the procedural part of subclauses D.2 if however no such reactions are specified the UE shall ignore the message

the network should follow the same procedure

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Change history | | | | | | | |
| **Date** | **Meeting** | **Tdoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2017-10 | CT1#106 | C1-174182 |  |  |  | Draft skeleton provided by the rapporteur. | 0.0.0 |
| 2017-11 | CT1#106 |  |  |  |  | Implementing the following p-CRs agreed by CT1: C1-174183, C1-174184, C1-174185. | 0.1.0 |
| 2017-12 | CT1#107 |  |  |  |  | Implementing the following p-CRs agreed by CT1: C1-175098, C1-175313.  Corrections done by the rapporteur. | 0.2.0 |
| 2017-12 | CT1 e-mail review |  |  |  |  | Editorial corrections. | 0.2.1 |
| 2017-12 | CT1 e-mail review |  |  |  |  | Re-introduction of table in subclause 8.2.23.1 | 0.2.2 |
| 2018-02 | CT1#108 |  |  |  |  | Implementing the following p-CRs agreed by CT1: C1-180663, C1-180224, C1-180046, C1-180437, C1-180438, C1-180448, C1-180307, C1-180211, C1-180316, C1-180221, C1-180281, C1-180339, C1-180361, C1-180148, C1-180415, C1-180451, C1-180453, C1-180455, C1-180459, C1-180482, C1-180483, C1-180484, C1-180619, C1-180620, C1-180623, C1-180624, C1-180627, C1-180628, C1-180664, C1-180665, C1-180668, C1-180672, C1-180673, C1-180679, C1-180680, C1-180684, C1-180707, C1-180721, C1-180725, C1-180736, C1-180737, C1-180738, C1-180739, C1-180740, C1-180741, C1-180750, C1-180751, C1-180013, C1-180311, C1-180312, C1-180197, C1-180313, C1-180283, C1-180037, C1-180041, C1-180464, C1-180465, C1-180466, C1-180469, C1-180645, C1-180646, C1-180648, C1-180688, C1-180689, C1-180690, C1-180473, C1-180720, C1-180226, C1-180632, C1-180633, C1-180635, C1-180640, C1-180669, C1-180731, C1-180732, C1-180734, C1-180735, C1-180746, C1-180209, C1-180040, C1-180015, C1-180035, C1-180198, C1-180421, C1-180487, C1-180488, C1-180490, C1-180621, C1-180622, C1-180701, C1-180162, C1-180190, C1-180604, C1-180605, C1-180606, C1-180611, C1-180614, C1-180616, C1-180704, C1-180719, C1-180722, C1-180747, C1-180755, C1-180756  Corrections done by the rapporteur. | 0.3.0 |
| 2018-02 | CT1 e-mail review |  |  |  |  | Resolution of collision among C1-180679, C1-180721 and C1-180740.  Resolution of collision among C1-180605, C1-180616 and C1-180704.  Re-implementation of parts of C1-180035, C1-180488, C1-180605, C1-180606, C1-180729 and C1-180734 as some of the proposed changes were not implemented correctly in the previous version.  Implementation of C1-180646 which was missed.  Editorial corrections.  Corrections done by the rapporteur. | 0.3.1 |
| 2018-03 | CT1#109 |  |  |  |  | Implementing the following p-CRs agreed by CT1: C1-181362, C1-181377, C1-181456, C1-181457, C1-181703, C1-181748, C1-181462, C1-181786, C1-181168, C1-181269, C1-181278, C1-181307, C1-181180, C1-181279, C1-181280, C1-181281, C1-181354, C1-181283, C1-181284, C1-181287, C1-181305, C1-181352, C1-181364, C1-181365, C1-181366, C1-181399, C1-181466, C1-181467, C1-181468, C1-181470, C1-181471, C1-181473, C1-181474, C1-181477, C1-181628, C1-181629, C1-181633, C1-181661, C1-181663, C1-181666, C1-181668, C1-181670, C1-181681, C1-181682, C1-181683, C1-181684, C1-181695, C1-181696, C1-181707, C1-181713, C1-181715, C1-181716, C1-181717, C1-181718, C1-181733, C1-181734, C1-181735, C1-181736, C1-181737, C1-181738, C1-181739, C1-181740, C1-181741, C1-181747, C1-181752, C1-181764, C1-181770, C1-181771, C1-181781, C1-181782, C1-181785, C1-181182, C1-181120, C1-181121, C1-181395, C1-181480, C1-181482, C1-181484, C1-181485, C1-181486, C1-181487, C1-181488, C1-181650, C1-181651, C1-181652, C1-181678, C1-181726, C1-181751, C1-181273, C1-181274, C1-181276, C1-181277, C1-181496, C1-181784, C1-181312, C1-181357, C1-181605, C1-181606, C1-181609, C1-181645, C1-181674, C1-181675, C1-181677, C1-181679, C1-181708, C1-181710, C1-181728, C1-181613, C1-181615, C1-181680, C1-181750, C1-181618, C1-181619, C1-181779, C1-181360, C1-181636, C1-181640, C1-181643, C1-181729, C1-181730, C1-181731, C1-181732  Corrections done by the rapporteur. | 0.4.0 |
| 2018-03 | CT1 e-mail review |  |  |  |  | Re-implementation of C1-181168 and C1-181307.  Re-implementation of C1-181656 and C1-181606 so that C1-181656 is implemented first.  Reverting to the old title.  Editorial corrections of some of the implemented p-CRs as well as adding some missing parts.  Corrections done by the rapporteur. | 0.4.1 |
| 2018-03 | CT#79 | CP-180101 |  |  |  | Version 1.0.0 created for presentation to TSG CT#79 for information. | 1.0.0 |
| 2018-05 | CT1#110 |  |  |  |  | Implementing the following p-CRs agreed by CT1: C1-182219, C1-182493, C1-182496, C1-182202, C1-182497, C1-182053, C1-182311, C1-182019, C1-182359, C1-182360, C1-182361, C1-182358, C1-182305, C1-182306, C1-182354, C1-182117, C1-182182, C1-182455, C1-182459, C1-182491, C1-182600, C1-182601, C1-182605, C1-182606, C1-182607, C1-182608, C1-182609, C1-182610, C1-182614, C1-182615, C1-182621, C1-182662, C1-182664, C1-182665, C1-182708, C1-182728, C1-182730, C1-182733, C1-182724, C1-182757, C1-182759, C1-182760, C1-182768, C1-182772, C1-182775, C1-182786, C1-182787, C1-182791, C1-182831, C1-182832, C1-182833, C1-182834, C1-182835, C1-183836, C1-182838, C1-182840, C1-182844, C1-182067, C1-182073, C1-182303, C1-182321, C1-182352, C1-182385, C1-182645, C1-182646, C1-182647, C1-182648, C1-182650, C1-182651, C1-182657, C1-182659, C1-182660, C1-182741, C1-182742, C1-182761, C1-182762, C1-182763, C1-182764, C1-182765, C1-182774, C1-182789, C1-182789, C1-182815, C1-182845, C1-182797, C1-182232, C1-182230, C1-182666, C1-182667, C1-182671, C1-182673, C1-182677, C1-182800, C1-182824, C1-182710, C1-182072, C1-182078, C1-182174, C1-182190, C1-182456, C1-182636, C1-182637, C1-182638, C1-182639, C1-182726, C1-182729, C1-182747, C1-182749, C1-182766, C1-182767, C1-182841, C1-182847, C1-182043, C1-182057, C1-182260, C1-182044, C1-182617, C1-182618, C1-182619, C1-182620, C1-182622, C1-182623, C1-182624, C1-182627, C1-182628, C1-182629, C1-182802, C1-182808, C1-182345, C1-182461, C1-182630  Corrections done by the rapporteur. | 1.1.0 |
| 2018-05 | CT1 e-mail review |  |  |  |  | Re-implementation of C1-182768, C1-182841, C1-182841, C1-182619, C1-182665, C1-182497, C1-182067 and C1-182078 to correct some editorials as well as adding some missing parts.  Corrections done by the rapporteur. | 1.1.1 |
| 2018-06 | CT1#111 |  |  |  |  | Implementing the following p-CRs agreed by CT1: C1-183268, C1-183109, C1-183281, C1-183517, C1-183518, C1-183519, C1-183791, C1-183115, C1-183527, C1-183812, C1-183813, C1-183141, C1-183148, C1-183406, C1-183070, C1-183207, C1-183273, C1-183276, C1-183277, C1-183415, C1-183143, C1-183146, C1-183197, C1-183260, C1-183142, C1-183151, C1-183154, C1-183225, C1-183205, C1-183223, C1-183314, C1-183278, C1-183367, C1-183279, C1-183381, C1-183399, C1-183413, C1-183467, C1-183530, C1-183532, C1-183533, C1-183534, C1-183535, C1-183538, C1-183539, C1-183715, C1-183716, C1-183717, C1-183718, C1-183720, C1-183721, C1-183737, C1-183739, C1-183741, C1-183744, C1-183745, C1-183748, C1-183749, C1-183750, C1-183751, C1-183774, C1-183775, C1-183779, C1-183780, C1-183781, C1-183809, C1-183822, C1-183824, C1-183825, C1-183826, C1-183845, C1-183858, C1-183761, C1-183147, C1-183237, C1-183329, C1-183353, C1-183378, C1-183387, C1-183401, C1-183408, C1-183499, C1-183541, C1-183542, C1-183543, C1-183545, C1-183726, C1-183756, C1-183757, C1-183758, C1-183759, C1-183762, C1-183795, C1-183796, C1-183802, C1-183827, C1-183846, C1-183847, C1-183848, C1-183211, C1-183731, C1-183784, C1-183578, C1-183585, C1-183831, C1-183861, C1-183247, C1-183562, C1-183563, C1-183798, C1-183194, C1-183238, C1-183256, C1-183528, C1-183427, C1-183706, C1-183707, C1-183709, C1-183763, C1-183766, C1-183767, C1-183768, C1-183769, C1-183770, C1-183771, C1-183772, C1-183773, C1-183785, C1-183787, C1-183788, C1-183789, C1-183799, C1-183805, C1-183816, C1-183832, C1-183834, C1-183849, C1-183850, C1-183114, C1-183457, C1-183458, C1-183510, C1-183511, C1-183512, C1-183513, C1-183515, C1-183800, C1-183806, C1-183470  Corrections done by the rapporteur. | 1.2.0 |
| 2018-06 | CT1 e-mail review |  |  |  |  | Re-implementation of C1-183535, C1-183813, C1-183408, C1-183766 and C1-183831.  Implementation of C1-183816 which was missed.  Editorial corrections of some of the implemented p-CRs.  Corrections done by the rapporteur. | 1.2.1 |
| 2018-06 | CT#80 | CP-181094 |  |  |  | Version 2.0.0 created for presentation to TSG CT#80 for approval. | 2.0.0 |
| 2018-06 | CT#80 |  |  |  |  | Version 15.0.0 created after approval | 15.0.0 |
| 2018-09 | CT#81 | CP-182139 | 0001 |  | F | Replace unknown "registration update accept" | 15.1.0 |
| 2018-09 | CT#81 | CP-182142 | 0003 | 2 | F | Pass (Extended) Emergency Number List to upper layers | 15.1.0 |
| 2018-09 | CT#81 | CP-182132 | 0004 |  | F | Correcting access selection for SMS over NAS | 15.1.0 |
| 2018-09 | CT#81 | CP-182138 | 0006 | 1 | F | Referring to the correct bits for SMS over NAS during the registration procedure | 15.1.0 |
| 2018-09 | CT#81 | CP-182140 | 0007 | 1 | F | Setting and checking 5GS update status | 15.1.0 |
| 2018-09 | CT#81 | CP-182132 | 0008 | 1 | F | Clarifications on MICO indication | 15.1.0 |
| 2018-09 | CT#81 | CP-182141 | 0009 | 1 | F | Timer T3540 clarifications | 15.1.0 |
| 2018-09 | CT#81 | CP-182137 | 0010 | 3 | F | Network Slicing Subscription Change Indication | 15.1.0 |
| 2018-09 | CT#81 | CP-182133 | 0012 |  | F | Correction for PDU session context | 15.1.0 |
| 2018-09 | CT#81 | CP-182133 | 0013 | 1 | F | Correction for establishment of user-plane resources | 15.1.0 |
| 2018-09 | CT#81 | CP-182133 | 0014 | 1 | F | Correction for establishment cause | 15.1.0 |
| 2018-09 | CT#81 | CP-182133 | 0016 | 4 | F | Correction for maximum data rate per UE for integrity protection for DRBs | 15.1.0 |
| 2018-09 | CT#81 | CP-182137 | 0018 | 3 | F | Invalid DNN | 15.1.0 |
| 2018-09 | CT#81 | CP-182132 | 0020 | 1 | F | Correction for 5GMM cause #90 in subclause A.3 | 15.1.0 |
| 2018-09 | CT#81 | CP-182135 | 0021 |  | F | Editor's notes in UPDP | 15.1.0 |
| 2018-09 | CT#81 | CP-182136 | 0023 | 2 | F | Exchange of extended protocol configuration options | 15.1.0 |
| 2018-09 | CT#81 | CP-182130 | 0024 | 1 | F | 5G QoS - restructuring QoS rules IE | 15.1.0 |
| 2018-09 | CT#81 | CP-182133 | 0025 | 1 | F | Correction for editor's note on further 5GSM causes and further minor issues | 15.1.0 |
| 2018-09 | CT#81 | CP-182132 | 0026 |  | F | Correction and alignment of cause code values | 15.1.0 |
| 2018-09 | CT#81 | CP-182141 | 0027 | 2 | F | UAC information and establishment cause when uplink user data packet is to be sent for a PDU session with suspended user-plane resources | 15.1.0 |
| 2018-09 | CT#81 | CP-182134 | 0028 | 2 | F | Corrections for operator-defined access categories | 15.1.0 |
| 2018-09 | CT#81 | CP-182131 | 0030 | 1 | F | AMF Region ID (8 bits), AMF Set ID (10 bits), and AMF Pointer (6 bits) | 15.1.0 |
| 2018-09 | CT#81 | CP-182132 | 0031 | 1 | F | Correcting message definition of message including EENL | 15.1.0 |
| 2018-09 | CT#81 | CP-182141 | 0032 | 2 | F | SMF knowledge that a UE is configured for high priority access | 15.1.0 |
| 2018-09 | CT#81 | CP-182131 | 0035 | 2 | F | Authentication for normal services not accepted by network | 15.1.0 |
| 2018-09 | CT#81 | CP-182130 | 0036 | 4 | C | Addition of ABBA in 5G based primary authentication procedure | 15.1.0 |
| 2018-09 | CT#81 | CP-182131 | 0037 | 2 | C | Alignment and correction of mapped security context creation at S1 to N1 mode HO | 15.1.0 |
| 2018-09 | CT#81 | CP-182130 | 0038 | 1 | C | Addition of NAS container IE for N1 mode HO | 15.1.0 |
| 2018-09 | CT#81 | CP-182132 | 0039 | 1 | F | Correction and update of S1 mode to N1 mode NAS transparent container | 15.1.0 |
| 2018-09 | CT#81 | CP-182139 | 0040 | 1 | C | Removal of MAC editor´s note | 15.1.0 |
| 2018-09 | CT#81 | CP-182139 | 0041 | 1 | F | Removal of transparent container at N1 mode to S1 mode HO | 15.1.0 |
| 2018-09 | CT#81 | CP-182133 | 0042 |  | F | Correction of 5GS TAC LSB | 15.1.0 |
| 2018-09 | CT#81 | CP-182136 | 0043 | 1 | B | Handling of Emergency PDU sessions and null algorithms | 15.1.0 |
| 2018-09 | CT#81 | CP-182139 | 0044 | 2 | B | Request for Kamf re-derivation | 15.1.0 |
| 2018-09 | CT#81 | CP-182137 | 0045 | 1 | F | Mobility Registration when T3346 running | 15.1.0 |
| 2018-09 | CT#81 | CP-182135 | 0046 |  | F | DL NAS Transport message | 15.1.0 |
| 2018-09 | CT#81 | CP-182140 | 0047 | 1 | F | Single-registration mode | 15.1.0 |
| 2018-09 | CT#81 | CP-182131 | 0048 |  | F | Authentication Response | 15.1.0 |
| 2018-09 | CT#81 | CP-182138 | 0049 | 2 | F | Parameters for PDU session establishment due to change of SSC mode 3 or 2 PSA | 15.1.0 |
| 2018-09 | CT#81 | CP-182136 | 0054 | 2 | F | Equivalent PLMNs | 15.1.0 |
| 2018-09 | CT#81 | CP-182139 | 0055 | 2 | F | Remove the remaining instance of SUPI paging | 15.1.0 |
| 2018-09 | CT#81 | CP-182138 | 0056 | 2 | F | PDU session status | 15.1.0 |
| 2018-09 | CT#81 | CP-182131 | 0058 | 1 | F | Clarification on NAS level MM congestion Control | 15.1.0 |
| 2018-09 | CT#81 | CP-182141 | 0060 | 3 | B | SM cause for out of LADN service area | 15.1.0 |
| 2018-09 | CT#81 | CP-182139 | 0064 | 1 | F | Removal of redundant MICO statement | 15.1.0 |
| 2018-09 | CT#81 | CP-182137 | 0065 | 4 | C | LADN indication from UE at registration | 15.1.0 |
| 2018-09 | CT#81 | CP-182137 | 0066 |  | F | Mapping to configured NSSAI for HPLM shall be included if available | 15.1.0 |
| 2018-09 | CT#81 | CP-182130 | 0069 | 2 | F | Abnormal Cases in the UE for mobilty and periodic Registration Update Procedures | 15.1.0 |
| 2018-09 | CT#81 | CP-182134 | 0070 | 1 | D | Correction to 5GMM Substate | 15.1.0 |
| 2018-09 | CT#81 | CP-182135 | 0071 | 1 | F | Definition of emergency and non-emergency PDU sessions | 15.1.0 |
| 2018-09 | CT#81 | CP-182138 | 0074 | 2 | F | PDU session establish criteria for emergency PDU sessions | 15.1.0 |
| 2018-09 | CT#81 | CP-182140 | 0075 | 3 | F | Service request allowed for PDU release outside LADN | 15.1.0 |
| 2018-09 | CT#81 | CP-182136 | 0076 | 2 | F | Handling of Transmission failure for Service request message. | 15.1.0 |
| 2018-09 | CT#81 | CP-182136 | 0077 | 4 | B | How to determine the maximum number of established PDU sessions | 15.1.0 |
| 2018-09 | CT#81 | CP-182141 | 0079 | 2 | F | UAC and setting of the Uplink data status IE | 15.1.0 |
| 2018-09 | CT#81 | CP-182137 | 0080 | 1 | C | Non-3GPP access to 5GCN not allowed | 15.1.0 |
| 2018-09 | CT#81 | CP-182136 | 0082 | 2 | B | Including S-NSSAI received in EPS in Requested NSSAI and in PDU session establishment request upon inter-system change from S1 mode to N1 mode | 15.1.0 |
| 2018-09 | CT#81 | CP-182141 | 0083 |  | B | UE configuration for AC 11-15 and MCS (access identity 2) | 15.1.0 |
| 2018-09 | CT#81 | CP-182142 | 0084 |  | B | UE configuration for NAS signalling low priority via OMA-DM or USIM not applicable in 5GS | 15.1.0 |
| 2018-09 | CT#81 | CP-182137 | 0085 | 2 | F | Miscellaneous corrections | 15.1.0 |
| 2018-09 | CT#81 | CP-182132 | 0086 | 2 | F | Clarifications on ATTEMPTING-REGISTRATION-UPDATE | 15.1.0 |
| 2018-09 | CT#81 | CP-182141 | 0087 | 2 | F | UE behaviour in substate ATTEMPTING-REGISTRATION-UPDATE | 15.1.0 |
| 2018-09 | CT#81 | CP-182140 | 0090 |  | F | Service area list IE | 15.1.0 |
| 2018-09 | CT#81 | CP-182136 | 0091 | 1 | F | Handling of forbidden tracking area list | 15.1.0 |
| 2018-09 | CT#81 | CP-182134 | 0092 | 2 | F | Corrections for authentication | 15.1.0 |
| 2018-09 | CT#81 | CP-182141 | 0094 | 4 | F | Trigger for mobility and periodic registration update | 15.1.0 |
| 2018-09 | CT#81 | CP-182130 | 0095 |  | F | Abnormal cases in the UE for network-initiated de-registration procedure | 15.1.0 |
| 2018-09 | CT#81 | CP-182130 | 0096 | 4 | F | Add attempt counter to Service Request procedure | 15.1.0 |
| 2018-09 | CT#81 | CP-182131 | 0097 | 1 | F | Authentication procedure during registration procedure for mobility and periodic registration update | 15.1.0 |
| 2018-09 | CT#81 | CP-182138 | 0098 | 4 | F | Registration procedure for mobility and periodic registration update | 15.1.0 |
| 2018-09 | CT#81 | CP-182138 | 0099 | 3 | F | Release of the N1 NAS signalling connection | 15.1.0 |
| 2018-09 | CT#81 | CP-182139 | 0100 | 2 | F | Resetting of registration attempt counter | 15.1.0 |
| 2018-09 | CT#81 | CP-182138 | 0101 | 4 | F | On #27 N1 mode not allowed | 15.1.0 |
| 2018-09 | CT#81 | CP-182130 | 0102 | 3 | F | Adding EPLMN list related descriptions | 15.1.0 |
| 2018-09 | CT#81 | CP-182138 | 0104 | 2 | F | Provision of IWK N26 indication in registration update procedure | 15.1.0 |
| 2018-09 | CT#81 | CP-182134 | 0105 |  | F | Corrections for interworking with EPS | 15.1.0 |
| 2018-09 | CT#81 | CP-182135 | 0106 | 4 | F | Emergency Services Support indicator for non-3GPP access | 15.1.0 |
| 2018-09 | CT#81 | CP-182219 | 0107 | 7 | C | Network control for always-on PDU sessions | 15.1.0 |
| 2018-09 | CT#81 | CP-182135 | 0108 |  | F | Corrections on inconsistent descriptions for 5GSM and 5GMM | 15.1.0 |
| 2018-09 | CT#81 | CP-182135 | 0110 |  | F | Corrections on the timers of 5GMM | 15.1.0 |
| 2018-09 | CT#81 | CP-182137 | 0112 | 1 | F | No operation code for UE policy management | 15.1.0 |
| 2018-09 | CT#81 | CP-182134 | 0113 | 1 | F | Correction on UE behaviour for 5GSM congestion control | 15.1.0 |
| 2018-09 | CT#81 | CP-182134 | 0114 |  | F | Correction on UE security capability IE | 15.1.0 |
| 2018-09 | CT#81 | CP-182136 | 0115 | 5 | F | Including SD when Mapped configured SD is included in S-NSSAI | 15.1.0 |
| 2018-09 | CT#81 | CP-182142 | 0116 | 3 | F | Updates to deleting a derived QoS rule in the UE | 15.1.0 |
| 2018-09 | CT#81 | CP-182138 | 0117 |  | F | Provisioning of ANDSP for non-3GPP access | 15.1.0 |
| 2018-09 | CT#81 | CP-182136 | 0118 |  | D | Fix incorrect references | 15.1.0 |
| 2018-09 | CT#81 | CP-182130 | 0120 | 2 | F | Addition of ngKSI in DEREGISTRATION REQUEST | 15.1.0 |
| 2018-09 | CT#81 | CP-182141 | 0123 | 2 | F | Storing of MPS indicator in non-volatile memory of mobile | 15.1.0 |
| 2018-09 | CT#81 | CP-182138 | 0124 | 4 | C | NW slicing and delayed re-registration due to emergency services | 15.1.0 |
| 2018-09 | CT#81 | CP-182131 | 0125 | 1 | F | Addtion of cause values for service request reject | 15.1.0 |
| 2018-09 | CT#81 | CP-182141 | 0126 | 3 | F | UE actions when other causes received at SERVICE REJECT | 15.1.0 |
| 2018-09 | CT#81 | CP-182137 | 0128 |  | F | Missing general description on sub-clause 9.10 | 15.1.0 |
| 2018-09 | CT#81 | CP-182134 | 0130 |  | F | Correction to general message format | 15.1.0 |
| 2018-09 | CT#81 | CP-182138 | 0131 |  | F | Plain 5GS NAS message | 15.1.0 |
| 2018-09 | CT#81 | CP-182134 | 0134 | 1 | F | Correction to the 5GMM capability IE | 15.1.0 |
| 2018-09 | CT#81 | CP-182134 | 0135 |  | F | Correction to the 5GS identity type IE | 15.1.0 |
| 2018-09 | CT#81 | CP-182134 | 0136 | 1 | F | Correction to the 5GS network feature support IE | 15.1.0 |
| 2018-09 | CT#81 | CP-182135 | 0137 | 1 | F | Editorials and minor corrections | 15.1.0 |
| 2018-09 | CT#81 | CP-182140 | 0138 |  | F | Security procedures and handling after inter-system change | 15.1.0 |
| 2018-09 | CT#81 | CP-182130 | 0140 |  | F | 5GMM aspects of NAS over non-3GPP access | 15.1.0 |
| 2018-09 | CT#81 | CP-182139 | 0141 | 2 | F | Resolution of editor's note on equivalent PLMN list | 15.1.0 |
| 2018-09 | CT#81 | CP-182140 | 0142 |  | F | Resolution of editor's notes on 5GMM sub-layer design | 15.1.0 |
| 2018-09 | CT#81 | CP-182139 | 0143 |  | F | Resolution of editor's note on UE behaviour in substate 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION | 15.1.0 |
| 2018-09 | CT#81 | CP-182139 | 0144 |  | F | Resolution of editor's note on other sub-states of state 5GMM-DEREGISTERED | 15.1.0 |
| 2018-09 | CT#81 | CP-182139 | 0145 | 3 | F | Resolution of editor's note on sub-states of state 5GMM-REGISTERED | 15.1.0 |
| 2018-09 | CT#81 | CP-182139 | 0146 | 1 | F | Resolution of editor's note on the key derivation function field | 15.1.0 |
| 2018-09 | CT#81 | CP-182139 | 0147 |  | F | Resolution of editor's note on security context coordination | 15.1.0 |
| 2018-09 | CT#81 | CP-182139 | 0148 |  | F | Removal of unnecesary editor's notes FFS | 15.1.0 |
| 2018-09 | CT#81 | CP-182139 | 0151 |  | F | Resolution of editor's note on handling of unknown, unforeseen, and erroneous protocol data | 15.1.0 |
| 2018-09 | CT#81 | CP-182131 | 0153 | 2 | C | AMF taking both EMC and EMC BS availability into account in setting EMF | 15.1.0 |
| 2018-09 | CT#81 | CP-182131 | 0154 | 1 | F | Clarification on SM congestion control specific to PLMN | 15.1.0 |
| 2018-09 | CT#81 | CP-182131 | 0155 | 1 | F | Aligning T35cd handling upon NW initiated SM request with T3396 and T35ef | 15.1.0 |
| 2018-09 | CT#81 | CP-182132 | 0156 | 2 | F | Clarification on stopping back-off timers upon reception of NW initiated SM request | 15.1.0 |
| 2018-09 | CT#81 | CP-182131 | 0157 | 1 | F | Clarification for registration attempt counter handling and introduction of lower layer failure | 15.1.0 |
| 2018-09 | CT#81 | CP-182137 | 0158 | 2 | B | Introduction of 5GMM cause #15 | 15.1.0 |
| 2018-09 | CT#81 | CP-182141 | 0159 | 1 | F | Timer for re-enabling N1 mode capability | 15.1.0 |
| 2018-09 | CT#81 | CP-182137 | 0160 |  | F | Lists of 5GS forbidden tracking areas | 15.1.0 |
| 2018-09 | CT#81 | CP-182137 | 0162 | 1 | F | Local release of a persistent PDU session | 15.1.0 |
| 2018-09 | CT#81 | CP-182134 | 0163 | 1 | F | Correction on retry of PDU session establishment procedure | 15.1.0 |
| 2018-09 | CT#81 | CP-182134 | 0164 |  | F | Correction to 5GSM/ESM coordination | 15.1.0 |
| 2018-09 | CT#81 | CP-182133 | 0165 |  | F | Correction on PDU address IE | 15.1.0 |
| 2018-09 | CT#81 | CP-182130 | 0166 | 1 | F | 5GSM congestion control over AMF on PDU session modification procedure | 15.1.0 |
| 2018-09 | CT#81 | CP-182136 | 0167 | 3 | F | Exception handling in QoS operation | 15.1.0 |
| 2018-09 | CT#81 | CP-182134 | 0168 | 1 | F | Correction on PTI mismatch | 15.1.0 |
| 2018-09 | CT#81 | CP-182136 | 0169 | 1 | B | Establishment of N1 NAS signalling connection due to change in the network slicing information | 15.1.0 |
| 2018-09 | CT#81 | CP-182138 | 0170 | 2 | F | Release of N1 NAS signalling connection due to change in the network slicing information | 15.1.0 |
| 2018-09 | CT#81 | CP-182137 | 0171 | 3 | F | Multiple S-NSSAIs in PDU session establishment | 15.1.0 |
| 2018-09 | CT#81 | CP-182132 | 0173 | 3 | F | Clarifications on UE 5GSM capabilities and procedures during inter-working with EPS | 15.1.0 |
| 2018-09 | CT#81 | CP-182136 | 0174 | 1 | B | Interworking between ePDG/EPC and NG-RAN/5GCN | 15.1.0 |
| 2018-09 | CT#81 | CP-182136 | 0176 | 1 | B | Interworking between E-UTRAN/EPC and N3IWF/5GCN | 15.1.0 |
| 2018-09 | CT#81 | CP-182142 | 0178 | 2 | F | UE re-registration when the AMF cannot determine an Allowed NSSAI | 15.1.0 |
| 2018-09 | CT#81 | CP-182137 | 0180 | 2 | F | Local release of a PDU session due to 5GSM cause #43: Invalid PDU session identity | 15.1.0 |
| 2018-09 | CT#81 | CP-182132 | 0182 | 2 | C | Common NAS security transparent container IE for intra-5G HO and S1 to N1 inter-system HO | 15.1.0 |
| 2018-09 | CT#81 | CP-182136 | 0184 | 1 | F | Handling of PDU session type after intersystem change from N1 mode to S1 mode | 15.1.0 |
| 2018-09 | CT#81 | CP-182131 | 0185 | 2 | F | Allowed NSSAI of a single-registration mode UE within a network with N26 | 15.1.0 |
| 2018-09 | CT#81 | CP-182141 | 0187 | 1 | F | SMF selection based on DNN for transfer a PDN connection from EPS to 5GS | 15.1.0 |
| 2018-09 | CT#81 | CP-182141 | 0188 | 1 | F | UE behaviour for determination of the UE presence in LADN service area | 15.1.0 |
| 2018-09 | CT#81 | CP-182133 | 0189 | 3 | F | Correction on emergency PDU session handling | 15.1.0 |
| 2018-09 | CT#81 | CP-182137 | 0190 | 1 | F | No EMM parameters handling for DR mode UEs due to rejected service request | 15.1.0 |
| 2018-09 | CT#81 | CP-182131 | 0192 | 3 | F | Clarification on activation of UP resources of PDU session | 15.1.0 |
| 2018-09 | CT#81 | CP-182130 | 0194 | 1 | B | Access attempt barred for the UE-initiated NAS transport procedure | 15.1.0 |
| 2018-09 | CT#81 | CP-182142 | 0195 | 5 | F | UE configured for EAB and access category 1 | 15.1.0 |
| 2018-09 | CT#81 | CP-182137 | 0197 | 1 | F | No bearer for N1 NAS | 15.1.0 |
| 2018-09 | CT#81 | CP-182133 | 0198 | 4 | F | Correction of S-NSSAI based congestion control | 15.1.0 |
| 2018-09 | CT#81 | CP-182132 | 0199 | 1 | F | Clean-up in definitions | 15.1.0 |
| 2018-09 | CT#81 | CP-182132 | 0200 | 4 | F | Clarify abnormal cases in the UE for independency of 5GMM procedures between accesses | 15.1.0 |
| 2018-09 | CT#81 | CP-182141 | 0203 | 2 | B | Storing Configured NSSAI when the PLMN is changed | 15.1.0 |
| 2018-09 | CT#81 | CP-182136 | 0206 |  | F | Incorrect statement for handling of security context at IWK | 15.1.0 |
| 2018-09 | CT#81 | CP-182134 | 0207 | 2 | F | Correction to SSC mode selection | 15.1.0 |
| 2018-09 | CT#81 | CP-182135 | 0208 | 2 | F | Corrections to terms and references | 15.1.0 |
| 2018-09 | CT#81 | CP-182140 | 0209 | 1 | C | Revision on AMF transport behaviour of 5GSM message | 15.1.0 |
| 2018-09 | CT#81 | CP-182135 | 0210 | 2 | F | Differences between NAS over 3GPP access and NAS over non-3GPP access | 15.1.0 |
| 2018-09 | CT#81 | CP-182138 | 0212 | 6 | B | Preferred list terminating at ME or USIM | 15.1.0 |
| 2018-09 | CT#81 | CP-182131 | 0213 | 4 | F | Clarification on network-initiated de-registration procedure | 15.1.0 |
| 2018-09 | CT#81 | CP-182133 | 0214 |  | F | Correction of detach terminology | 15.1.0 |
| 2018-09 | CT#81 | CP-182132 | 0215 |  | F | Clarification on S-NSSAI based congestion control for PDU session modification procedure | 15.1.0 |
| 2018-09 | CT#81 | CP-182141 | 0216 | 4 | B | SOR acknowledge message coding | 15.1.0 |
| 2018-09 | CT#81 | CP-182141 | 0232 | 1 | F | SMS over NAS re-transmission upon delivery failure on one Access Type | 15.1.0 |
| 2018-09 | CT#81 | CP-182134 | 0233 | 2 | F | Corrections in EAP based primary authentication procedure (alternative 2) | 15.1.0 |
| 2018-09 | CT#81 | CP-182133 | 0234 |  | F | Correction for multi-homed IPv6 PDU session | 15.1.0 |
| 2018-09 | CT#81 | CP-182133 | 0235 | 1 | F | Correction for transfer of a PDN connection from untrusted non-3GPP access connected to EPC | 15.1.0 |
| 2018-09 | CT#81 | CP-182133 | 0237 | 1 | F | Correction for generation of QoS rules | 15.1.0 |
| 2018-09 | CT#81 | CP-182137 | 0239 |  | F | Interworking for multi-homed IPv6 PDU session | 15.1.0 |
| 2018-09 | CT#81 | CP-182131 | 0241 | 1 | F | Clarification of N1 NAS signalling connection release in AMF on generic UE configuration update completion | 15.1.0 |
| 2018-09 | CT#81 | CP-182139 | 0242 | 1 | F | Requests for emergency services fallback from upper layers | 15.1.0 |
| 2018-09 | CT#81 | CP-182135 | 0245 |  | F | Corrections to the Identification and Registration procedures | 15.1.0 |
| 2018-09 | CT#81 | CP-182132 | 0246 |  | F | Correct abnormal procedures reference when handling CC #22 (Congestion) | 15.1.0 |
| 2018-09 | CT#81 | CP-182137 | 0247 | 1 | F | Non-IP PDN connection type for S1 to N1 interworking | 15.1.0 |
| 2018-09 | CT#81 | CP-182137 | 0248 | 1 | F | Non-3GPP de-registration timer | 15.1.0 |
| 2018-09 | CT#81 | CP-182141 | 0250 | 3 | F | Substates for registration result | 15.1.0 |
| 2018-09 | CT#81 | CP-182142 | 0251 | 1 | F | Updating NS Configuration via registration procedure | 15.1.0 |
| 2018-09 | CT#81 | CP-182141 | 0254 | 4 | B | SUCI encoding format and protection scheme | 15.1.0 |
| 2018-09 | CT#81 | CP-182132 | 0255 | 1 | C | Clarify the method of configuring the UE to use Access Identity 1 | 15.1.0 |
| 2018-09 | CT#81 | CP-182136 | 0256 | 1 | B | Handling of error case when UE gets URSP from VPLMN | 15.1.0 |
| 2018-09 | CT#81 | CP-182132 | 0258 | 2 | F | Correction for abnormal cases in the UE of service request procedure | 15.1.0 |
| 2018-09 | CT#81 | CP-182140 | 0259 | 1 | F | Setting of RRC establishment cause for operator-defined access categories | 15.1.0 |
| 2018-09 | CT#81 | CP-182131 | 0262 |  | F | Alignment with terminology "emergency PDU session" throughout TS 24.501 | 15.1.0 |
| 2018-09 | CT#81 | CP-182141 | 0263 | 1 | F | TAI removed from list of Servie area lists after reject from network | 15.1.0 |
| 2018-09 | CT#81 | CP-182135 | 0264 | 1 | F | EAP message IE mandatory in PDU SESSION AUTHENTICATION messages | 15.1.0 |
| 2018-09 | CT#81 | CP-182135 | 0269 | 1 | F | Corrections related to the authentication procedure | 15.1.0 |
| 2018-09 | CT#81 | CP-182140 | 0271 | 2 | F | Security parameter carrying DL NAS COUNT during N1 to S1 mode HO | 15.1.0 |
| 2018-09 | CT#81 | CP-182130 | 0272 | 2 | F | Adding procedures for updating local emergency numbers in other modes | 15.1.0 |
| 2018-09 | CT#81 | CP-182131 | 0275 |  | F | Authentication response parameter IE to be of fixed length (24.501) | 15.1.0 |
| 2018-09 | CT#81 | CP-182134 | 0276 |  | F | Correction to the PDU Session ID value in Allowed PDU session status IE | 15.1.0 |
| 2018-09 | CT#81 | CP-182138 | 0277 | 2 | F | Reactivation result indicating insufficient resources during service request procedure | 15.1.0 |
| 2018-09 | CT#81 | CP-182138 | 0278 | 1 | C | Registration procedure triggered by a change of UE Radio Capability | 15.1.0 |
| 2018-09 | CT#81 | CP-182142 | 0280 | 2 | F | Updates to RRC fallback indication while in 5GMM-CONNECTED mode, or while in 5GMM-CONNECTED mode with RRC inactive indication | 15.1.0 |
| 2018-09 | CT#81 | CP-182138 | 0281 | 2 | C | PDU Session Release due to Semantic or Syntactical Errors | 15.1.0 |
| 2018-09 | CT#81 | CP-182138 | 0282 | 3 | F | Removal of 5GSM cause from ePCO for PDU Session Release Complete | 15.1.0 |
| 2018-09 | CT#81 | CP-182134 | 0283 |  | F | Correction on PTI definition | 15.1.0 |
| 2018-09 | CT#81 | CP-182140 | 0284 | 1 | F | Resolving EN on fatal causes in 5GMM/5GSM state machine | 15.1.0 |
| 2018-09 | CT#81 | CP-182130 | 0285 | 1 | F | Uplink data handling for MT notification | 15.1.0 |
| 2018-09 | CT#81 | CP-182136 | 0286 | 1 | F | Fallback handling for RRC inactive | 15.1.0 |
| 2018-09 | CT#81 | CP-182134 | 0287 | 1 | F | Correction on PDU session modification procedure | 15.1.0 |
| 2018-09 | CT#81 | CP-182140 | 0289 | 1 | F | RRC establishment cause for EAB | 15.1.0 |
| 2018-09 | CT#81 | CP-182138 | 0290 | 2 | C | NW slicing and delayed registration due to emergency services, reject PDU session request | 15.1.0 |
| 2018-09 | CT#81 | CP-182134 | 0291 | 1 | F | Correction to the UE security capability IE encoding | 15.1.0 |
| 2018-09 | CT#81 | CP-182130 | 0292 | 3 | F | Additions to UE configuration update completion clause | 15.1.0 |
| 2018-09 | CT#81 | CP-182139 | 0293 | 2 | F | Removal of local PDU session relase statement in UCU procedure | 15.1.0 |
| 2018-09 | CT#81 | CP-182140 | 0294 |  | F | Resolution of editor's notes in D.3 and D.6.2 | 15.1.0 |
| 2018-09 | CT#81 | CP-182140 | 0295 |  | F | Resolution of the editor's note on value of the non-3GPP de-registration timer value | 15.1.0 |
| 2018-09 | CT#81 | CP-182139 | 0296 |  | F | Resolution of editor's note on the format of the authentication parameters | 15.1.0 |
| 2018-09 | CT#81 | CP-182140 | 0297 | 2 | F | Resolution of editor's note on unknown or unforeseen PDU session identity | 15.1.0 |
| 2018-09 | CT#81 | CP-182139 | 0298 |  | F | Resolution of editor's note on other types of payload for the NAS transport procedure(s) | 15.1.0 |
| 2018-09 | CT#81 | CP-182140 | 0300 | 2 | F | Serving network name format for primary authentication | 15.1.0 |
| 2018-09 | CT#81 | CP-182136 | 0301 | 1 | B | Initial registration not accepted due to serving network not authorized | 15.1.0 |
| 2018-09 | CT#81 | CP-182130 | 0303 | 1 | F | 5GSM cause #xx –out of LADN service area | 15.1.0 |
| 2018-09 | CT#81 | CP-182142 | 0304 | 1 | F | UE policy delivery protocol in the scope | 15.1.0 |
| 2018-09 | CT#81 | CP-182131 | 0305 | 1 | F | AMF pointer pointing one or more AMFs | 15.1.0 |
| 2018-09 | CT#81 | CP-182135 | 0306 |  | F | Corrections in the conditions for SMS via non-3GPP access | 15.1.0 |
| 2018-09 | CT#81 | CP-182130 | 0308 |  | F | 5GMM STATUS message sent by the AMF when certain error conditions are detected upon receipt of 5GMM protocol data in the AMF | 15.1.0 |
| 2018-09 | CT#81 | CP-182137 | 0311 | 1 | F | Interworking with E-UTRAN connected to EPC of a UE registered to 5GC via non-3GPP access | 15.1.0 |
| 2018-09 | CT#81 | CP-182142 | 0313 | 2 | F | Use of S-NSSAI and session-AMBR provided during the EPS bearer context modification procedure | 15.1.0 |
| 2018-09 | CT#81 | CP-182136 | 0314 | 1 | F | Handling of inter-access handover of a PDU session whose S-NSSAI is not allowed for the target access | 15.1.0 |
| 2018-09 | CT#81 | CP-182130 | 0319 | 1 | F | 5GSM sublayer states for PDU session inactive | 15.1.0 |
| 2018-09 | CT#81 | CP-182139 | 0321 | 1 | F | Rename of T3584 and T3585 | 15.1.0 |
| 2018-09 | CT#81 | CP-182133 | 0322 |  | F | Correction on acknowledgement handling of UE configuration update | 15.1.0 |
| 2018-09 | CT#81 | CP-182133 | 0323 | 1 | F | Correction on NW initiated de-registration procedure | 15.1.0 |
| 2018-09 | CT#81 | CP-182140 | 0326 | 1 | F | Service area restrictions | 15.1.0 |
| 2018-09 | CT#81 | CP-182135 | 0327 | 3 | F | Disabling and re-enabling N1 mode capability | 15.1.0 |
| 2018-09 | CT#81 | CP-182131 | 0328 | 1 | F | Clarification on packet filters | 15.1.0 |
| 2018-09 | CT#81 | CP-182133 | 0329 | 1 | F | Correction on 5G-GUTI type encoding | 15.1.0 |
| 2018-09 | CT#81 | CP-182133 | 0330 | 1 | F | Correction on EAP-AKA' based primary authentication | 15.1.0 |
| 2018-09 | CT#81 | CP-182133 | 0331 |  | F | Correction on 5GSM state mapping when interworking | 15.1.0 |
| 2018-09 | CT#81 | CP-182138 | 0333 | 1 | F | Removal of Default EPS Bearer (DEB) indication | 15.1.0 |
| 2018-09 | CT#81 | CP-182133 | 0334 | 1 | F | Correction on interaction with upper layers | 15.1.0 |
| 2018-09 | CT#81 | CP-182140 | 0337 | 2 | F | Security Context | 15.1.0 |
| 2018-09 | CT#81 | CP-182135 | 0339 | 3 | B | Emergency call in limited service state | 15.1.0 |
| 2018-09 | CT#81 | CP-182201 | 0340 | 3 | C | Emergency call error handling | 15.1.0 |
| 2018-09 | CT#81 | CP-182138 | 0341 | 2 | F | PDU session status in notification response message | 15.1.0 |
| 2018-09 | CT#81 | CP-182132 | 0342 | 1 | F | Clarifications on inclusion of S-NSSAI in 5GSM request | 15.1.0 |
| 2018-09 | CT#81 | CP-182133 | 0344 |  | F | Correction for LADN | 15.1.0 |
| 2018-09 | CT#81 | CP-182135 | 0345 | 1 | F | Definition of user-plane resources | 15.1.0 |
| 2018-09 | CT#81 | CP-182136 | 0346 | 1 | F | Handling of PDU session(s) not supporting interworking with EPS | 15.1.0 |
| 2018-09 | CT#81 | CP-182141 | 0350 |  | D | Terminology correction | 15.1.0 |
| 2018-09 | CT#81 | CP-182131 | 0351 | 3 | F | Clarification on MICO indication and LADN information via generic UE configuration update procedure | 15.1.0 |
| 2018-09 | CT#81 | CP-182132 | 0352 | 1 | F | Clarification on the temporary identity in the service request procedure | 15.1.0 |
| 2018-09 | CT#81 | CP-182130 | 0353 |  | F | Abbreviation update for NITZ | 15.1.0 |
| 2018-09 | CT#81 | CP-182135 | 0355 |  | D | Duplicated subclause for registration request message | 15.1.0 |
| 2018-09 | CT#81 | CP-182135 | 0356 | 1 | D | Editorial corrections | 15.1.0 |
| 2018-09 | CT#81 | CP-182135 | 0357 | 2 | B | DL and UL NAS Transport procedure updates for SOR | 15.1.0 |
| 2018-09 | CT#81 | CP-182132 | 0358 | 1 | F | Conditions to send registration complete message. | 15.1.0 |
| 2018-09 | CT#81 | CP-182132 | 0359 | 1 | F | Condition for starting timer T3540 | 15.1.0 |
| 2018-09 | CT#81 | CP-182140 | 0361 | 2 | F | Security context mapping at 5GS to EPS HO | 15.1.0 |
| 2018-09 | CT#81 | CP-182134 | 0363 | 2 | F | Correction to reset registration attempt counter | 15.1.0 |
| 2018-09 | CT#81 | CP-182130 | 0365 | 3 | F | Adding the reference to T3346 | 15.1.0 |
| 2018-09 | CT#81 | CP-182130 | 0367 | 1 | F | Access attempt due to delivery of LPP message/transparent container/UE policy container | 15.1.0 |
| 2018-12 | CT#82 | CP-183032 | 0103 | 6 | F | Clarification on coordination between 5GMM and 5GSM | 15.2.0 |
| 2018-12 | CT#82 | CP-183032 | 0121 | 10 | F | Clarification to VoPS indicator | 15.2.0 |
| 2018-12 | CT#82 | CP-183032 | 0274 | 4 | F | Correct Extended Local Emergency Numbers List deletion upon PLMN change | 15.2.0 |
| 2018-12 | CT#82 | CP-183032 | 0315 | 4 | F | Operator-controlled inclusion of NSSAI in access stratum connection establishment | 15.2.0 |
| 2018-12 | CT#82 | CP-183032 | 0371 | 2 | F | Correction for maximum data rate per UE for integrity protection for DRBs for PDU sessions in non-3GPP access which are transferable to 3GPP access | 15.2.0 |
| 2018-12 | CT#82 | CP-183032 | 0372 | 1 | F | Correction for 3GPP PS data off and non-IP user data packets | 15.2.0 |
| 2018-12 | CT#82 | CP-183032 | 0373 | 2 | F | Corrections for determination of RRC establishment cause and establishment cause for non-3GPP access | 15.2.0 |
| 2018-12 | CT#82 | CP-183032 | 0374 |  | F | Corrections for MTU PCO parameters handling | 15.2.0 |
| 2018-12 | CT#82 | CP-183032 | 0376 | 2 | F | Correction for SM PDU DN request container coding | 15.2.0 |
| 2018-12 | CT#82 | CP-183032 | 0379 | 1 | F | UAC: Correction for SMSoIP sent over DNN other that "IMS" | 15.2.0 |
| 2018-12 | CT#82 | CP-183032 | 0380 | 2 | F | UAC: Correction for operator-defined access categories | 15.2.0 |
| 2018-12 | CT#82 | CP-183032 | 0381 | 1 | F | DRX parameters IE definition | 15.2.0 |
| 2018-12 | CT#82 | CP-183032 | 0383 | 1 | F | Removal of UE security capability from Intra N1 mode NAS container | 15.2.0 |
| 2018-12 | CT#82 | CP-183032 | 0385 |  | F | Correct procedure for determining registered PLMN | 15.2.0 |
| 2018-12 | CT#82 | CP-183032 | 0392 | 1 | F | Definition of emergency registration | 15.2.0 |
| 2018-12 | CT#82 | CP-183032 | 0393 | 1 | F | Correction for EAP based primary authentication and AUTHENTICATION REJECT | 15.2.0 |
| 2018-12 | CT#82 | CP-183032 | 0394 |  | F | Correction for LADN information encoding | 15.2.0 |
| 2018-12 | CT#82 | CP-183032 | 0395 | 3 | B | Dynamic Routing indicator update description | 15.2.0 |
| 2018-12 | CT#82 | CP-183032 | 0398 | 1 | F | ABBA handling for 5G-AKA based authentication procedure | 15.2.0 |
| 2018-12 | CT#82 | CP-183032 | 0399 | 2 | F | ABBA handling when initiating EAP procedures | 15.2.0 |
| 2018-12 | CT#82 | CP-183032 | 0401 | 3 | F | Clarification on NAS message field format and mapping | 15.2.0 |
| 2018-12 | CT#82 | CP-183032 | 0402 | 1 | F | Correction to home country definition | 15.2.0 |
| 2018-12 | CT#82 | CP-183032 | 0403 | 1 | F | Signalling Default Configured NSSAI indication in the registration procedure | 15.2.0 |
| 2018-12 | CT#82 | CP-183032 | 0404 | 1 | F | Rename "configured NSSAI not associated with a PLMN" to align to new stage 2 terminology | 15.2.0 |
| 2018-12 | CT#82 | CP-183032 | 0405 | 1 | F | "SMS subscribed indication" in CONFIGURATION UPDATE COMMAND | 15.2.0 |
| 2018-12 | CT#82 | CP-183033 | 0406 | 1 | F | S-NSSAI not allowed by AMF | 15.2.0 |
| 2018-12 | CT#82 | CP-183033 | 0407 |  | F | Continued need to align with terminology "emergency PDU session" throughout TS 24.501 | 15.2.0 |
| 2018-12 | CT#82 | CP-183033 | 0408 | 1 | F | Ambiguity in the use of the terms "no other parameter" and "no parameters" | 15.2.0 |
| 2018-12 | CT#82 | CP-183033 | 0409 |  | F | Change EMCW to EMCN3 | 15.2.0 |
| 2018-12 | CT#82 | CP-183033 | 0410 | 2 | F | Miscellaneous wording, terminology and reference corrections | 15.2.0 |
| 2018-12 | CT#82 | CP-183033 | 0411 |  | F | Rejected NSSAI clarifications | 15.2.0 |
| 2018-12 | CT#82 | CP-183033 | 0413 | 1 | F | Rejected NSSAI sent in CONFIGURATION UPDATE COMMAND – Alt 2 | 15.2.0 |
| 2018-12 | CT#82 | CP-183033 | 0415 |  | F | UAC – meaning of "the broadcast of categories a, b or c" | 15.2.0 |
| 2018-12 | CT#82 | CP-183033 | 0416 | 2 | F | Clarification of "registration requested" in CONFIGURATION UPDATE COMMAND | 15.2.0 |
| 2018-12 | CT#82 | CP-183033 | 0417 | 5 | F | Updates on steering of roaming handling and information coding | 15.2.0 |
| 2018-12 | CT#82 | CP-183033 | 0419 | 3 | F | Security context usage during NAS security mode control procedure | 15.2.0 |
| 2018-12 | CT#82 | CP-183033 | 0420 | 1 | F | Corrections on GFBR parameter for QoS flow | 15.2.0 |
| 2018-12 | CT#82 | CP-183033 | 0421 | 1 | F | Correction to UE behavior when disabling N1 mode for non-3GPP access | 15.2.0 |
| 2018-12 | CT#82 | CP-183033 | 0423 | 1 | F | Mapped QoS information validation (Solution 1) | 15.2.0 |
| 2018-12 | CT#82 | CP-183033 | 0424 | 4 | B | Protection of initial NAS messages – overall description | 15.2.0 |
| 2018-12 | CT#82 | CP-183033 | 0425 | 4 | B | Support for protection of initial NAS messages | 15.2.0 |
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| 2018-12 | CT#82 | CP-183041 | 0695 | 1 | F | QoS flow and mapped EPS bearer context | 15.2.0 |
| 2018-12 | CT#82 | CP-183041 | 0696 | 1 | F | Corrections on 5GSM IEs | 15.2.0 |
| 2018-12 | CT#82 | CP-183041 | 0697 | 1 | F | Correction on 5GSM congestion control | 15.2.0 |
| 2018-12 | CT#82 | CP-183041 | 0698 |  | F | Correction on PTI value release | 15.2.0 |
| 2018-12 | CT#82 | CP-183041 | 0699 | 1 | F | Corrections on QoS rules IE | 15.2.0 |
| 2018-12 | CT#82 | CP-183041 | 0700 | 1 | F | UE handling for semantic error in the QoS operation | 15.2.0 |
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| 2018-12 | CT#82 | CP-183041 | 0715 | 1 | F | Integrity protection maximum data rate for UL and DL | 15.2.0 |
| 2018-12 | CT#82 | CP-183041 | 0717 | 1 | F | General section for limited service state over non-3GPP access | 15.2.0 |
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| 2019-09 | CT#85 | CP-192056 | 1333 |  | F | Clarification for emergency call when T3396 or T3585 is running | 16.2.0 |
| 2019-09 | CT#85 | CP-192052 | 1334 | 1 | F | Removal of Editors Note for active timers in the NW | 16.2.0 |
| 2019-09 | CT#85 | CP-192083 | 1335 | 1 | B | Addition of LCS indication in 5GMM capability and 5GS NW capability | 16.2.0 |
| 2019-09 | CT#85 | CP-192083 | 1336 | 1 | B | Addition of location service message condition to Additional informaton IE | 16.2.0 |
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| 2019-09 | CT#85 | CP-192056 | 1340 |  | F | Clarify encoding of EPS bearer identity | 16.2.0 |
| 2019-09 | CT#85 | CP-192071 | 1341 |  | F | Keep equivalent PLMNs list for Deregistration Request message with 5GMM cause #7 | 16.2.0 |
| 2019-09 | CT#85 | CP-192056 | 1344 |  | F | Correction to handling of operator-defined access category missing a standardized access category | 16.2.0 |
| 2019-09 | CT#85 | CP-192056 | 1345 | 1 | F | ODAC IEI correction | 16.2.0 |
| 2019-09 | CT#85 | CP-192052 | 1346 |  | F | Removal of eDRX support with RRC\_INACTIVE for NB-IoT | 16.2.0 |
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| 2019-09 | CT#85 | CP-192069 | 1357 | 2 | B | UE radio capability ID assignment by the network | 16.2.0 |
| 2019-09 | CT#85 | CP-192073 | 1358 | 1 | B | Signalling of UE support for transfer of port management information containers, MAC address and DS-TT residence time | 16.2.0 |
| 2019-09 | CT#85 | CP-192073 | 1359 | 2 | B | Adding support for transfer of Ethernet port management information containers | 16.2.0 |
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| 2020-03 | CT#87e | CP-200107 | 1966 | 1 | C | Recovery from fallback for UEs using CP CIoT optimization | 16.4.0 |
| 2020-03 | CT#87e | CP-200119 | 1968 |  | B | Triggering service request procedure for V2X communication over PC5 interface | 16.4.0 |
| 2020-03 | CT#87e | CP-200117 | 1971 | 1 | C | Removal of the use of Service area list IE during NSSAAt | 16.4.0 |
| 2020-03 | CT#87e | CP-200117 | 1973 |  | F | Additional triggers for deletion of pending S-NSSAI | 16.4.0 |
| 2020-03 | CT#87e | CP-200114 | 1976 | 1 | B | Considering allowed NSSAI when establishing MA PDU session | 16.4.0 |
| 2020-03 | CT#87e | CP-200114 | 1977 | 1 | B | UE Handling upon receipt of PDU session release command | 16.4.0 |
| 2020-03 | CT#87e | CP-200107 | 1978 | 1 | F | Correction to UL CIoT user data container not routable or not allowed to be routed | 16.4.0 |
| 2020-03 | CT#87e | CP-200107 | 1979 | 1 | F | Single downlink data only indication and release of N1 NAS signalling connection | 16.4.0 |
| 2020-03 | CT#87e | CP-200107 | 1980 | 2 | F | PDU session status with control plane service request message | 16.4.0 |
| 2020-03 | CT#87e | CP-200107 | 1981 | 1 | F | Service gap control, correction when to start service gap control timer in UE and NW | 16.4.0 |
| 2020-03 | CT#87e | CP-200107 | 1982 | 1 | F | Clarification of control plane service request message options | 16.4.0 |
| 2020-03 | CT#87e | CP-200107 | 1983 | 1 | C | UAC updates for NB-IoT to include "MO exception data" | 16.4.0 |
| 2020-03 | CT#87e | CP-200107 | 1984 | 1 | B | Clarification on the use of exception data reporting | 16.4.0 |
| 2020-03 | CT#87e | CP-200286 | 1985 | 5 | F | Update SNPN key differences | 16.4.0 |
| 2020-03 | CT#87e | CP-200109 | 1987 | 1 | F | Setting the Always-on PDU session indication IE in the PDU SESSION ESTABLISHMENT ACCEPT message | 16.4.0 |
| 2020-03 | CT#87e | CP-200117 | 1991 |  | F | AMF updates the UE NSSAI storage after network slice-specific authentication and authorization is completed | 16.4.0 |
| 2020-03 | CT#87e | CP-200117 | 1995 |  | F | Clarification on the S-NSSAI not subject to NSSAA included in allowed NSSAI | 16.4.0 |
| 2020-03 | CT#87e | CP-200117 | 1996 | 2 | F | Subscribed S-NSSAI marked as default and NSSAA | 16.4.0 |
| 2020-03 | CT#87e | CP-200117 | 1997 |  | F | Additional conditions to the presence in the subscribed S-NSSAIs | 16.4.0 |
| 2020-03 | CT#87e | CP-200130 | 1998 | 1 | F | Triggering mobility registration update due to manual CAG selection | 16.4.0 |
| 2020-03 | CT#87e | CP-200117 | 2000 | 1 | F | Emergency PDU session handling after NSSAA failure | 16.4.0 |
| 2020-03 | CT#87e | CP-200125 | 2002 |  | F | UE behaviour upon receipt of a UE radio capability ID deletion indication | 16.4.0 |
| 2020-03 | CT#87e | CP-200125 | 2005 | 1 | F | Additional condition to change UE radio capability ID during mobility registration update | 16.4.0 |
| 2020-03 | CT#87e | CP-200125 | 2006 | 1 | F | UE radio capability information storage not needed for RACS | 16.4.0 |
| 2020-03 | CT#87e | CP-200097 | 2008 | 3 | F | Handling of a UE with an emergency PDU session in terms of CAG | 16.4.0 |
| 2020-03 | CT#87e | CP-200130 | 2012 | 2 | F | N1 mode capability disabling and re-enabling for SNPN | 16.4.0 |
| 2020-03 | CT#87e | CP-200130 | 2013 | 1 | F | #31 not applicable in an SNPN | 16.4.0 |
| 2020-03 | CT#87e | CP-200130 | 2015 | 1 | F | Validity of the USIM for an SNPN and for a specific access type | 16.4.0 |
| 2020-03 | CT#87e | CP-200130 | 2016 |  | F | Handling of 5GMM cause values #62 in an SNPN | 16.4.0 |
| 2020-03 | CT#87e | CP-200130 | 2017 | 1 | F | No mandate to support default configured NSSAI or network slicing indication | 16.4.0 |
| 2020-03 | CT#87e | CP-200130 | 2018 | 2 | F | SNN coding | 16.4.0 |
| 2020-03 | CT#87e | CP-200130 | 2019 | 1 | F | 5GMM cause value #74 in an SNPN with a globally-unique SNPN identity | 16.4.0 |
| 2020-03 | CT#87e | CP-200113 | 2020 | 1 | B | Registration of N5GC devices via wireline access | 16.4.0 |
| 2020-03 | CT#87e | CP-200113 | 2021 | 1 | F | Correction on EUI-64 as PEI | 16.4.0 |
| 2020-03 | CT#87e | CP-200113 | 2022 |  | F | Corrections on N5CW support | 16.4.0 |
| 2020-03 | CT#87e |  |  |  |  | Addition of IEI values, editorial corrections, implementation of missing CR1985 | 16.4.1 |
| 2020-06 | CT#88e | CP-201102 | 0793 | 9 | F | Inclusion of ATTACH REQUEST message in REGISTRATION REQUEST message during initial registration when 5G-GUTI mapped from 4G-GUTI is used | 16.5.0 |
| 2020-06 | CT#88e | CP-201102 | 1379 | 6 | F | Corrections on the abnormal cases of registration procedure for initial registration | 16.5.0 |
| 2020-06 | CT#88e | CP-201102 | 1415 | 12 | F | Handling of MCS data in various 5GMM states. | 16.5.0 |
| 2020-06 | CT#88e | CP-201096 | 1701 | 5 | C | Enhancement on CPSR for CIoT CP data transport | 16.5.0 |
| 2020-06 | CT#88e | CP-201113 | 1734 | 2 | F | S-NSSAI in rejected NSSAI for the failed or revoked NSSAA not to be requested | 16.5.0 |
| 2020-06 | CT#88e | CP-201102 | 1782 | 5 | F | Correcting transfer of connections/sessions if there is an emergency call | 16.5.0 |
| 2020-06 | CT#88e | CP-201102 | 1792 | 2 | F | Restricting handling of cause #9 to the access on which it was received | 16.5.0 |
| 2020-06 | CT#88e | CP-201102 | 1795 | 3 | F | Clarification on use of operator-defined access categories | 16.5.0 |
| 2020-06 | CT#88e | CP-201102 | 1803 | 3 | F | Add handling for UE configured to use timer T3245 in 5GS via 3GPP access | 16.5.0 |
| 2020-06 | CT#88e | CP-201102 | 1823 | 4 | F | Correction on UE behaviour for service area restriction | 16.5.0 |
| 2020-06 | CT#88e | CP-201102 | 1841 | 4 | F | Paging with two valid 5G-GUTIs | 16.5.0 |
| 2020-06 | CT#88e | CP-201136 | 1880 | 2 | C | CAG-ID not provided to lower layers during NAS signalling connection establishment | 16.5.0 |
| 2020-06 | CT#88e | CP-201113 | 1912 | 5 | C | Deleting Editors note regarding indefinite wait at the UE for NSSAA completion | 16.5.0 |
| 2020-06 | CT#88e | CP-201102 | 1974 | 1 | F | Dual-registration requirements for EHPLMNs | 16.5.0 |
| 2020-06 | CT#88e |  |  |  |  |  | 16.5.0 |
| 2020-06 | CT#88e | CP-201136 | 2010 | 2 | C | Correction in UE behavior upon receipt of 5GMM cause value #74 or #75 via a non-integrity protected NAS message | 16.5.0 |
| 2020-06 | CT#88e | CP-201109 | 2027 |  | B | EPS interworking of MA PDU session of 5G-RG when N26 is not supported | 16.5.0 |
| 2020-06 | CT#88e | CP-201108 | 2028 | 1 | F | Secondary authentication and W-AGF acting on behalf of N5GC device | 16.5.0 |
| 2020-06 | CT#88e | CP-201109 | 2029 | 2 | B | EPS interworking of MA PDU session of 5G-RG when N26 is supported | 16.5.0 |
| 2020-06 | CT#88e | CP-201096 | 2030 | 2 | F | Indication of change in the use of enhanced coverage | 16.5.0 |
| 2020-06 | CT#88e | CP-201096 | 2031 |  | F | Integrity protection data rate for UEs that don't support N3 data transfer | 16.5.0 |
| 2020-06 | CT#88e | CP-201096 | 2032 |  | F | Addition of Control Plane Service Request in the abnormal cases for service request procedure | 16.5.0 |
| 2020-06 | CT#88e | CP-201132 | 2033 |  | F | Correction of certain erroneous Information Element Identifiers | 16.5.0 |
| 2020-06 | CT#88e | CP-201096 | 2034 | 5 | F | DRX parameters for NB-IoT | 16.5.0 |
| 2020-06 | CT#88e | CP-201096 | 2035 |  | F | Correcting a wrong reference | 16.5.0 |
| 2020-06 | CT#88e | CP-201102 | 2037 |  | F | Clarification on DL only match-all packet filer | 16.5.0 |
| 2020-06 | CT#88e | CP-201113 | 2038 | 1 | F | Clarification S-NSSAI status in AMF for NSSAA | 16.5.0 |
| 2020-06 | CT#88e | CP-201113 | 2039 | 2 | F | Update description on UE indicate supporting NSSAA | 16.5.0 |
| 2020-06 | CT#88e | CP-201113 | 2040 | 1 | F | Pending NSSAI update for the configured NSSAI in the UCU message | 16.5.0 |
| 2020-06 | CT#88e | CP-201109 | 2042 | 1 | F | Applicability of PS data off to MA PDU session | 16.5.0 |
| 2020-06 | CT#88e | CP-201113 | 2043 | 1 | F | Missing condition for inclusion of "NSSAA to be performed" indicator | 16.5.0 |
| 2020-06 | CT#88e | CP-201113 | 2044 | 1 | F | AMF triggers PDU session release | 16.5.0 |
| 2020-06 | CT#88e | CP-201102 | 2047 |  | F | Correction of the handling of 5GMM cause #27 | 16.5.0 |
| 2020-06 | CT#88e | CP-201113 | 2049 |  | F | Stopping of T3346 after receiving the NSSA Command message | 16.5.0 |
| 2020-06 | CT#88e | CP-201102 | 2050 | 2 | F | Additional condition to start T3540 | 16.5.0 |
| 2020-06 | CT#88e | CP-201102 | 2051 | 1 | F | Specify UE behaviour for NOTIFICATION message for additional state/sub-states | 16.5.0 |
| 2020-06 | CT#88e | CP-201113 | 2053 | 1 | F | Clarification on the rejected S-NSSAI included in requested NSSAI in registration procedure. | 16.5.0 |
| 2020-06 | CT#88e | CP-201108 | 2055 |  | F | ANDSP is not supported by 5G-RG and W-AGF | 16.5.0 |
| 2020-06 | CT#88e | CP-201096 | 2056 | 3 | C | Adding a new abnormal case on the network side for CPSR | 16.5.0 |
| 2020-06 | CT#88e | CP-201113 | 2058 | 3 | F | Clarifying the description for Network Slice-Specific Authorization Revocation | 16.5.0 |
| 2020-06 | CT#88e | CP-201113 | 2059 | 3 | C | Updating requirements of NSSAA for roaming scenarios | 16.5.0 |
| 2020-06 | CT#88e | CP-201136 | 2060 | 1 | F | Definition of registered SNPN | 16.5.0 |
| 2020-06 | CT#88e | CP-201096 | 2062 |  | F | Correction of SGC | 16.5.0 |
| 2020-06 | CT#88e | CP-201096 | 2063 | 1 | F | Emergency PDU sesseion established after WUS negotiation | 16.5.0 |
| 2020-06 | CT#88e | CP-201136 | 2064 |  | F | update of the counter for SNPN | 16.5.0 |
| 2020-06 | CT#88e | CP-201136 | 2065 |  | F | temporarily and permanently forbidden SNPNs lists per access type | 16.5.0 |
| 2020-06 | CT#88e | CP-201136 | 2066 | 3 | F | storage of counters for UE in SNPN | 16.5.0 |
| 2020-06 | CT#88e | CP-201136 | 2067 | 1 | F | 5G GUTI of SNPN | 16.5.0 |
| 2020-06 | CT#88e | CP-201136 | 2068 |  | F | 5GMM cause value #74 in an SNPN with a globally-unique SNPN identity | 16.5.0 |
| 2020-06 | CT#88e | CP-201136 | 2069 | 2 | F | 5GMM cause value #13 not supporting roaming for SNPN | 16.5.0 |
| 2020-06 | CT#88e | CP-201136 | 2070 |  | F | Clarification of the cause of start of T3550 | 16.5.0 |
| 2020-06 | CT#88e | CP-201102 | 2071 | 2 | F | storage of counters for UE in PLMN | 16.5.0 |
| 2020-06 | CT#88e | CP-201102 | 2072 |  | F | Clarification of the figure of registration procedure | 16.5.0 |
| 2020-06 | CT#88e | CP-201102 | 2074 | 1 | D | Editorial corrections | 16.5.0 |
| 2020-06 | CT#88e | CP-201113 | 2075 |  | F | T3540 is not started if the Registration Accept includes a pending NSSAI | 16.5.0 |
| 2020-06 | CT#88e | CP-201096 | 2077 | 1 | C | Generic UE configuration update trigger for registration and EC Restriction change | 16.5.0 |
| 2020-06 | CT#88e | CP-201127 | 2078 | 1 | F | RACS parameters in generic UE configuration procedure | 16.5.0 |
| 2020-06 | CT#88e | CP-201113 | 2079 | 1 | F | Clarify that NSSAA can occur during periodic registration or mobility updating for NB-N1 mode UEs | 16.5.0 |
| 2020-06 | CT#88e | CP-201113 | 2080 |  | F | Fixing typo related to eNS | 16.5.0 |
| 2020-06 | CT#88e | CP-201113 | 2084 | 1 | F | Alignment of UE actions of rejected NSSAI for the failed or revoked NSSAA | 16.5.0 |
| 2020-06 | CT#88e | CP-201136 | 2087 | 1 | C | Addition of CAG information list in registration reject message. | 16.5.0 |
| 2020-06 | CT#88e | CP-201113 | 2089 | 1 | F | Exception to initiate the service request procedure during NSSAA when there is no allowed NSSAI | 16.5.0 |
| 2020-06 | CT#88e | CP-201113 | 2091 | 1 | F | Missing condition at registration reject due to no available slices | 16.5.0 |
| 2020-06 | CT#88e | CP-201102 | 2093 | 1 | F | Add handling for parameter set to "value is not used" in 5GS | 16.5.0 |
| 2020-06 | CT#88e | CP-201096 | 2094 | 1 | F | Correct UE behavior for receiving 5GMM cause #31 in 5GS | 16.5.0 |
| 2020-06 | CT#88e | CP-201102 | 2095 |  | F | Correct parameters included by AMF during inter-system change from S1 mode to N1 mode in 5GMM-CONNECTED mode | 16.5.0 |
| 2020-06 | CT#88e | CP-201102 | 2096 |  | F | Remove invalid cases in error handling for QoS rule operation and TFT operation | 16.5.0 |
| 2020-06 | CT#88e | CP-201102 | 2098 | 2 | F | Applicable URSP is not optional for a UE | 16.5.0 |
| 2020-06 | CT#88e | CP-201144 | 2100 | 2 | F | Inclusion of NSSAI in AN Parameters for non-3GPP access | 16.5.0 |
| 2020-06 | CT#88e | CP-201102 | 2101 | 1 | F | Additional QoS error handling related to mapped EBI | 16.5.0 |
| 2020-06 | CT#88e | CP-201102 | 2102 | 1 | F | PS Data Off status report for non-3GPP access | 16.5.0 |
| 2020-06 | CT#88e | CP-201102 | 2103 | 1 | D | Unify terms network-initiated and network-requested | 16.5.0 |
| 2020-06 | CT#88e | CP-201102 | 2104 | 1 | F | Network triggered service request procedure over non-3GPP access | 16.5.0 |
| 2020-06 | CT#88e | CP-201096 | 2106 | 3 | F | Avoid repeated redirection for CIoT | 16.5.0 |
| 2020-06 | CT#88e | CP-201096 | 2107 | 2 | F | PDU session release due to CP only revocation | 16.5.0 |
| 2020-06 | CT#88e | CP-201113 | 2108 | 3 | C | Updating Rejected NSSAI IE for failed NSSAA case in roaming scenerios | 16.5.0 |
| 2020-06 | CT#88e | CP-201102 | 2110 |  | F | Consider PDU session type IE set by UE in IP address allocation | 16.5.0 |
| 2020-06 | CT#88e | CP-201116 | 2111 | 1 | F | T3540 for service request for V2X communications | 16.5.0 |
| 2020-06 | CT#88e | CP-201096 | 2112 | 1 | F | Clarification on the UE behaviour when receiving T3448 | 16.5.0 |
| 2020-06 | CT#88e | CP-201096 | 2113 | 2 | F | Connection Resumption for Notification | 16.5.0 |
| 2020-06 | CT#88e | CP-201096 | 2114 | 1 | F | CIoT user or small data container in CPSR message not forwarded | 16.5.0 |
| 2020-06 | CT#88e | CP-201099 | 2115 | 2 | F | Initial Registration after 5G-SRVCC | 16.5.0 |
| 2020-06 | CT#88e | CP-201103 | 2118 |  | F | Fixing a reference in the service request procedure | 16.5.0 |
| 2020-06 | CT#88e | CP-201103 | 2120 | 1 | F | Add MFBR as mandatory parameter in GBR QoS flow | 16.5.0 |
| 2020-06 | CT#88e | CP-201103 | 2121 | 2 | F | Initial registration for initiating emergency PDU session | 16.5.0 |
| 2020-06 | CT#88e | CP-201103 | 2122 | 3 | F | Missing QoS flow description parameters for GBR QoS flows in 5GSM and ESM coordination | 16.5.0 |
| 2020-06 | CT#88e | CP-201196 | 2128 | 4 | F | Sending CAG information list | 16.5.0 |
| 2020-06 | CT#88e | CP-201096 | 2130 | 1 | F | Correction on terminology for the Control plane CIoT 5GS optimization | 16.5.0 |
| 2020-06 | CT#88e | CP-201096 | 2132 | 1 | F | Handling of PDU session and PDN connection associated with Control plane only indication in case of N26 based interworking procedures | 16.5.0 |
| 2020-06 | CT#88e | CP-201136 | 2134 | 1 | F | Non-integrity protected REGISTRATION REJECT message including 5GMM cause #76 | 16.5.0 |
| 2020-06 | CT#88e | CP-201114 | 2135 | 2 | F | NSSAA in an SNPN | 16.5.0 |
| 2020-06 | CT#88e | CP-201139 | 2140 | 3 | F | Correction in the UE behaviour upon failure of the procedures initiated for ESFB | 16.5.0 |
| 2020-06 | CT#88e | CP-201103 | 2141 |  | F | No emergency session transfer after ESFB | 16.5.0 |
| 2020-06 | CT#88e | CP-201103 | 2142 | 2 | F | Indication that the emergency services fallback attempt failed | 16.5.0 |
| 2020-06 | CT#88e | CP-201113 | 2144 | 1 | F | Handling of Pending S-NSSAI | 16.5.0 |
| 2020-06 | CT#88e | CP-201096 | 2145 | 1 | F | QoS error checks for UEs in NB-N1 mode | 16.5.0 |
| 2020-06 | CT#88e | CP-201136 | 2149 | 2 | F | NB-IoT not applicable for SNPN | 16.5.0 |
| 2020-06 | CT#88e | CP-201096 | 2150 | 1 | F | Retransmission of a CPSR message after integrity check failure at the AMF | 16.5.0 |
| 2020-06 | CT#88e | CP-201136 | 2152 | 1 | F | Miscellaneous clean-up for SNPN | 16.5.0 |
| 2020-06 | CT#88e | CP-201136 | 2153 | 2 | F | Service area restrictions in an SNPN | 16.5.0 |
| 2020-06 | CT#88e | CP-201103 | 2154 | 1 | D | Corrections on MICO | 16.5.0 |
| 2020-06 | CT#88e | CP-201136 | 2156 | 3 | F | 5GSM back-off mechanisms in an SNPN | 16.5.0 |
| 2020-06 | CT#88e | CP-201136 | 2157 | 1 | F | UE in the 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE substate operating in SNPN access mode | 16.5.0 |
| 2020-06 | CT#88e | CP-201136 | 2158 | 2 | F | Routing indicator update in an SNPN | 16.5.0 |
| 2020-06 | CT#88e | CP-201136 | 2159 | 1 | F | 3GPP PS data off in an SNPN | 16.5.0 |
| 2020-06 | CT#88e | CP-201103 | 2161 | 1 | F | Correction to conditions for including the S-NSSAI(s) from default NSSAI in the requested NSSAI | 16.5.0 |
| 2020-06 | CT#88e | CP-201096 | 2162 |  | F | Corrections to CR#1907 | 16.5.0 |
| 2020-06 | CT#88e | CP-201096 | 2164 | 1 | B | Signalling of EPS APN rate control parameters during PDU session establishment | 16.5.0 |
| 2020-06 | CT#88e | CP-201283 | 2165 | 3 | B | Ethernet header compression for CP CIoT – 5GMM aspects | 16.5.0 |
| 2020-06 | CT#88e | CP-201109 | 2169 | 1 | F | Editorial fix in 9.11.4 | 16.5.0 |
| 2020-06 | CT#88e | CP-201096 | 2173 |  | F | Acknowledgement of truncated 5G-S-TMSI configuration | 16.5.0 |
| 2020-06 | CT#88e | CP-201096 | 2174 |  | F | NAS-MAC calculation for RRC connection reestablishment for NB-IoT CP optimisation | 16.5.0 |
| 2020-06 | CT#88e | CP-201097 | 2175 |  | F | Removal of Editor's Note for CP congestion control | 16.5.0 |
| 2020-06 | CT#88e | CP-201097 | 2176 | 1 | F | Correction on WUS assistance | 16.5.0 |
| 2020-06 | CT#88e | CP-201136 | 2177 | 1 | F | Non-3GPP access for PLMN and SNPN | 16.5.0 |
| 2020-06 | CT#88e | CP-201136 | 2178 |  | F | No CAG in non-3GPP access | 16.5.0 |
| 2020-06 | CT#88e | CP-201136 | 2179 |  | F | Correction on 5GMM #27 for CAG | 16.5.0 |
| 2020-06 | CT#88e | CP-201114 | 2180 | 2 | F | Clarification on handling of pending NSSAI | 16.5.0 |
| 2020-06 | CT#88e | CP-201114 | 2181 |  | F | Term on rejected NSSAI for the failed or revoked NSSAA | 16.5.0 |
| 2020-06 | CT#88e | CP-201103 | 2182 | 1 | F | Single-registration mode without N26 | 16.5.0 |
| 2020-06 | CT#88e | CP-201103 | 2183 | 1 | F | Handling of unallowed SSC mode | 16.5.0 |
| 2020-06 | CT#88e | CP-201103 | 2184 | 1 | F | UAC exception for emergency | 16.5.0 |
| 2020-06 | CT#88e | CP-201103 | 2185 | 3 | F | MRU after SR for ESFB aborted | 16.5.0 |
| 2020-06 | CT#88e | CP-201103 | 2187 | 1 | F | Correction to criteria to enter 5GMM-REGISTERED.UPDATE-NEEDED substate after resumption failure | 16.5.0 |
| 2020-06 | CT#88e | CP-201103 | 2192 |  | F | Correcting that 5G NAS integrity key is one of the input parameters for integrity protection algorithm | 16.5.0 |
| 2020-06 | CT#88e | CP-201103 | 2193 | 2 | F | Correction to Handling of T3521 timer | 16.5.0 |
| 2020-06 | CT#88e | CP-201103 | 2194 |  | F | Correction to Handling of #31 | 16.5.0 |
| 2020-06 | CT#88e | CP-201097 | 2195 | 1 | F | Correction to handling of T3447 timer | 16.5.0 |
| 2020-06 | CT#88e | CP-201137 | 2196 |  | D | Correct "theregistration" | 16.5.0 |
| 2020-06 | CT#88e | CP-201103 | 2197 |  | F | De-registration before initial registration for Emergency Services | 16.5.0 |
| 2020-06 | CT#88e | CP-201103 | 2198 | 2 | F | Handling of allowed NSSAI when the RA includes the TAI belonging to EPLMN | 16.5.0 |
| 2020-06 | CT#88e | CP-201103 | 2200 |  | F | Corrections on NSSAI storage | 16.5.0 |
| 2020-06 | CT#88e | CP-201103 | 2202 | 1 | F | UE behaviour when the UE receives the rejected NSSAI for the current RA and does not have a valid RA | 16.5.0 |
| 2020-06 | CT#88e | CP-201109 | 2203 | 1 | B | Handlings of MA PDU session when deregistration from an access | 16.5.0 |
| 2020-06 | CT#88e | CP-201103 | 2204 |  | F | Indicate support of ePCO length of two octets parameter when establishing the PDU session – Alt#2 | 16.5.0 |
| 2020-06 | CT#88e | CP-201103 | 2205 | 2 | F | Addition of 5GSM cause #59 | 16.5.0 |
| 2020-06 | CT#88e | CP-201103 | 2214 | 1 | F | Handling of mapped EPS bearer contexts | 16.5.0 |
| 2020-06 | CT#88e | CP-201103 | 2215 | 1 | F | Integrity check interworking in 5GMM-CONNECTED mode | 16.5.0 |
| 2020-06 | CT#88e | CP-201103 | 2216 | 1 | F | Correction on LADN DNN based congestion control | 16.5.0 |
| 2020-06 | CT#88e | CP-201108 | 2218 | 1 | B | Primary authentication of an N5GC device | 16.5.0 |
| 2020-06 | CT#88e | CP-201108 | 2219 |  | F | Stop of enforcement of wireline access service area restrictions and forbidden wireline access area | 16.5.0 |
| 2020-06 | CT#88e |  |  |  |  |  | 16.5.0 |
| 2020-06 | CT#88e | CP-201104 | 2221 |  | F | Incorrect set up of PDN type in inter-system change from S1 mode to N1 mode | 16.5.0 |
| 2020-06 | CT#88e | CP-201109 | 2222 |  | F | Session-AMBR and MA PDU session | 16.5.0 |
| 2020-06 | CT#88e | CP-201109 | 2223 | 1 | F | Introduction of ATSSS | 16.5.0 |
| 2020-06 | CT#88e | CP-201109 | 2224 |  | F | "MA PDU request" when the UE has an MA PDU session established over one access and requests establishment of user plane resources over the other access | 16.5.0 |
| 2020-06 | CT#88e | CP-201104 | 2227 | 1 | F | Mobile Terminated Voice Gap for MPS | 16.5.0 |
| 2020-06 | CT#88e | CP-201114 | 2228 | 1 | F | Adding AAA-S via NSSAAF to support NSSAA | 16.5.0 |
| 2020-06 | CT#88e | CP-201311 | 2229 | 2 | F | Resolve EN for Ciphering Key data IE regarding positioning SIBs | 16.5.0 |
| 2020-06 | CT#88e | CP-201104 | 2230 | 1 | F | MICO indication needs to be included without Network Slicing Subscription Change Indication in UCU. | 16.5.0 |
| 2020-06 | CT#88e | CP-201104 | 2231 | 2 | F | Conditions for use of S-NSSAIs after receiving Rejected NSSAI Conditions for use of S-NSSAIs after receiving Rejected NSSAI | 16.5.0 |
| 2020-06 | CT#88e | CP-201114 | 2232 | 2 | F | Default S-NSSAI not subject to network slice-specific authentication and authorization | 16.5.0 |
| 2020-06 | CT#88e | CP-201114 | 2233 | 3 | F | Performing network slice-specific re-authentication and re-authorisation | 16.5.0 |
| 2020-06 | CT#88e | CP-201114 | 2234 | 2 | F | Storage of pending NSSAI | 16.5.0 |
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| 2020-06 | CT#88e | CP-201104 | 2249 | 1 | F | Change of E-UTRAN UE Capability | 16.5.0 |
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| 2020-06 | CT#88e | CP-201104 | 2270 |  | F | Clarification in state transition of 5GMM-DEREGISTERED from another 5GMM state | 16.5.0 |
| 2020-06 | CT#88e | CP-201104 | 2271 |  | F | Clarification of SMS over NAS supported bit in initial registration | 16.5.0 |
| 2020-06 | CT#88e | CP-201104 | 2272 |  | F | Clarification on missing subclause in 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION | 16.5.0 |
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| 2020-06 | CT#88e | CP-201104 | 2274 |  | F | Clarification regarding update status in NR RAT | 16.5.0 |
| 2020-06 | CT#88e | CP-201104 | 2275 | 1 | F | Correction to paging timer stop in case of integrity check failure | 16.5.0 |
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| 2020-06 | CT#88e | CP-201114 | 2282 | 1 | F | Correction on allowed NSSAI for UE not supporting NSSAA | 16.5.0 |
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| 2020-06 | CT#88e | CP-201104 | 2287 |  | F | Stop back-off timer upon receipt of 5GSM #39 | 16.5.0 |
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| 2020-06 | CT#88e | CP-201105 | 2294 | 1 | F | Correction to 5GMM-DEREGISTERED.NORMAL-SERVICE | 16.5.0 |
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| 2020-06 | CT#88e | CP-201105 | 2341 |  | D | Correction on unclear texts regarding the CONFIGURATION UPDATE COMMAND message | 16.5.0 |
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| 2020-06 | CT#88e | CP-201105 | 2352 | 1 | F | Unify terminology for default S-NSSAIs and subscribed S-NSSAIs marked as default | 16.5.0 |
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| 2020-06 | CT#88e | CP-201105 | 2357 | 1 | F | UE behaviour when receiving allowed NSSAI in CUC | 16.5.0 |
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| 2020-09 | CT#89e | CP-202166 | 2092 | 5 | F | TA change during Authentication procedure in 5GMM-CONNECTED mode | 16.6.0 |
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| 2020-09 | CT#89e | CP-202168 | 2441 |  | F | Removal of Editor's note on inter PLMN mobility under same AMF | 16.6.0 |
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| 2020-09 | CT#89e | CP-202171 | 2459 |  | F | Correction of counters in an SNPN | 16.6.0 |
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| 2020-09 | CT#89e | CP-202153 | 2465 | 1 | F | Correction on unnecessary restriction for modifying/upgrading a PDU session to an MA PDU session | 16.6.0 |
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| 2020-09 | CT#89e | CP-202150 | 2469 | 1 | F | Handling for SR in 5U2 state | 16.6.0 |
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| 2020-09 | CT#89e | CP-202146 | 2473 |  | F | CP data allowed in connected mode in Non-allowed area | 16.6.0 |
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| 2020-09 | CT#89e | CP-202150 | 2492 | 1 | F | CR#2299 clean up: continuity of emergency session upon registration failure | 16.6.0 |
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| 2020-09 | CT#89e | CP-202146 | 2499 | 1 | F | Adding the handling of AMF for case k in the service request procedure | 16.6.0 |
| 2020-09 | CT#89e | CP-202146 | 2502 | 1 | F | UE behavior when the timer T3447 is stopped | 16.6.0 |
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| 2020-09 | CT#89e | CP-202171 | 2507 | 1 | F | #76 cause handling in case of reception of Registration Reject in roaming scenarios | 16.6.0 |
| 2020-09 | CT#89e | CP-202150 | 2509 | 1 | F | Corrections on the error check of QoS rules | 16.6.0 |
| 2020-09 | CT#89e | CP-202171 | 2512 | 1 | F | Add definition of "allowed CAG list" | 16.6.0 |
| 2020-09 | CT#89e | CP-202032 | 2514 | 1 | F | Paging not initiated for PDU session transfer from non-3GPP access when CP CIoT 5GS optimization is being used | 16.6.0 |
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| 2020-09 | CT#89e | CP-202146 | 2540 | 1 | F | Define "emergency services" for Control plane service type in CPSR | 16.6.0 |
| 2020-09 | CT#89e | CP-202122 | 2552 | 4 | F | Type of the N5GC indication information element | 16.6.0 |
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| 2020-09 | CT#89e | CP-202171 | 2562 | 1 | F | Clarification to the usage of last visited registered TAI in SNPN registration | 16.6.0 |
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| 2021-06 | CT#92e | CP-211142 | 3125 | 1 | B | ProSe as a trigger for Service Request procedure | 17.3.0 |
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| 2021-06 | CT#92e | CP-211152 | 3101 | 2 | B | New 5GMM cause for satellite access | 17.3.0 |
| 2021-06 | CT#92e | CP-211152 | 3219 | 2 | B | UE's handling of the indication of country of UE location | 17.3.0 |
| 2021-06 | CT#92e | CP-211152 | 3348 | 1 | B | PDU session establishment for NR satellite access | 17.3.0 |
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| 2021-09 | CT#93e | CP-212129 | 3377 | 1 | B | Clarification of UE status during registration procedure for onboarding | 17.4.0 |
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| 2021-09 | CT#93e | CP-212131 | 3438 | 1 | B | Resolving the Editor's note related to Paging Rejection for MUSIM UE in 5GS | 17.4.0 |
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| 2021-09 | CT#93e | CP-212132 | 3559 | 1 | B | AMF handling on NSAC based on EAC mode | 17.4.0 |
| 2021-09 | CT#93e | CP-212132 | 3535 | 1 | F | Clarification on rejected NSSAI term | 17.4.0 |
| 2021-09 | CT#93e | CP-212132 | 3534 | - | F | Stop associated back-off timer when remove S-NSSAI from rejected NSSAI for the maximum number of UEs reached | 17.4.0 |
| 2021-09 | CT#93e | CP-212132 | 3517 | 1 | F | Removal of unnecessary ENs | 17.4.0 |
| 2021-09 | CT#93e | CP-212132 | 3516 | 1 | B | Clarify mobility management based on NSAC per access type independently | 17.4.0 |
| 2021-09 | CT#93e | CP-212142 | 3361 | - | F | Removal of CR3100r3 (C1-213895) (MCC list for 5GMM message) | 17.4.0 |
| 2021-09 | CT#93e | CP-212132 | 3515 | 1 | B | Clarification of mobility management based NSAC for roaming case | 17.4.0 |
| 2021-09 | CT#93e | CP-212132 | 3468 | 1 | B | Update to session management based NSAC | 17.4.0 |
| 2021-09 | CT#93e | CP-212132 | 3467 | 1 | F | Clarification on network behavior when all S-NSSAIs included in the requested NSSAI are rejected | 17.4.0 |
| 2021-09 | CT#93e | CP-212132 | 3417 | 1 | F | Update the description of NSAC about SNPN | 17.4.0 |
| 2021-09 | CT#93e | CP-212132 | 3416 | 1 | C | Resolution of an EN about pre-Rel-17 UE on NSAC | 17.4.0 |
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| 2021-09 | CT#93e | CP-212133 | 3523 | 1 | F | Update of general section for ID\_UAS | 17.4.0 |
| 2021-09 | CT#93e | CP-212133 | 3522 | 1 | B | Multiple round-trip of AA messages during UUAA-SM | 17.4.0 |
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| 2021-09 | CT#93e | CP-212133 | 3418 | 1 | B | PDU session establishment request for UAS services | 17.4.0 |
| 2021-09 | CT#93e | CP-212133 | 3406 | 2 | B | NW initiated de-registration upon failure of ongoing UUAA-MM | 17.4.0 |
| 2021-09 | CT#93e | CP-212134 | 3486 | - | F | Add the missing description on ProSe under avoiding double barring | 17.4.0 |
| 2021-09 | CT#93e | CP-212134 | 3430 | 1 | F | Requesting ProSe resources as a trigger for Service Request procedure | 17.4.0 |
| 2021-09 | CT#93e | CP-212134 | 3426 | 1 | B | Introducing the Remote UE report procedure | 17.4.0 |
| 2021-09 | CT#93e | CP-212134 | 3420 | 1 | F | Resuming a connection due to ProSe discovery/communication over PC5 | 17.4.0 |
| 2021-09 | CT#93e | CP-212136 | 3386 | 1 | B | EAS rediscovery | 17.4.0 |
| 2021-09 | CT#93e | CP-212136 | 3385 | 1 | B | (Re)configuring DNS server addresses | 17.4.0 |
| 2021-09 | CT#93e | CP-212139 | 3399 | 1 | B | Network-requested PDU session modification procedure to be used for removing joined UE from MBS session(s) | 17.4.0 |
| 2021-09 | CT#93e | CP-212139 | 3395 | 1 | B | Introducing the MBS join and leave procedures | 17.4.0 |
| 2021-09 | CT#93e | CP-212139 | 3394 | 1 | B | Adding MBS join and Leave as purposes of the UE-requested PDU session modification procedure | 17.4.0 |
| 2021-09 | CT#93e | CP-212139 | 3370 | 2 | B | Multicast join procedure - Alt.1 | 17.4.0 |
| 2021-09 | CT#93e | CP-212139 | 3369 | 1 | C | Paging with TMGI for multicast services | 17.4.0 |
| 2021-09 | CT#93e | CP-212140 | 3529 | 1 | F | Correction on value of UE radio capability ID deletion indication IE | 17.4.0 |
| 2021-09 | CT#93e | CP-212140 | 3527 | 1 | F | Sending P-CSCF address(es) | 17.4.0 |
| 2021-09 | CT#93e | CP-212140 | 3457 | - | F | Incorrect reference in subclause 6.2.16 | 17.4.0 |
| 2021-09 | CT#93e | CP-212140 | 3453 | - | D | Editorial corrections | 17.4.0 |
| 2021-09 | CT#93e | CP-212140 | 3423 | - | F | Add handling of 5GMM cause #76 when UE does not have any stored CAG information list | 17.4.0 |
| 2021-09 | CT#93e | CP-212141 | 3525 | - | D | Corrected S-NSSAI SST for SOR-CMCI | 17.4.0 |
| 2021-09 | CT#93e | CP-212141 | 3365 | 1 | B | Alignments for the introduction of SOR-CMCI | 17.4.0 |
| 2021-09 | CT#93e | CP-212143 | 3452 | - | F | Resolving the Editor's note in AKMA procedure related to K\_AUSF change after 5G AKA based primary authentication | 17.4.0 |
| 2021-09 | CT#93e | CP-212152 | 3483 | - | D | Superfluous description | 17.4.0 |
| 2021-09 | CT#93e | CP-212152 | 3482 | - | F | Non-IP MTU request in the PDU session establishment procedure | 17.4.0 |
| 2021-09 | CT#93e | CP-212152 | 3478 | - | F | Handling of multiple S-TAGs in the Ethernet header | 17.4.0 |
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| 2022-12 | CT#98e | CP-223158 | 4502 | 4 | F | Cause #62 handling in case of "S-NSSAI not available in the current registration area" | 18.1.0 |
| 2022-12 | CT#98e | CP-223158 | 4506 | 3 | F | Using UE local configuration for default DNN and S-NSSAI | 18.1.0 |
| 2022-12 | CT#98e | CP-223158 | 4579 | 2 | F | Clarification on the SD value in Rejected NSSAI | 18.1.0 |
| 2022-12 | CT#98e | CP-223122 | 4642 | 2 | A | Editor's note in 6.4.1.2 | 18.1.0 |
| 2022-12 | CT#98e | CP-223122 | 4643 | 2 | A | Editor's note in subclause 5.3.2 | 18.1.0 |
| 2022-12 | CT#98e | CP-223158 | 4644 | 3 | D | Re-use of S-NSSAI after removal of S-NSSAI from rejected NSSAI. | 18.1.0 |
| 2022-12 | CT#98e | CP-223136 | 4652 | 1 | A | Correction to the NSAG priority field reference | 18.1.0 |
| 2022-12 | CT#98e | CP-223116 | 4654 | 1 | A | Correction to PDU session types | 18.1.0 |
| 2022-12 | CT#98e | CP-223158 | 4656 | 1 | F | Added further clarification in handling of T3502, T3346 in SNPN. | 18.1.0 |
| 2022-12 | CT#98e | CP-223116 | 4658 | 2 | A | Correction to the CONFIGURATION UPDATE COMMAND message | 18.1.0 |
| 2022-12 | CT#98e | CP-223158 | 4660 | 1 | F | Clarification on packet filter in signalled QoS rule | 18.1.0 |
| 2022-12 | CT#98e | CP-223158 | 4661 |  | F | Correction to the PDU session modification for LADN | 18.1.0 |
| 2022-12 | CT#98e | CP-223158 | 4662 |  | F | Correction to QoS rules IE | 18.1.0 |
| 2022-12 | CT#98e | CP-223158 | 4663 | 1 | F | Correction to default NSSAI inclusion mode | 18.1.0 |
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| 2022-12 | CT#98e | CP-223136 | 4666 |  | A | Correction to NSAG default area | 18.1.0 |
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| 2022-12 | CT#98e | CP-223158 | 4696 | 1 | F | Correction on semantic error about UL PF of TFT | 18.1.0 |
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| 2022-12 | CT#98e | CP-223158 | 4714 |  | Fa | Clarification on condition of sending 5GMM cause #62 | 18.1.0 |
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| 2022-12 | CT#98e | CP-223118 | 4963 | 1 | B | Rejecting the UE Registration due to the selected N3IWF by the UE is not compatible with the used slices | 18.1.0 |
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| 2022-12 | CT#98e | CP-223144 | 4965 | 1 | F | Adding missing Abbreviations and other miscellaneous corrections in TS 24.501 | 18.1.0 |
| 2022-12 | CT#98e | CP-223160 | 4968 | 1 | F | UE behavior when an always-on PDU sessioin is subject to ODAC | 18.1.0 |
| 2022-12 | CT#98e | CP-223115 | 4971 |  | A | Correction of IEI values | 18.1.0 |
| 2022-12 | CT#98e | CP-223279 | 4973 | 3 | A | Notification of change of aerial service availability to the UE | 18.1.0 |
| 2023-03 | CT#99 | [CP-230265](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230265) | 4977 | - | B | Enhanced CAG selection - enforcement in successful cases | 18.2.0 |
| 2023-032022-12 | CT#99 | [CP-230265](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230265) | 4978 | - | B | Enhanced CAG selection - enforcement in unsuccessful cases | 18.2.0 |
| 2023-03 | CT#99 | [CP-230220](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230220) | 4995 | - | D | Editorial corrections | 18.2.0 |
| 2023-03 | CT#99 | [CP-230260](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230260) | 5011 | - | B | General updates for LADN per DNN & S-NSSAI | 18.2.0 |
| 2023-03 | CT#99 | [CP-230217](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230217) | 5021 | - | F | Correction to the coding of N3IWF address IE | 18.2.0 |
| 2023-03 | CT#99 | [CP-230252](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230252) | 5024 | - | B | IPv6 prefix delegation in 5GS | 18.2.0 |
| 2023-03 | CT#99 | [CP-230231](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230231) | 5025 | - | B | Equivalent SNPNs: 5GS forbidden tracking areas in TS 24.501 | 18.2.0 |
| 2023-03 | CT#99 | [CP-230219](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230219) | 5027 | - | B | Equivalent SNPNs: NSSAIs, network-assigned UE radio capability ID, maximum number of established PDU sessions and 5GMM parameters in annex C stored per selected entry | 18.2.0 |
| 2023-03 | CT#99 | [CP-230219](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230219) | 5028 | - | B | Equivalent SNPNs: entry of list of subscriber data becoming invalid | 18.2.0 |
| 2023-03 | CT#99 | [CP-230214](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230214) | 5033 | - | A | Fix encoding of 5QI 87 | 18.2.0 |
| 2023-03 | CT#99 | [CP-230215](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230215) | 5041 | - | F | Clarification on PDU session type in PDU session establishment request | 18.2.0 |
| 2023-03 | CT#99 | [CP-230215](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230215) | 5052 | - | F | Corrections to TAI list handling in deregistration and FTAI storing | 18.2.0 |
| 2023-03 | CT#99 | [CP-230224](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230224) | 5055 | - | A | Correction of implementation error of CR4615 | 18.2.0 |
| 2023-03 | CT#99 | [CP-230250](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230250) | 5074 | - | F | Clarification on determination of T3512 value based on unavailability period duration | 18.2.0 |
| 2023-03 | CT#99 | [CP-230285](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230285) | 5075 | - | F | NSAC applicability in SNPN | 18.2.0 |
| 2023-03 | CT#99 | [CP-230285](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230285) | 5076 | - | F | Correction on reference of S-NSSAI inclusion in ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message | 18.2.0 |
| 2023-03 | CT#99 | [CP-230219](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230219) | 5082 | - | F | Correction on the equivalent SNPNs | 18.2.0 |
| 2023-03 | CT#99 | [CP-230219](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230219) | 5085 | - | F | Correction on the equivalent SNPNs usage for congestion control | 18.2.0 |
| 2023-03 | CT#99 | [CP-230214](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230214) | 5090 | - | A | Correction of incomplete implementation of CR4380 (C1-224129) | 18.2.0 |
| 2023-03 | CT#99 | [CP-230250](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230250) | 5103 | - | F | Abnormal case handling for registration procedure due to Unavailability period duaration | 18.2.0 |
| 2023-03 | CT#99 | [CP-230217](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230217) | 5119 | - | B | Aborting registration procedure when the selected N3IWF is not compatible with the allowed NSSAI | 18.2.0 |
| 2023-03 | CT#99 | [CP-230217](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230217) | 5120 | - | F | Correction for N3IWF identifier IE | 18.2.0 |
| 2023-03 | CT#99 | [CP-230285](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230285) | 5152 |  | F | Store the rejected NSSAI for failed or revoked NSSAA associated with EPLMN | 18.2.0 |
| 2023-03 | CT#99 | [CP-230285](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230285) | 5153 |  | F | Handing pending paging message if access attempt for registration procedure is barred | 18.2.0 |
| 2023-03 | CT#99 | [CP-230278](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230278) | 4983 | 1 | B | Equivalent SNPNs: error cases and abnormal cases | 18.2.0 |
| 2023-03 | CT#99 | [CP-230219](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230219) | 5026 | 1 | B | Equivalent SNPNs: forbidden SNPNs in TS 24.501 | 18.2.0 |
| 2023-03 | CT#99 | [CP-230232](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230232) | 5078 | 1 | A | UE and AMF comply with NSSRG restriction across different access types over the same PLMN and different PLMNs | 18.2.0 |
| 2023-03 | CT#99 | [CP-230271](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230271) | 5125 | 1 | A | Correction for SNN related to 5G NSWO | 18.2.0 |
| 2023-03 | CT#99 | [CP-230307](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230307) | 5073 | 1 | A | Clarification on NSAG information validity when TAI list is absent | 18.2.0 |
| 2023-03 | CT#99 | [CP-230214](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230214) | 4993 | 1 | A | 5GMM IEI Duplicated in Registration Accept | 18.2.0 |
| 2023-03 | CT#99 | [CP-230312](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230312) | 5128 | 1 | A | Impact on network and relay UE behaviour when CP-PRUK is not found | 18.2.0 |
| 2023-03 | CT#99 | [CP-230236](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230236) | 5037 | 1 | F | Added DNN and S-NSSAI as indication for UUAA-SM and C2 authorization | 18.2.0 |
| 2023-03 | CT#99 | [CP-230307](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230307) | 5164 | 2 | A | Correction of misimplementation of CR 4883, 4665, and 4678 (Rel 18) | 18.2.0 |
| 2023-03 | CT#99 | [CP-230311](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230311) | 5112 | 4 | F | Forbidden lists handling due to SNPN mode switch. | 18.2.0 |
| 2023-03 | CT#99 | [CP-230215](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230215) | 5016 | 2 | F | Correction on NAS signalling connection | 18.2.0 |
| 2023-03 | CT#99 | [CP-230215](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230215) | 4991 | 2 | F | Clarification on UE policy part contents | 18.2.0 |
| 2023-03 | CT#99 | [CP-230215](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230215) | 5017 | 1 | F | Correction on Back-off timer value IE conditions in network-initiated NAS transport procedure | 18.2.0 |
| 2023-03 | CT#99 | [CP-230219](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230219) | 5084 | 1 | F | The equivalent SNPNs usage for access identities | 18.2.0 |
| 2023-03 | CT#99 | [CP-230214](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230214) | 5010 | 2 | F | No PDU session release for non-current access | 18.2.0 |
| 2023-03 | CT#99 | [CP-230217](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230217) | 5002 | 1 | F | Correction N3IWF address information element | 18.2.0 |
| 2023-03 | CT#99 | [CP-230210](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230210) | 5015 | 1 | B | User plane positioning capability indication | 18.2.0 |
| 2023-03 | CT#99 | [CP-230278](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230278) | 4985 | 1 | B | Equivalent SNPNs: MPS and MCS indicators | 18.2.0 |
| 2023-03 | CT#99 | [CP-230219](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230219) | 5063 | 1 | F | The AMF shall not provide equivalent SNPN/PLMN list when the UE is registered in PLMN/SNPN | 18.2.0 |
| 2023-03 | CT#99 | [CP-230310](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230310) | 4982 | 1 | B | Equivalent SNPNs: LADN service area | 18.2.0 |
| 2023-03 | CT#99 | [CP-230278](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230278) | 4981 | 1 | B | Equivalent SNPNs: service area restrictions | 18.2.0 |
| 2023-03 | CT#99 | [CP-230278](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230278) | 4984 | 1 | B | Equivalent SNPNs: applicability of network-assigned UE radio capability ID, NSSAI inclusion mode IE and operator-defined access category definitions | 18.2.0 |
| 2023-03 | CT#99 | [CP-230278](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230278) | 5014 | 1 | F | Term definition for SNPN access mode | 18.2.0 |
| 2023-03 | CT#99 | [CP-230218](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230218) | 4944 | 3 | B | Support for UE accessing SNPN services using non-3GPP access | 18.2.0 |
| 2023-03 | CT#99 | [CP-230217](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230217) | 5121 | 1 | B | UE to indicate its support for Slice-based TNGF selection to the network | 18.2.0 |
| 2023-03 | CT#99 | [CP-230217](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230217) | 5122 | 1 | B | Aborting registration procedure when the selected TNGF is not compatible with the allowed NSSAI | 18.2.0 |
| 2023-03 | CT#99 | [CP-230217](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230217) | 5123 | 1 | B | Introducing the TNAN information IE | 18.2.0 |
| 2023-03 | CT#99 | [CP-230217](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230217) | 5020 | 1 | F | Correction to the IP address type and minor fixes on N3IWF address IE | 18.2.0 |
| 2023-03 | CT#99 | [CP-230250](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230250) | 4999 | - | B | UE initiated de-registration procedure for Unavailability Period | 18.2.0 |
| 2023-03 | CT#99 | [CP-230250](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230250) | 5053 | 1 | B | Handling UE NAS timers in duration of unavailability period | 18.2.0 |
| 2023-03 | CT#99 | [CP-230254](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230254) | 5061 | 1 | B | Instructing a UE to reconnect to the network upon receiving an indication of a change in the RAN timing synchronization status | 18.2.0 |
| 2023-03 | CT#99 | [CP-230260](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230260) | 5012 | 1 | B | 5GMM procedure updates for LADN per DNN & S-NSSAI | 18.2.0 |
| 2023-03 | CT#99 | [CP-230262](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230262) | 5081 | 1 | B | Introduction of general aspects of PIN | 18.2.0 |
| 2023-03 | CT#99 | [CP-230220](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230220) | 4989 | 2 | F | Missing message in the inclusion criteria of Additional 5G security information | 18.2.0 |
| 2023-03 | CT#99 | [CP-230265](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230265) | 4976 | 1 | B | Enhanced CAG selection - providing additional information | 18.2.0 |
| 2023-03 | CT#99 | [CP-230257](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230257) | 5003 | 1 | B | Update UE handling of the MA PDU session | 18.2.0 |
| 2023-03 | CT#99 | [CP-230257](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230257) | 5138 | 1 | B | Redundant steering mode is not applicable for ATSSS-LL functionality (impact on TS 24.501) | 18.2.0 |
| 2023-03 | CT#99 | [CP-230264](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230264) | 5008 | 1 | B | UE capability indication to the network for A2X | 18.2.0 |
| 2023-03 | CT#99 | [CP-230260](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230260) | 5013 | 1 | B | 5GSM procedure updates for LADN per DNN & S-NSSAI | 18.2.0 |
| 2023-03 | CT#99 | [CP-230215](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230215) | 5004 | 1 | F | Use default configured NSSAI because of no configured NSSAI | 18.2.0 |
| 2023-03 | CT#99 | [CP-230215](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230215) | 4867 | 3 | F | Clarification to the Mapped EPS bearer contexts | 18.2.0 |
| 2023-03 | CT#99 | [CP-230215](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230215) | 5031 | 1 | B | Protocol error handling enhancements for Type 6 IE container IEs | 18.2.0 |
| 2023-03 | CT#99 | [CP-230215](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230215) | 5047 | 1 | F | Extended CAG information list in CONFIGURATION UPDATE COMMAND | 18.2.0 |
| 2023-03 | CT#99 | [CP-230285](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230285) | 5091 | 1 | F | UE handling for cause78 in DL NAS TRANSPORT and connection management | 18.2.0 |
| 2023-03 | CT#99 | [CP-230236](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230236) | 5135 | 1 | A | Rejecting PDU session for C2 communication when UAS service is not allowed | 18.2.0 |
| 2023-03 | CT#99 | [CP-230285](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230285) | 5093 | 1 | F | Clarification on remote UE ID | 18.2.0 |
| 2023-03 | CT#99 | [CP-230215](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230215) | 4998 | 1 | F | UE-requested PDU session modification after inter-system change from S1 mode to N1 mode | 18.2.0 |
| 2023-03 | CT#99 | [CP-230215](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230215) | 5044 | 1 | F | Support for S-NSSAI(s) added in S1 mode without NSSRG Information | 18.2.0 |
| 2023-03 | CT#99 | [CP-230220](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230220) | 5049 | 1 | F | MBS handling in abnormal and PDU session rejection cases | 18.2.0 |
| 2023-03 | CT#99 | [CP-230258](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230258) | 5069 | 1 | B | General introduction of network slice replacement | 18.2.0 |
| 2023-03 | CT#99 |  | 5070 | 1 | B | Support of network slice replacement during registration procedure | 18.2.0 |
| 2023-03 | CT#99 | [CP-230258](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230258) | 5071 | 1 | B | Support of network slice replacement during UCU procedure | 18.2.0 |
| 2023-03 | CT#99 | [CP-230278](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230278) | 4996 | 1 | F | Equivalent SNPNs: identification | 18.2.0 |
| 2023-03 | CT#99 | [CP-230278](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230278) | 4997 | 1 | F | Equivalent SNPNs: 5G-GUTI selection | 18.2.0 |
| 2023-03 | CT#99 | [CP-230219](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230219) | 5029 | 1 | B | Equivalent SNPNs: last visited TAI | 18.2.0 |
| 2023-03 | CT#99 | [CP-230215](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230215) | 5007 | 1 | F | NSSAI applicable to equivalent PLMNs in registration area | 18.2.0 |
| 2023-03 | CT#99 | [CP-230285](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230285) | 5154 | 1 | F | Start T3540 upon receiving #22 along with a T3346 value | 18.2.0 |
| 2023-03 | CT#99 | [CP-230285](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230285) | 5019 | 1 | F | Correction to NSAG | 18.2.0 |
| 2023-03 | CT#99 | [CP-230215](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230215) | 5045 | 1 | F | NSAG and lower layer failure | 18.2.0 |
| 2023-03 | CT#99 | [CP-230215](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230215) | 5060 | 2 | F | No transfer of LADN PDU session to S1 mode | 18.2.0 |
| 2023-03 | CT#99 | [CP-230232](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230232) | 4910 | 6 | F | Handling of pending NSSAI in NSSRG procedure-option 1 | 18.2.0 |
| 2023-03 | CT#99 | [CP-230219](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230219) | 5087 | 2 | B | The enhancement on onboarding services in SNPN supporting localized services | 18.2.0 |
| 2023-03 | CT#99 | [CP-230219](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230219) | 5113 | 2 | F | Extending Re-attempt indicator IE & 5GSM congestion re-attempt indicator IE for equivalent SNPN | 18.2.0 |
| 2023-03 | CT#99 | [CP-230219](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230219) | 5118 | 4 | F | Save NID value of registered SNPN in NV memory. | 18.2.0 |
| 2023-03 | CT#99 | [CP-230219](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230219) | 5116 | 3 | F | Mobility registration update for SNPNs. | 18.2.0 |
| 2023-03 | CT#99 | [CP-230285](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230285) | 5114 | 2 | F | Deletion of 5GS forbidden tracking areas for roaming added due to rejected S-NSSAI | 18.2.0 |
| 2023-03 | CT#99 | [CP-230254](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230254) | 5056 | 2 | B | Indication of support for reconnection to the network due to RAN timing synchronization status change via the 5GMM capability IE | 18.2.0 |
| 2023-03 | CT#99 | [CP-230214](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230214) | 5107 | 3 | A | Update MPS indicator in CUC message R18 | 18.2.0 |
| 2023-03 | CT#99 | [CP-230234](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230234) | 5117 | 2 | B | Add new indication on the UE support of URSP Provisioning in EPS | 18.2.0 |
| 2023-03 | CT#99 | [CP-230219](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230219) | 5097 | 3 | B | Equivalent SNPN information provided to lower layers for cell reselection | 18.2.0 |
| 2023-03 | CT#99 | [CP-230215](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230215) | 4994 | 2 | B | Type 6 IE container | 18.2.0 |
| 2023-03 | CT#99 | [CP-230307](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230307) | 5058 | 2 | A | Slices provided to the lower layers for NSAG | 18.2.0 |
| 2023-03 | CT#99 | [CP-230219](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230219) | 5036 | 3 | B | CH controlled prioritized list of preferred SNPNs and GINs for access for localized services in SNPN | 18.2.0 |
| 2023-03 | CT#99 | [CP-230257](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-230257) | 5165 | 2 | B | Capability for MPQUIC Steering Functionality | 18.2.0 |
| 2023-03 | CT#99 |  |  |  |  | Correction of Formatting errors and mis implementation | 18.2.1 |
| 2023-06 | CT#100 | CP-231216 | 5167 | - | F | Inconsistent description of UE policy section management list IE | 18.3.0 |
| 2023-06 | CT#100 | CP-231240 | 5181 | - | F | Use defined term Alternative NSSAI | 18.3.0 |
| 2023-06 | CT#100 | CP-231216 | 5182 | - | F | UE behaviour after receiving rejected NSSAI | 18.3.0 |
| 2023-06 | CT#100 | CP-231277 | 5050 | 1 | B | Transmission of A2X Policy | 18.3.0 |
| 2023-06 | CT#100 | CP-231216 | 5198 | - | F | Remove the NOTE not applicable to SNPN scenario | 18.3.0 |
| 2023-06 | CT#100 | CP-231219 | 5199 | - | F | Remove NSWO from abbreviation list | 18.3.0 |
| 2023-06 | CT#100 | CP-231216 | 5202 | - | F | Correcting few errors in UE handing of QoS rules | 18.3.0 |
| 2023-06 | CT#100 | CP-231232 | 5218 | - | F | NF name correction for UUAA-MM | 18.3.0 |
| 2023-06 | CT#100 | CP-231232 | 5219 | - | F | Correction on referred table No. to 24.008 | 18.3.0 |
| 2023-06 | CT#100 | CP-231216 | 5233 | - | F | Correction of Paging Subgroup ID value | 18.3.0 |
| 2023-06 | CT#100 | CP-231216 | 5224 | 1 | F | Clarification on UE policy part contents length | 18.3.0 |
| 2023-06 | CT#100 | CP-231216 | 5295 | - | F | NW handling when treating an MRU as an initial registration | 18.3.0 |
| 2023-06 | CT#100 | CP-231216 | 5298 | - | F | Correction to handling of FTAI list on receiving #62 | 18.3.0 |
| 2023-06 | CT#100 | CP-231238 | 5303 | - | F | Clarification on Emergency PDU session release | 18.3.0 |
| 2023-06 | CT#100 | CP-231228 | 5312 | - | B | AMF to indicate the capability of supporting non-3GPP access path switching | 18.3.0 |
| 2023-06 | CT#100 | CP-231228 | 5313 | - | B | UE to indicate the capability of supporting non-3GPP access path switching | 18.3.0 |
| 2023-06 | CT#100 | CP-231221 | 5320 | - | B | Indicating Uplink data status IE in REGISTRATION REQUEST message after failure of resumption of the RRC connection for UE that has joined Multicast session | 18.3.0 |
| 2023-06 | CT#100 | CP-231304 | 5225 | 2 | B | Ranging capability over NAS | 18.3.0 |
| 2023-06 | CT#100 | CP-231277 | 5250 | 1 | B | AMF should not release NAS signalling after Registration procedure if the UE is authorized A2X | 18.3.0 |
| 2023-06 | CT#100 | CP-231216 | 5272 | 1 | F | Not include uplink data status IE in mobility registration procedure | 18.3.0 |
| 2023-06 | CT#100 | CP-231216 | 5279 | 1 | F | Clearing maximum number of PDU sessions | 18.3.0 |
| 2023-06 | CT#100 | CP-231216 | 5332 | 1 | F | TAIs belonging to different PLMNs which are equivalent PLMNs in forbidden tracking areas for regional provision of service or forbidden tracking areas for roaming | 18.3.0 |
| 2023-06 | CT#100 | CP-231240 | 5176 | 1 | B | Mobility management for the support of optimised handling of temporarily available network slices | 18.3.0 |
| 2023-06 | CT#100 | CP-231216 | 5274 | 1 | F | No need to include rejected NSSAI for 5GMM causes other than #62 | 18.3.0 |
| 2023-06 | CT#100 | CP-231223 | 5309 | 1 | F | Adding reject cause values #81 and #82 under the Annex A | 18.3.0 |
| 2023-06 | CT#100 | CP-231207 | 5323 | 1 | F | Support of PRUs in NAS transport procedure | 18.3.0 |
| 2023-06 | CT#100 | CP-231240 | 5205 | 2 | B | Indication of partial network slice support in a registration area when registering | 18.3.0 |
| 2023-06 | CT#100 | CP-231216 | 5186 | 2 | F | Enabling UE to send UE STATE INDICATION message even when UE does not have stored UE policy sections - Option B | 18.3.0 |
| 2023-06 | CT#100 | CP-231240 | 5329 | 1 | B | Capability indication to support of network slice usage control | 18.3.0 |
| 2023-06 | CT#100 | CP-231216 | 5171 | 1 | F | Correction of handling of the PDU session reactivation result error cause | 18.3.0 |
| 2023-06 | CT#100 | CP-231276 | 5192 | 1 | F | MRU for RAN timing synchronization status change | 18.3.0 |
| 2023-06 | CT#100 | CP-231245 | 5188 | 1 | F | Correction to LADN restriction for UE to create PDU session | 18.3.0 |
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| 2023-09 | CT#101 | CP-232187 | 5553 | 1 | F | Update the definition of network slicing information | 18.4.0 |
| 2023-09 | CT#101 | CP-232187 | 5555 | 1 | F | PDU session re-establishment on the alternative S-NSSAI | 18.4.0 |
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| 2023-09 | CT#101 | CP-232187 | 5505 | 1 | F | Correction of 5GMM aspects of NS-AoS | 18.4.0 |
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| 2023-09 | CT#101 | CP-232187 | 5519 | 1 | F | Correction on S-NSSAI location validity information | 18.4.0 |
| 2023-09 | CT#101 | CP-232187 | 5559 | 1 | F | Service request as per S-NSSAI location validity information | 18.4.0 |
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| 2023-09 | CT#101 | CP-232188 | 5534 | 1 | F | Correction to clause reference to Mobility management for partial network slice | 18.4.0 |
| 2023-09 | CT#101 | CP-232188 | 5564 | 1 | F | Further clarification on partially allowed NSSAI and NSSAA | 18.4.0 |
| 2023-09 | CT#101 | CP-232188 | 5565 | 1 | F | Clarification on partially allowed NSSAI and NSAC | 18.4.0 |
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| 2023-12 | CT#102 | CP-233141 | 5666 | 1 | F | Correction on starting timer T3540 if indicate re-registration required | 18.5.0 |
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| 2023-12 | CT#102 | CP-233162 | 5795 | 1 | B | Handling of equivalent SNPN for localized services | 18.5.0 |
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| 2023-12 | CT#102 | CP-233141 | 5800 | 1 | F | Clarification of the UE behavior disabling N1 mode capability | 18.5.0 |
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| 2024-03 | CT#103 | CP-240095 | 6114 | - | F | Correction to encoding of unavailability configuration | 18.6.0 |
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| 2024-03 | CT#103 | CP-240095 | 5928 | 6 | F | Clarification on the unavailability period | 18.6.0 |
| 2024-03 | CT#103 | CP-240095 | 6115 | 4 | F | Correction on support for unavailability period | 18.6.0 |
| 2024-03 | CT#103 | CP-240128 | 6065 | 3 | F | LADN Provisioning when there is existing PDU session | 18.6.0 |
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| 2024-03 | CT#103 | CP-240106 | 5989 | 3 | F | PDU Session management when the UE is outside the area of slice support or availability | 18.6.0 |
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| 2024-03 | CT#103 | CP-240294 | 6008 | 3 | F | Correction to timers handling in unavailability period | 18.6.0 |
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| 2024-06 | CT#104 | CP-241176 | 6158 | - | F | Congestion handling for SNPN providing access for localized services in SNPN | 18.7.0 |
| 2024-06 | CT#104 | CP-241177 | 6167 | - | D | Removal of duplicated paragraph for on-demand NSSAI in initial registration | 18.7.0 |
| 2024-06 | CT#104 | CP-241177 | 6171 | - | F | SMF performs NSAC for replaced S-NSSAI and alternative S-NSSAI | 18.7.0 |
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| 2024-06 | CT#104 | CP-241161 | 6203 | - | F | Correction on N1 mode capability handling during SoR procedure in connected mode | 18.7.0 |
| 2024-06 | CT#104 | CP-241163 | 6212 | - | F | Correction for the Start of the unavailability period | 18.7.0 |
| 2024-06 | CT#104 | CP-241161 | 6216 | - | F | Clarification for AMF behaviour on UE location verification for satellite access | 18.7.0 |
| 2024-06 | CT#104 | CP-241203 | 6223 | - | D | Editorial correction for MBSR | 18.7.0 |
| 2024-06 | CT#104 | CP-241177 | 6147 | 1 | F | Correction to the CONFIGURATION UPDATE COMMAND message | 18.7.0 |
| 2024-06 | CT#104 | CP-241177 | 6173 | 1 | F | Correction on CIoT user data transmission for network slice with NS-AoS and partial network slice | 18.7.0 |
| 2024-06 | CT#104 | CP-241177 | 6175 | 1 | F | Inclusion of Allowed PDU session status IE considering S-NSSAI location validity information | 18.7.0 |
| 2024-06 | CT#104 | CP-241177 | 6217 | 1 | F | Correction on the parameter name in the S-NSSAI time validity information IE | 18.7.0 |
| 2024-06 | CT#104 | CP-241177 | 6150 | 1 | F | Correcting requirements for emergency services and the network slice usage control for the S-NSSAI | 18.7.0 |
| 2024-06 | CT#104 | CP-241177 | 6177 | 1 | F | Term definition for on-demand S-NSSAI and on-demand NSSAI | 18.7.0 |
| 2024-06 | CT#104 | CP-241175 | 6153 | 1 | F | SOR-SNPN-SI and SOR-SNPN-SI-SL indicators set in UL NAS transport | 18.7.0 |
| 2024-06 | CT#104 | CP-241176 | 6221 | 1 | F | Reference corrections in SNPN clause | 18.7.0 |
| 2024-06 | CT#104 | CP-241165 | 6136 | 1 | F | Handling of abnormal cases of cause 81 and 82 | 18.7.0 |
| 2024-06 | CT#104 | CP-241165 | 6192 | 1 | F | Definitions and abbreviations for NAUN3 device and AUN3 device | 18.7.0 |
| 2024-06 | CT#104 | CP-241178 | 6206 | 1 | F | URSP rule enforcement reporting after an inter-system change from S1 mode to N1 mode | 18.7.0 |
| 2024-06 | CT#104 | CP-241163 | 6164 | 1 | F | Consideration of discontinuous coverage maximum time offset for determination of periodic T3512 timer. | 18.7.0 |
| 2024-06 | CT#104 | CP-241161 | 6166 | 1 | F | Tsense timer handling for MICO mode | 18.7.0 |
| 2024-06 | CT#104 | CP-241163 | 6201 | 1 | F | Updation of the initial registration accept handling for the start of unavailability period time. | 18.7.0 |
| 2024-06 | CT#104 | CP-241163 | 6215 | 1 | F | Clarification on the unavailability case in registration procedure | 18.7.0 |
| 2024-06 | CT#104 | CP-241167 | 6185 | 1 | F | Corrections to NAS transport for Non-3GPP access path switching | 18.7.0 |
| 2024-06 | CT#104 | CP-241204 | 6200 | 1 | F | Abbreviations for PDU set handling | 18.7.0 |
| 2024-06 | CT#104 | CP-241179 | 6154 | 1 | F | AMF handling on LADN provisioning for an existing PDU session | 18.7.0 |
| 2024-06 | CT#104 | CP-241179 | 6191 | 1 | F | Correction to the area restriction for LADN | 18.7.0 |
| 2024-06 | CT#104 | CP-241179 | 6193 | 1 | F | Correction to the inclusion condition of extended LADN information | 18.7.0 |
| 2024-06 | CT#104 | CP-241179 | 6194 | 1 | F | Correction to the wrong message name for LADN information | 18.7.0 |
| 2024-06 | CT#104 | CP-241179 | 6219 | 1 | F | Clarification of ambiguous statement for LADN | 18.7.0 |
| 2024-06 | CT#104 | CP-241165 | 6182 | 1 | F | Clarification of ANDSP and URSP coding | 18.7.0 |
| 2024-06 | CT#104 | CP-241199 | 6195 | 1 | F | Add abbreviation for ABBAf | 18.7.0 |
| 2024-06 | CT#104 | CP-241199 | 6197 | 1 | D | Minor corrections | 18.7.0 |
| 2024-06 | CT#104 | CP-241161 | 6052 | 2 | F | Clarification on disabling and enabling N1 mode for deregistration abnormal | 18.7.0 |
| 2024-06 | CT#104 | CP-241161 | 6160 | 1 | F | The UE handling on the MICO mode | 18.7.0 |
| 2024-06 | CT#104 | CP-241161 | 6186 | 1 | F | Correction to PDU session reactivation result IE | 18.7.0 |
| 2024-06 | CT#104 | CP-241161 | 6202 | 1 | F | Handling of congestion control for transport of user data via the control plane timer for emergency services | 18.7.0 |
| 2024-06 | CT#104 | CP-241164 | 6130 | 2 | F | Clarification on the negotiation of the unavailability period duration during initial registration procedure | 18.7.0 |
| 2024-06 | CT#104 | CP-241177 | 6170 | 2 | F | Remove alternative S-NSSAI from allowed NSSAI and configured NSSAI | 18.7.0 |
| 2024-06 | CT#104 | CP-241161 | 6071 | 4 | F | Inter-system change for SSC mode 2 or SSC mode 3 PDU session | 18.7.0 |
| 2024-06 | CT#104 | CP-241159 | 6152 | 3 | F | Handling of regulatory prioritized services in non-allowed area | 18.7.0 |
| 2024-06 | CT#104 | CP-241179 | 6188 | 2 | F | Clarification to the S-NSSAI in extended LADN information | 18.7.0 |
| 2024-06 | CT#104 | CP-241161 | 6207 | 2 | F | Handling of collision between 5GMM common procedure and deregistration procedure. | 18.7.0 |
| 2024-06 | CT#104 | CP-241163 | 6199 | 2 | F | Updation on the condition for AMF to determine periodic timer | 18.7.0 |
| 2024-06 | CT#104 | CP-241192 | 6139 | 1 | F | Minor corrections | 18.7.0 |
| 2024-06 | CT#104 | CP-241161 | 6135 | 2 | F | Handling of Restricted service area cause in non-restricting cases | 18.7.0 |
| 2024-06 | CT#104 | CP-241180 | 6137 | 2 | F | Handling of UAS services not allowed cause for a UE not supporting UAS services | 18.7.0 |
| 2024-06 | CT#104 | CP-241164 | 6178 | 2 | F | Corrected that the deregistration procedure is used only for non satellite cases. | 18.7.0 |
| 2024-06 | CT#104 | CP-241160 | 6237 | - | F | Applicability of DefaultNSSAIInclusionMode | 18.7.0 |
| 2024-06 | CT#104 | CP-241160 | 6251 | - | F | Missing occurrence of the CPSR message for existing abnormal cases | 18.7.0 |
| 2024-06 | CT#104 | CP-241153 | 6253 | - | F | Removal of UPP-CM | 18.7.0 |
| 2024-06 | CT#104 | CP-241204 | 6228 | 5 | F | Corrections for aligning statements for UL PDU set handling | 18.7.0 |
| 2024-06 | CT#104 | CP-241177 | 6257 | - | F | Network slice replacement during PDU session establishment procedure | 18.7.0 |
| 2024-06 | CT#104 | CP-241177 | 6262 | - | F | Remove redundant paragraph for network slice usage control | 18.7.0 |
| 2024-06 | CT#104 | CP-241177 | 6263 | - | F | Network slice usage control for non-supporting UE | 18.7.0 |
| 2024-06 | CT#104 | CP-241177 | 6264 | - | F | Slice deregistration inactivity timer per access type | 18.7.0 |
| 2024-06 | CT#104 | CP-241153 | 6265 | - | F | DL NAS transport of UPP-CMI container | 18.7.0 |
| 2024-06 | CT#104 | CP-241204 | 6198 | 2 | F | Correction to RTP header extension in Protocol description IE | 18.7.0 |
| 2024-06 | CT#104 | CP-241204 | 6270 | - | F | Delete protocol description associated with a QoS rule | 18.7.0 |
| 2024-06 | CT#104 | CP-241164 | 6294 | - | F | Correction to handling of Follow-on request indicator in MRU for UA | 18.7.0 |
| 2024-06 | CT#104 | CP-241164 | 6298 | - | F | Clarification of T3324 in UA | 18.7.0 |
| 2024-06 | CT#104 | CP-241164 | 6299 | - | F | NR disable timers and unavailability period | 18.7.0 |
| 2024-06 | CT#104 | CP-241160 | 6305 |  | F | Clarification on initial registration for emergency services | 18.7.0 |
| 2024-06 | CT#104 | CP-241175 | 6306 | - | D | Minor correction of wrong NOTE numbering | 18.7.0 |
| 2024-06 | CT#104 | CP-241163 | 6309 | - | F | Add reference to the satellite coverage availability information | 18.7.0 |
| 2024-06 | CT#104 | CP-241160 | 6321 | - | F | Correction on missing abbreviations | 18.7.0 |
| 2024-06 | CT#104 | CP-241204 | 6180 | 2 | F | Clarification on UL PDU set handling | 18.7.0 |
| 2024-06 | CT#104 | CP-241177 | 6248 | 1 | F | Correction on coding of S-NSSAI location validity information | 18.7.0 |
| 2024-06 | CT#104 | CP-241177 | 6259 | 1 | F | Transition to RRC\_CONNECTED state considering partially allowed NSSAI and S-NSSAI location validity information | 18.7.0 |
| 2024-06 | CT#104 | CP-241177 | 6260 | 1 | F | Maximum number of S-NSSAIs in allowed NSSAI and partially allowed NSSAI | 18.7.0 |
| 2024-06 | CT#104 | CP-241177 | 6250 | 1 | F | Slice deregistration timer during MICO | 18.7.0 |
| 2024-06 | CT#104 | CP-241177 | 6300 | 1 | F | Clarification of slice deregistration timer in deregistered state | 18.7.0 |
| 2024-06 | CT#104 | CP-241177 | 6313 | 1 | F | Slice deregistration inactivity timer for PDU session release | 18.7.0 |
| 2024-06 | CT#104 | CP-241164 | 6268 | 1 | D | Editorial corrections on unavailability configuration and unavailability information | 18.7.0 |
| 2024-06 | CT#104 | CP-241175 | 6240 | 1 | F | Corrections for forbidden SNPNs in 24.501 | 18.7.0 |
| 2024-06 | CT#104 | CP-241176 | 6266 | 1 | D | Correction on 5GMM capability indication for equivalent SNPNs support | 18.7.0 |
| 2024-06 | CT#104 | CP-241177 | 6174 | 1 | F | Maximum number of S-NSSAIs in S-NSSAI location validity information IE | 18.7.0 |
| 2024-06 | CT#104 | CP-241163 | 6307 | 1 | F | Correction about terminology regarding 5GSAT | 18.7.0 |
| 2024-06 | CT#104 | CP-241163 | 6279 | 1 | F | Clarification on the unavailability due to UE reasons | 18.7.0 |
| 2024-06 | CT#104 | CP-241163 | 6277 | 1 | F | Clarification on the end of unavailability period report | 18.7.0 |
| 2024-06 | CT#104 | CP-241204 | 6229 | 4 | F | Update UL PDU Set handling when inter-system change | 18.7.0 |
| 2024-06 | CT#104 | CP-241165 | 6274 | 1 | F | Correction for the TNGF ID | 18.7.0 |
| 2024-06 | CT#104 | CP-241184 | 6242 | 1 | D | Replacement of MS with UE for the term MS determined PLMN with disaster condition | 18.7.0 |
| 2024-06 | CT#104 | CP-241198 | 6273 | 1 | F | Clarifications related to QoS flow descriptions | 18.7.0 |
| 2024-06 | CT#104 | CP-241177 | 6261 | 1 | F | Registration complete message to acknowledge the reception of on-demand NSSAI | 18.7.0 |
| 2024-06 | CT#104 | CP-241160 | 6140 | 2 | F | UE identity handling in case of a USIM removal during a registration procedure | 18.7.0 |
| 2024-06 | CT#104 | CP-241160 | 6267 | 1 | F | Clarification on purpose of service request procedure | 18.7.0 |
| 2024-06 | CT#104 | CP-241160 | 6280 | 1 | F | Clarification on some causes received in cell belonging to SNPN | 18.7.0 |
| 2024-06 | CT#104 | CP-241160 | 6281 | 1 | F | Correction on Extended CAG information list IE | 18.7.0 |
| 2024-06 | CT#104 | CP-241160 | 6196 | 3 | F | Correction to the checking of allowed TAI list in attempting to update state. | 18.7.0 |
| 2024-06 | CT#104 | CP-241160 | 6304 | 1 | D | Minor corrections in cause#36 and #62 | 18.7.0 |
| 2024-06 | CT#104 | CP-241160 | 6317 | 1 | F | Revise confusing statement in HPLMN S-NSSAI(s) handling | 18.7.0 |
| 2024-06 | CT#104 | CP-241164 | 6289 | 2 | D | Clarification of ambiguity in clause 5.3.26 | 18.7.0 |
| 2024-06 | CT#104 | CP-241177 | 6258 | 2 | F | Clarification when the only allowed S-NSSAI expires | 18.7.0 |
| 2024-06 | CT#104 | CP-241167 | 6275 | 2 | F | Corrections on supporting steering modes for the MA PDU session | 18.7.0 |
| 2024-06 | CT#104 | CP-241204 | 6224 | 2 | F | Clarification for QoS rule associated with UL Protocol description | 18.7.0 |
| 2024-06 | CT#104 | CP-241177 | 6156 | 7 | F | Re-enable N1 Mode based on timer validity information | 18.7.0 |
| 2024-06 | CT#104 | CP-241177 | 6190 | 4 | F | Handling of PDU session reactivation when the UE is not located in NS-AoS | 18.7.0 |
| 2024-06 | CT#104 | CP-241163 | 6278 | 2 | F | Clarification on the unavailability configuration during initial registration | 18.7.0 |
| 2024-06 | CT#104 | CP-241198 | 6234 | 2 | F | T3448 exemption for MPS | 18.7.0 |
| 2024-06 | CT#104 | CP-241160 | 6074 | 5 | F | MINT corrections in 24.501 | 18.7.0 |
| 2024-06 | CT#104 | CP-241160 | 5997 | 5 | F | Disaster timers handling | 18.7.0 |
| 2024-06 | CT#104 | CP-241203 | 6272 | 2 | F | Clarification on AMF behavior during the deregistration procedure | 18.7.0 |
| 2024-06 | CT#104 | CP-241160 | 5995 | 5 | F | MM parameter handling when receiving DL NAS transport message with cause 78 | 18.7.0 |
| 2024-06 | CT#104 | CP-241177 | 6288 | 2 | F | Update of partially allowed NSSAI for network slice replacement operation in the configuration update procedure and registration procedure | 18.7.0 |
| 2024-06 | CT#104 | CP-241177 | 6314 | 2 | F | Slice deregistration inactivity timer at unavailability activation | 18.7.0 |
| 2024-06 | CT#104 | CP-241177 | 6252 | 4 | F | Start of the slice inactivity timer based on the PDU session status IE | 18.7.0 |
| 2024-06 | CT#104 | CP-241198 | 6247 | 2 | F | Corrections to satellite access technologies in disabling and re-enabling of UE's N1 mode capability for 3GPP access | 18.7.0 |
| 2024-06 | CT#104 | CP-241177 | 6311 | 3 | F | NSSAI List Clarification | 18.7.0 |
| 2024-06 | CT#104 | CP-241198 | 6245 | 2 | A | Custom throttling to temporary failed 5GSM procedure | 18.7.0 |
| 2024-06 | CT#104 | CP-241170 | 6244 | 2 | F | Remove NOTE on DNS over (D)TLS | 18.7.0 |
| 2024-06 | CT#104 | CP-241170 | 5968 | 6 | B | Update to add security parameter to ECS address IE | 18.7.0 |
| 2024-06 | CT#104 | CP-241163 | 6249 | 4 | C | 5GMM cause code #15 indicating Satellite NG-RAN not allowed in PLMN | 18.7.0 |
| 2024-06 | CT#104 | CP-241227 | 6149 | 3 | F | Correction of the procedure's name | 18.7.0 |
| 2024-06 | CT#104 | [CP-241231](https://www.3gpp.org/ftp/tsg_ct/tsg_ct/TSGC_104_Shanghai/Docs/CP-241231.zip) | 6162 | 4 | F | Disaster return wait range timer | 18.7.0 |
| 2024-09 | CT#105 | CP-242165 | 6330 | - | A | Adding inclusion criteria and correcting information element | 18.8.0 |
| 2024-09 | CT#105 | CP-242167 | 6398 | - | F | Collision handling for NSSAA procedure and MRU for release connection | 18.8.0 |
| 2024-09 | CT#105 | CP-242205 | 6334 | 1 | F | Correction of IEI for Protocol description IE | 18.8.0 |
| 2024-09 | CT#105 | CP-242184 | 6365 | 1 | F | Handling of PDU session reactivation in the Mobility registration update procedure | 18.8.0 |
|  |  |  |  |  |  |  |  |
| 2024-09 | CT#105 | CP-242184 | 6410 | 1 | F | Network slice replacement including an on-demand S-NSSAI | 18.8.0 |
| 2024-09 | CT#105 | CP-242167 | 6338 | 1 | F | 5GMM capability IE definition errors | 18.8.0 |
| 2024-09 | CT#105 | CP-242184 | 6347 | 1 | F | Correction to the 5GMM capability IE because of implementation error of CR6034 | 18.8.0 |
|  |  |  |  |  |  |  |  |
| 2024-09 | CT#105 | CP-242167 | 6352 | 1 | F | Clarification for coding and usage of UE POLICY PROVISIONING REQUEST message | 18.8.0 |
| 2024-09 | CT#105 | CP-242167 | 6387 | 1 | F | Correction of incomplete timer table for T3540 | 18.8.0 |
| 2024-09 | CT#105 | CP-242190 | 6391 | 1 | F | Correction to requirements upon determining that a disaster condition has ended for MINT because of implementation collision of CR6074 and CR6162 | 18.8.0 |
| 2024-09 | CT#105 | CP-242167 | 6405 | 1 | F | Update description on requirements to be met for MT SMSoIP | 18.8.0 |
|  |  |  |  |  |  |  |  |
| 2024-09 | CT#105 | CP-242171 | 6434 | 1 | F | Resolution of editor's notes on Maximum time offset | 18.8.0 |
| 2024-09 | CT#105 | CP-242193 | 6341 | 1 | F | Correction for undefined names | 18.8.0 |
| 2024-09 | CT#105 | CP-242177 | 6345 | 2 | F | Add list of supported PLMNs with ECSP information to the ECS address information | 18.8.0 |
| 2024-09 | CT#105 | CP-242205 | 6348 | 2 | F | Correction to the uplink PDU set handling at the UE side | 18.8.0 |
| 2024-09 | CT#105 | CP-242171 | 6002 | 8 | F | No T3540 entering unavailability period | 18.8.0 |
| 2024-09 | CT#105 | CP-242183 | 6424 | 2 | F | FSNPN in shared network | 18.8.0 |
| 2024-09 | CT#105 | CP-242199 | 6301 | 4 | F | Handling of ecall timers during intersystem between 2G/3G and 5G | 18.8.0 |
| 2024-09 | CT#105 | CP-242171 | 6342 | 2 | F | Corrections for Cause value 15, satellite disabling | 18.8.0 |
| 2024-09 | CT#105 | CP-242230 | 6429 | 4 | F | Correction to the Note for UEs supporting MUSIM | 18.8.0 |
| 2024-09 | CT#105 | CP-242184 | 6404 | 1 | F | Correction on description of the slice deregistration inactivity timer in 4.6.2.9 | 19.0.0 |
| 2024-09 | CT#105 | CP-242201 | 6419 | 1 | F | Missing handling of cause #36 | 19.0.0 |
| 2024-09 | CT#105 | CP-242171 | 6364 | 1 | F | Clarification on the maximum time offset | 19.0.0 |
| 2024-09 | CT#105 | CP-242169 | 6344 | - | F | Storage of N26 support in NVM | 19.0.0 |
| 2024-09 | CT#105 | CP-242169 | 6346 | - | D | Corrigenda | 19.0.0 |
| 2024-09 | CT#105 | CP-242171 | 6362 | - | F | Consistent usage of EUPR bit of Unavailability configuration IE | 19.0.0 |
| 2024-09 | CT#105 | CP-242184 | 6363 | - | D | Remove duplicated paragraph regarding UE behavior after receiving on-demand NSSAI | 19.0.0 |
| 2024-09 | CT#105 | CP-242170 | 6372 | - | F | Non-3GPP path switching while using old non-3GPP for MA PDU session | 19.0.0 |
| 2024-09 | CT#105 | CP-242164 | 6380 | - | F | Correction to the inconsistent LCS correlation identifier | 19.0.0 |
| 2024-09 | CT#105 | CP-242169 | 6397 | - | F | Performing service request for emergency services fallback when the network is performing NSSAA | 19.0.0 |
| 2024-09 | CT#105 | CP-242169 | 6399 | 1 | F | Correction on the 5GSM cause reason | 19.0.0 |
| 2024-09 | CT#105 | CP-242171 | 6388 | 1 | F | Correction regarding the discontinuous coverage maximum time offset timer | 19.0.0 |
| 2024-09 | CT#105 | CP-242165 | 6390 | 1 | F | Correction of terminology related to 5GProSe | 19.0.0 |
| 2024-09 | CT#105 | CP-242169 | 6413 | 1 | D | Miscellaneous editorial corrections | 19.0.0 |
| 2024-09 | CT#105 | CP-242169 | 6366 | 1 | F | Correction to the trigger for the de-registration procedure | 19.0.0 |
| 2024-09 | CT#105 | CP-242169 | 6356 | 1 | F | Correction on the definition of HPLMN S-NSSAI | 19.0.0 |
| 2024-09 | CT#105 | CP-242169 | 6371 | 1 | F | Correction to the De-registration type IE | 19.0.0 |
| 2024-09 | CT#105 | CP-242174 | 6349 | 1 | F | Correction to the condition for UE-initiated de-registration procedure at the UE side | 19.0.0 |
| 2024-09 | CT#105 | CP-242169 | 6435 | 1 | F | Clarification of NAS timer handling for NG-RAN Satellite Access | 19.0.0 |
| 2024-09 | CT#105 | CP-242171 | 6375 | 1 | F | Correction on maximum time offset | 19.0.0 |
| 2024-09 | CT#105 | CP-242169 | 6430 | - | F | Correction on format and grammar issues | 19.0.0 |
| 2024-09 | CT#105 | CP-242169 | 6368 | 2 | F | T3525 abnormal case in SNPN | 19.0.0 |
| 2024-09 | CT#105 | CP-242190 | 6418 | 1 | F | Correction to the applicability of MINT | 19.0.0 |
| 2024-09 | CT#105 | CP-242193 | 6241 | 4 | F | Ranging UE capabilities | 19.0.0 |
| 2024-09 | CT#105 | CP-242169 | 6420 | 1 | F | ESFB handling due to SMC failure | 19.0.0 |
| 2024-09 | CT#105 | CP-242184 | 6337 | 2 | F | UE restrictions for partial network slice and for NS-AoS | 19.0.0 |
| 2024-09 | CT#105 | CP-242169 | 6432 | 1 | F | Correction on the wrong message name in network slice statement | 19.0.0 |
| 2024-09 | CT#105 | CP-242169 | 6431 | 1 | F | Correction on the wrong descprition of 5QI value | 19.0.0 |
| 2024-09 | CT#105 | CP-242169 | 6238 | 4 | F | Timer T3540 handling for causes triggering cell or PLMN selection | 19.0.0 |
| 2024-09 | CT#105 | CP-242169 | 6374 | 2 | F | Correction on UPU and SOR transparent container | 19.0.0 |
| 2024-09 | CT#105 | CP-242201 | 6423 | 2 | F | Discontinuous offset timer handling for MUSIM capable UE | 19.0.0 |
| 2024-09 | CT#105 | CP-242169 | 6417 | 2 | F | Use of native 4G-GUTI | 19.0.0 |
| 2024-09 | CT#105 | CP-242175 | 6350 | 2 | B | The clarification of the applicability of RAT utilization control | 19.0.0 |
| 2024-09 | CT#105 | CP-242169 | 6396 | 2 | F | Handling of Tsor-cm timer expiry or stopped while MRU procedure is ongoing | 19.0.0 |
| 2024-09 | CT#105 | CP-242201 | 6331 | 3 | F | MPS exemption for T3540 | 19.0.0 |
| 2024-09 | CT#105 | CP-242190 | 6379 | 2 | D | Editorial correction in the MINT | 19.0.0 |
| 2024-09 | CT#105 | CP-242175 | 6343 | 3 | B | Control of UE RAT utilization by 5GS | 19.0.0 |
| 2024-09 | CT#105 | CP-242209 | 6392 | 2 | B | ProSe and NPN | 19.0.0 |
| 2024-09 | CT#105 | CP-242183 | 6367 | 2 | F | Handling of TAs on validity information met | 19.0.0 |
| 2024-09 | CT#105 | CP-242184 | 6378 | 3 | F | Slice deregistration inactivity timers | 19.0.0 |
| 2024-09 | CT#105 | CP-242175 | 6377 | 3 | B | The handling on the RAT utilization restriction information | 19.0.0 |
| 2024-12 | CT#106 | CP-243179 | 6437 | - | F | Condition to stop timer T3511 in case of MRU due to fallback indication from lower layers | 19.1.0 |
| 2024-12 | CT#106 | CP-243207 | 6473 | - | F | RAT utilization control in periodic registration update | 19.1.0 |
| 2024-12 | CT#106 | CP-243207 | 6475 | - | F | Update and alignment of RAT utilization control in UCU | 19.1.0 |
| 2024-12 | CT#106 | CP-243180 | 6487 | - | F | Clarification on non-3GPP path switching while using old non-3GPP | 19.1.0 |
| 2024-12 | CT#106 | CP-243179 | 6493 | - | F | Miscellaneous corrections | 19.1.0 |
| 2024-12 | CT#106 | CP-243179 | 6254 | 4 | F | Corrections for NSSAI Inclusion mode | 19.1.0 |
| 2024-12 | CT#106 | CP-243207 | 6499 | - | F | IEI assignment for RAT utilization control | 19.1.0 |
| 2024-12 | CT#106 | CP-243200 | 6521 |  | F | Clarification to triggering registration procedure after unavailability period when UE needs to report unavailability | 19.1.0 |
| 2024-12 | CT#106 | CP-243177 | 6522 | - | F | Correcting wrong terms related to 5G ProSe | 19.1.0 |
| 2024-12 | CT#106 | CP-243179 | 6540 | - | F | Handling of the abnormal case when unavailability information IE contains the start of the unavailability period. | 19.1.0 |
| 2024-12 | CT#106 | CP-243179 | 6548 | - | F | Addition of a condition for the removal of memorized PLMN and SNPN Ids. | 19.1.0 |
| 2024-12 | CT#106 | CP-243206 | 6527 | 2 | A | Correction to #62 handling in Initial registration | 19.1.0 |
| 2024-12 | CT#106 | CP-243187 | 6447 | 1 | A | Conditions when to remove alternative S-NSSAI from configured NSSAI | 19.1.0 |
| 2024-12 | CT#106 | CP-243179 | 6449 | 1 | F | UE behavior at expiry of discontinuous coverage maximum time offset timer | 19.1.0 |
| 2024-12 | CT#106 | CP-243182 | 6480 | 1 | A | AMF provision of unavailability information at DC only | 19.1.0 |
| 2024-12 | CT#106 | CP-243209 | 6495 | 1 | A | Correction to the 5G-RG de-registration | 19.1.0 |
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