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Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

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- x the first digit
 - 1 presented to TSG for information;
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 - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e., technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document specifies the E-UTRAN radio network layer signalling protocol for the S1 interface. The S1 Application Protocol (S1AP) supports the functions of S1 interface by signalling procedures defined in this document. S1AP is developed in accordance to the general principles stated in TS 36.401 [2] and TS 36.410 [3].

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1]	3GPP TR 21.905: "Vocabulary for 3GPP Specifications".	
[2]	3GPP TS 36.401: "E-UTRAN Architecture Description".	
[3]	3GPP TS 36.410: "S1 General Aspects and Principles".	
[4]	ITU-T Recommendation X.691 (07/2002): "Information technology – ASN.1 encoding rules: Specification of Packed Encoding Rules (PER)".	
[5]	$ITU-T\ Recommendation\ X.680\ (07/2002): "Information\ technology-Abstract\ Syntax\ Notation\ One\ (ASN.1):\ Specification\ of\ basic\ notation".$	
[6]	ITU-T Recommendation X.681 (07/2002): "Information technology – Abstract Syntax Notation One (ASN.1): Information object specification".	
[7]	Void	
[8]	3GPP TS 23.402: "Architecture enhancements for non-3GPP accesses".	
[9]	3GPP TS 23.216: "Single Radio Voice Call Continuity (SRVCC)".	
[10]	3GPP TS 32.422: "Trace control and configuration management".	
[11]	3GPP TS 23.401: "General Packet Radio Service (GPRS) enhancements for E-UTRAN access".	
[12]	3GPP TS 36.414: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); S1 data transport".	
[13]	3GPP TS 23.203: "Policy and charging control architecture"	
[14]	3GPP TS 36.300: "Evolved Universal Terrestrial Radio Access (E-UTRA), Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Overall description; Stage 2".	
[15]	3GPP TS 33.401: "Security architecture".	
[16]	3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRAN); Radio Resource Control (RRC) Protocol Specification".	
[17]	3GPP TS 23.272: "Circuit Switched Fallback in Evolved Packet System; Stage 2".	
[18]	3GPP TS 48.018: "General Packet Radio Service (GPRS); BSS GPRS Protocol (BSSGP)".	
[19]	3GPP TS 25.413: "UTRAN Iu interface RANAP signalling".	

[20]	3GPP TS 36.304: "Evolved Universal Terrestrial Radio Access (E-UTRA), User Equipment (UE) procedures in idle mode".
[21]	3GPP TS 23.003: "Technical Specification Group Core Network and Terminals; Numbering, addressing and identification".
[22]	3GPP TS 36.423: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); X2 Application Protocol (X2AP)".
[23]	3GPP TS 48.008: "Mobile Switching Centre-Base Station System (MSC-BSS) interface; Layer 3 specification".
[24]	3GPP TS 24.301: "Non-Access Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3".
[25]	3GPP2 A.S0008-C: "Interoperability Specification (IOS) for High Rate Packet Data (HRPD) Radio Access Network Interfaces with Session Control in the Access Network".
[26]	3GPP TS 36.213: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer procedures".
[27]	3GPP2 C.S0024-B: "cdma2000 High Rate Packet Data Air Interface Specification".
[28]	3GPP TS 22.220: "Service requirements for Home Node Bs and Home eNode Bs".
[29]	3GPP TS 23.041: "Technical realization of Cell Broadcast Service (CBS)".
[30]	3GPP TS 48.016: "General Packet Radio Service (GPRS); Base Station System (BSS) - Serving GPRS Support Node (SGSN) interface; Network service".
[31]	3GPP TS 37.320: "Universal Terrestrial Radio Access (UTRA) and Evolved Universal Terrestrial Radio Access (E-UTRA); Radio measurement collection for Minimization of Drive Tests (MDT);Overall description; Stage 2".
[32]	3GPP TS 29.281: "General Packet Radio Service (GPRS); Tunnelling Protocol User Plane (GTPv1-U)".
[33]	3GPP TS 24.008: "Mobile radio interface Layer 3 specification; Core network protocols; Stage 3".
[34]	3GPP TS 36.455: "Evolved Universal Terrestrial Radio Access (E-UTRA); LTE Positioning Protocol A (LPPa)".
[35]	3GPP TS 29.060: "GPRS Tunnelling Protocol (GTP) across the Gn and Gp interface".
[36]	3GPP TS 29.274: "Evolved Packet System (EPS); Evolved General Packet Radio Service (GPRS) Tunnelling Protocol for Control plane (GTPv2-C); Stage 3".
[37]	3GPP TS 23.139: "3GPP system – fixed broadband access network interworking".
[38]	3GPP TS 23.007: "Technical Specification Group Core Network Terminals; Restoration procedures".
[39]	3GPP TS 36.104: "Base Station (BS) radio transmission and reception".
[40]	3GPP TR 25.921 (version.7.0.0): "Guidelines and principles for protocol description and error handling".
[41]	3GPP TS 36.306: "User Equipment (UE) radio access capabilities".
[42]	IETF RFC 5905 (2010-06): "Network Time Protocol Version 4: Protocol and Algorithms Specification".
[43]	3GPP TS 26.247: "Transparent end-to-end Packet-switched Streaming Service (PSS); Progressive Download and Dynamic Adaptive Streaming over HTTP (3GP-DASH)".
[44]	3GPP TS 38.413: "NG Radio Access Network (NG-RAN); NG Application Protocol (NGAP)".

[45]	3GPP TS 38.300: "NR; Overall description; Stage-2".
[46]	3GPP TS 23.501: "System Architecture for the 5G System".
[47]	3GPP TS 37.340: "NR; Multi-connectivity; Overall description; Stage-2".
[48]	3GPP TS 33.501: "Security architecture and procedures for 5G System".
[49]	3GPP TS 23.285: "Technical Specification Group Services and System Aspects; Architecture enhancements for V2X services".
[50]	3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol specification".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 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 TR 21.905 [1].

ACL functionality: A functionality controlling the access to network nodes. In case of Access Control Lists (ACL) functionality is applied in a network node the network node may only accept connections from other peer network nodes once the source addresses of the sending network node is already known in the target node.

CSG Cell: an E-UTRAN cell broadcasting a CSG indicator set to true and a CSG identity. This cell operates in Closed Access Mode as defined in TS 22.220 [28].

DAPS Handover: as defined in TS 36.300 [14].

DCN-ID: DCN identity identifies a specific decicated core network (DCN).

Dual Connectivity: as defined in TS 36.300 [14].

Elementary Procedure: S1AP consists of Elementary Procedures (EPs). An Elementary Procedure is a unit of interaction between eNBs and the EPC. These Elementary Procedures are defined separately and are intended to be used to build up complete sequences in a flexible manner. If the independence between some EPs is restricted, it is described under the relevant EP description. Unless otherwise stated by the restrictions, the EPs may be invoked independently of each other as standalone procedures, which can be active in parallel. The usage of several S1AP EPs together or together with EPs from other interfaces is specified in stage 2 specifications (e.g., TS 23.401 [11] and TS 36.300 [14]).

An EP consists of an initiating message and possibly a response message. Two kinds of EPs are used:

- Class 1: Elementary Procedures with response (success and/or failure).
- Class 2: Elementary Procedures without response.

For Class 1 EPs, the types of responses can be as follows:

Successful:

- A signalling message explicitly indicates that the elementary procedure successfully completed with the receipt of the response.

Unsuccessful:

- A signalling message explicitly indicates that the EP failed.
- On time supervision expiry (i.e., absence of expected response).

Successful and Unsuccessful:

- One signalling message reports both successful and unsuccessful outcome for the different included requests. The response message used is the one defined for successful outcome.

Class 2 EPs are considered always successful.

eNB UE S1AP ID: as defined in TS 36.401 [2].

Hybrid Cell: an E-UTRAN cell broadcasting a CSG indicator set to false and a CSG identity. This cell operates in Hybrid Access Mode as defined in TS 22.220 [28].

MME UE S1AP ID: as defined in TS 36.401 [2].

E-RAB: as defined in TS 36.401 [2].

NOTE 1: The E-RAB is either a default E-RAB or a dedicated E-RAB.

E-RAB ID: the E-RAB ID uniquely identifies an E-RAB for one UE.

NOTE 2: The E-RAB ID remains unique for the UE even if the UE-associated logical S1-connection is released during periods of user inactivity.

Data Radio Bearer: the Data Radio bearer transports the packets of an E-RAB between a UE and an eNB. There is a one-to-one mapping between the E-RAB and the Data Radio Bearer.

Secondary Cell Group: as defined in TS 36.300 [14].

UE-associated signalling: When S1-AP messages associated to one UE uses the UE-associated logical S1-connection for association of the message to the UE in eNB and EPC.

UE-associated logical S1-connection: The UE-associated logical S1-connection uses the identities *MME UE S1AP ID* and *eNB UE S1AP ID* according to definition in TS 23.401 [11]. For a received UE associated S1-AP message the MME identifies the associated UE based on the *MME UE S1AP ID* IE and the eNB identifies the associated UE based on the *eNB UE S1AP ID* IE. The UE-associated logical S1-connection may exist before the S1 UE context is setup in eNB.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

ACL Access Control List

ARPI Additional RRM Policy Index

BBF Broadband Forum CCO Cell Change Order

CDMA Code Division Multiple Access
CID Cell-ID (positioning method)
CIoT Cellular Internet of Things

CS Circuit Switched

CSG Closed Subscriber Group

CN Core Network

DAPS Dual Active Protocol Stacks
DCN Dedicated Core Network

DL Downlink

eAN evolved Access Network

E-CID E-UTRAN Cell Global Identifier
E-CID Enhanced Cell-ID (positioning method)

eHRPD evolved High Rate Packet Data

eNB E-UTRAN NodeB

EN-DC E-UTRA-NR Dual Connectivity

EP Elementary Procedure EPC Evolved Packet Core EPS Evolved Packet System

E-RAB E-UTRAN Radio Access Bearer

E-SMLC Evolved Serving Mobile Location Centre

E-UTRAN Evolved UTRAN
GBR Guaranteed Bit Rate

GNSS Global Navigation Satellite System
GUMMEI Globally Unique MME Identifier
GTP GPRS Tunnelling Protocol
HFN Hyper Frame Number
HRPD High Rate Packet Data

IAB Integrated Access and Backhaul

IE Information Element

IMEISV International Mobile station Equipment Identity and Software Version number

IoT Internet of Things

LAA Licensed-Assisted Access

L-GW Local GateWay
LHN Local Home Network
LHN ID Local Home Network ID

LIPA Local IP Access

LPPa LTE Positioning Protocol Annex LWA LTE-WLAN Aggregation

LWIP LTE WLAN Radio Level Integration with IPsec Tunnel

MBSFN Multimedia Broadcast multicast service Single Frequency Network

MDT Minimization of Drive Tests MME Mobility Management Entity

MTSI Multimedia Telephony Service for IMS

NAS Non Access Stratum NB-IoT Narrowband IoT

NNSF NAS Node Selection Function
OTDOA Observed Time Difference of Arrival

PS Packet Switched
PSCell Primary SCell
ProSe Proximity Services
PWS Public Warning System

PDCP Packet Data Convergence Protocol
PLMN Public Land Mobile Network

PS Packet Switched
RRC Radio Resource Control
RIM RAN Information Management
QMC QoE Measurement Collection

QoE Quality of Experience

SCTP Stream Control Transmission Protocol

SCG Secondary Cell Group S-GW Serving GateWay SN Sequence Number

SIPTO Selected IP Traffic Offload

SIPTO@LN Selected IP Traffic Offload at the Local Network

SSID Service Set Identifier

S-TMSI S-Temporary Mobile Subscriber Identity

SUL Supplementary Uplink
TAC Tracking Area Code
TAI Tracking Area Identity
TEID Tunnel Endpoint Identifier

UE User Equipment

UE-AMBR UE-Aggregate Maximum Bitrate

UL Uplink

UTDOA Uplink Time Difference of Arrival

V2X Vehicle-to-Everything WUS Wake Up Signal

4 General

4.1 Procedure Specification Principles

The principle for specifying the procedure logic is to specify the functional behaviour of the terminating node exactly and completely. Any rule that specifies the behaviour of the originating node shall be possible to be verified with information that is visible within the system.

The following specification principles have been applied for the procedure text in clause 8:

- The procedure text discriminates between:
 - 1) Functionality which "shall" be executed

The procedure text indicates that the receiving node "shall" perform a certain function Y under a certain condition. If the receiving node supports procedure X but cannot perform functionality Y requested in the REQUEST message of a Class 1 EP, the receiving node shall respond with the message used to report unsuccessful outcome for this procedure, containing an appropriate cause value.

2) Functionality which "shall, if supported" be executed

The procedure text indicates that the receiving node "shall, if supported," perform a certain function Y under a certain condition. If the receiving node supports procedure X, but does not support functionality Y, the receiving node shall proceed with the execution of the EP, possibly informing the requesting node about the not supported functionality.

- Any required inclusion of an optional IE in a response message is explicitly indicated in the procedure text. If the procedure text does not explicitly indicate that an optional IE shall be included in a response message, the optional IE shall not be included. For requirements on including *Criticality Diagnostics* IE, see clause 10.

4.2 Forwards and Backwards Compatibility

The forwards and backwards compatibility of the protocol is assured by mechanism where all current and future messages, and IEs or groups of related IEs, include ID and criticality fields that are coded in a standard format that will not be changed in the future. These parts can always be decoded regardless of the standard version.

4.3 Specification Notations

For the purposes of the present document, the following notations apply:

Procedure When referring to an elementary procedure in the specification the Procedure Name is written with

the first letters in each word in upper case characters followed by the word "procedure", e.g., E-

RAB procedure.

Message When referring to a message in the specification the MESSAGE NAME is written with all letters

in upper case characters followed by the word "message", e.g., MESSAGE NAME message.

IE When referring to an information element (IE) in the specification the *Information Element Name*

is written with the first letters in each word in upper case characters and all letters in Italic font

followed by the abbreviation "IE", e.g., Information Element IE.

Value of an IE When referring to the value of an information element (IE) in the specification the "Value" is

written as it is specified in subclause 9.2 enclosed by quotation marks, e.g., "Value".

5 S1AP Services

S1AP provides the signalling service between E-UTRAN and the evolved packet core (EPC) that is required to fulfil the S1AP functions described in clause 7. S1AP services are divided into two groups:

Non UE-associated services: They are related to the whole S1 interface instance between the eNB and MME

utilising a non UE-associated signalling connection.

UE-associated services: They are related to one UE. S1AP functions that provide these services are

associated with a UE-associated signalling connection that is maintained for the UE

in question.

6 Services Expected from Signalling Transport

The signalling connection shall provide in sequence delivery of S1AP messages. S1AP shall be notified if the signalling connection breaks.

7 Functions of S1AP

The S1AP protocol has the following functions:

- E-RAB management function: This overall functionality is responsible for setting up, modifying and releasing E-RABs, which are triggered by the MME. The release and modification of E-RABs may be triggered by the eNB as well.
- Initial Context Transfer function: This functionality is used to establish an S1UE context in the eNB, to setup the default IP connectivity, to setup one or more E-RAB(s) if requested by the MME, and to transfer NAS signalling related information to the eNB if needed.
- UE Capability Info Indication function: This functionality is used to provide the UE Capability Info when received from the UE to the MME.
- Mobility Functions for UEs in LTE_ACTIVE in order to enable
 - a change of eNBs within SAE/LTE (Inter MME/Serving SAE-GW Handovers) via the S1 interface (with EPC involvement).
 - a change of RAN nodes between different RATs (Inter-3GPP-RAT Handovers) via the S1 interface (with EPC involvement).
- Paging: This functionality provides the EPC with the capability to page the UE.
- S1 interface management functions comprise the:
 - Reset functionality to ensure a well defined initialisation on the S1 interface.
 - Error Indication functionality to allow a proper error reporting/handling in cases where no failure messages are defined.
 - Overload function to indicate the load situation in the control plane of the S1 interface.
 - Load balancing function to ensure equally loaded MMEs within an MME pool area
 - S1 Setup functionality for initial S1 interface setup for providing configuration information
 - eNB and MME Configuration Update functions are to update application level configuration data needed for the eNB and MME to interoperate correctly on the S1 interface.
- NAS Signalling transport function between the UE and the MME is used:
 - to transfer and reroute NAS signalling related information and to establish the S1 UE context in the eNB.
 - to transfer NAS signalling related information when the S1 UE context in the eNB is already established.
- S1 UE context Release function: This functionality is responsible to manage the release of UE specific context in the eNB and the MME.
- UE Context Modification function: This functionality allows to modify the established UE Context partly.
- UE Context Resumption function: This functionality allows keeping the UE Context in the eNB for a UE in RRC_IDLE that has been enabled to use User Plane EPS Optimization (see TS 23.401 [11]) and to resume the RRC connection without the need to re-establish the UE Context.
- Status Transfer: This functionality transfers PDCP SN Status information from source eNB to target eNB in support of in-sequence delivery and duplication avoidance for intra LTE handover.
- Trace function: This functionality is to control a trace session recording for a UE in ECM_CONNECTED or to control an MDT session transferring MDT measurements collected by the UE.
- Location Reporting: This functionality allows MME to be aware of the UE's current location.
- LPPa Signalling transport: This functionality transfers LPPa messages between eNB and E-SMLC over the S1 interface.

- S1 CDMA2000 Tunnelling function: This functionality is to carry CDMA2000 signalling between UE and CDMA2000 RAT over the S1 Interface.
- Warning message transmission function:
 This functionality provides the means to start and overwrite the broadcasting of warning message.
- RAN Information Management (RIM) function: This functionality allows the request and transfer of RAN information (e.g., GERAN system information) between two RAN nodes via the core network.
- Configuration Transfer function: This functionality allows the request and transfer of RAN configuration information (e.g., SON information) between two RAN nodes via the core network.
- UE Radio Capability Match function. The functionality enables the eNB to derive and provide an indication to the MME whether the UE radio capabilities are compatible with the network configuration for voice continuity.
- PWS Restart Indication function. The functionality enables the eNB to inform the MME that PWS information for some or all cells of the eNB are available for reloading from the CBC if needed.
- PWS Failure Indication function. The functionality enables the eNB to inform the MME that ongoing PWS operation for one or more cells of the eNB has failed.
- Connection Establishment Indication function. The functionality enables the MME to complete the establishment of the UE-associated logical S1-connection.
- Retrieve UE Information function. The functionality enables the eNB to request UE information from the MME.
- UE Information Transfer function. The functionality enables the MME to transfer UE information to the eNB.
- CP Relocation function. The functionality enables the initiation of the UE-associated logical S1-connection for a NB-IOT UE using Control Plane CIoT EPS Optimisation following a re-establishment request.
- Report of Secondary RAT data volumes function. The functionality enables the eNB to report Secondary RAT data usage information in case of EN-DC as specified in TS 23.401 [11].
- QMC function. The functionality enables the eNB to collect QoE measurements from the UE.

8 S1AP Procedures

8.1 List of S1AP Elementary procedures

In the following tables, all EPs are divided into Class 1 and Class 2 EPs (see subclause 3.1 for explanation of the different classes):

Table 1: Class 1 procedures

Elementary	Initiating Message	Successful Outcome	Unsuccessful Outcome
Procedure		Response message	Response message
Handover	HANDOVER	HANDOVER COMMAND	HANDOVER
Preparation	REQUIRED	LIANDOVED DECLIEST	PREPARATION FAILURE
Handover	HANDOVER	HANDOVER REQUEST	HANDOVER FAILURE
Resource	REQUEST	ACKNOWLEDGE	
Allocation	DATH CWITCH	DATH CMITCH	DATH CWITCH DECLIFOR
Path Switch	PATH SWITCH	PATH SWITCH REQUEST	PATH SWITCH REQUEST FAILURE
Request	REQUEST	ACKNOWLEDGE	FAILURE
Handover	HANDOVER CANCEL	HANDOVER CANCEL	
Cancellation	HANDOVER CANCEL	ACKNOWLEDGE	
E-RAB Setup	E-RAB SETUP	E-RAB SETUP	
L-IVAD Setup	REQUEST	RESPONSE	
E-RAB Modify	E-RAB MODIFY	E-RAB MODIFY	
L TO ID Modify	REQUEST	RESPONSE	
E-RAB	E-RAB	E-RAB MODIFICATION	
Modification	MODIFICATION	CONFIRM	
Indication	INDICATION		
E-RAB Release	E-RAB RELEASE	E-RAB RELEASE	
	COMMAND	RESPONSE	
Initial Context	INITIAL CONTEXT	INITIAL CONTEXT	INITIAL CONTEXT SETUP
Setup	SETUP REQUEST	SETUP RESPONSE	FAILURE
Reset	RESET	RESET	
01.0	04.057110.05011507	ACKNOWLEDGE	OA OFFUR FAILURE
S1 Setup	S1 SETUP REQUEST	S1 SETUP RESPONSE	S1 SETUP FAILURE
UE Context	UE CONTEXT	UE CONTEXT RELEASE	
Release UE Context	RELEASE COMMAND UE CONTEXT	COMPLETE UE CONTEXT	UE CONTEXT
Modification	MODIFICATION	MODIFICATION	MODIFICATION FAILURE
Modification	REQUEST	RESPONSE	MODIFICATION FAILURE
eNB	ENB	ENB CONFIGURATION	ENB CONFIGURATION
Configuration	CONFIGURATION	UPDATE	UPDATE FAILURE
Update	UPDATE	ACKNOWLEDGE	
MME	MME	MME CONFIGURAION	MME CONFIGURATION
Configuration	CONFIGURATION	UPDATE	UPDATE FAILURE
Update	UPDATE	ACKNOWLEDGE	
Write-Replace	WRITE-REPLACE	WRITE-REPLACE	
Warning	WARNING REQUEST	WARNING RESPONSE	
Kill	KILL REQUEST	KILL RESPONSE	
UE Radio	UE RADIO	UE RADIO CAPABILITY	
Capability	CAPABILITY MATCH	MATCH RESPONSE	
Match	REQUEST	LIE CONTENT	
UE Context	UE CONTEXT	UE CONTEXT	
			LIE CONTEXT RESUME
	•		
	CAPABILITY ID	ID MAPPING	
Mapping	MAPPING REQUEST	RESPONSE	
Modification Indication UE Context Suspend UE Context Resume UE Radio Capability ID Mapping			UE CONTEXT RESUME FAILURE

Table 2: Class 2 procedures

Elementary Procedure	Massage
Elementary Procedure Handover Notification	Message
E-RAB Release Indication	HANDOVER NOTIFY E-RAB RELEASE INDICATION
	PAGING
Paging Initial UE Message	INITIAL UE MESSAGE
Downlink NAS Transport	DOWNLINK NAS TRANSPORT
Uplink NAS Transport	UPLINK NAS TRANSPORT
NAS non delivery indication	NAS NON DELIVERY INDICATION
Error Indication	ERROR INDICATION
UE Context Release Request	UE CONTEXT RELEASE REQUEST
DownlinkS1 CDMA2000 Tunnelling	DOWNLINK S1 CDMA2000
Downlinks i CDIVIA2000 Turinelling	TUNNELLING
Uplink S1 CDMA2000 Tunnelling	UPLINK S1 CDMA2000
opinik or obwikzooo ramoining	TUNNELLING
UE Capability Info Indication	UE CAPABILITY INFO INDICATION
eNB Status Transfer	eNB STATUS TRANSFER
MME Status Transfer	MME STATUS TRANSFER
Deactivate Trace	DEACTIVATE TRACE
Trace Start	TRACE START
Trace Failure Indication	TRACE FAILURE INDICATION
Location Reporting Control	LOCATION REPORTING CONTROL
Location Reporting Failure	LOCATION REPORTING FAILURE
Indication	INDICATION
Location Report	LOCATION REPORT
Overload Start	OVERLOAD START
Overload Stop	OVERLOAD STOP
eNB Direct Information Transfer	eNB DIRECT INFORMATION
	TRANSFER
MME Direct Information Transfer	MME DIRECT INFORMATION
	TRANSFER
eNB Configuration Transfer	eNB CONFIGURATION TRANSFER
MME Configuration Transfer	MME CONFIGURATION TRANSFER
Cell Traffic Trace	CELL TRAFFIC TRACE
Downlink UE Associated LPPa	DOWNLINK UE ASSOCIATED LPPA
Transport Uplink UE Associated LPPa	TRANSPORT UPLINK UE ASSOCIATED LPPA
Transport	TRANSPORT
Downlink Non UE Associated LPPa	DOWNLINK NON UE ASSOCIATED
Transport	LPPA TRANSPORT
Uplink Non UE Associated LPPa	UPLINK NON UE ASSOCIATED
Transport	LPPA TRANSPORT
PWS Restart Indication	PWS RESTART INDICATION
Reroute NAS Request	REROUTE NAS REQUEST
PWS Failure Indication	PWS FAILURE INDICATION
Connection Establishment	CONNECTION ESTABLISHMENT
Indication	INDICATION
NAS Delivery Indication	NAS DELIVERY INDICATION
Retrieve UE Information	RETRIEVE UE INFORMATION
UE Information Transfer	UE INFORMATION TRANSFER
eNB CP Relocation Indication	eNB CP RELOCATION INDICATION
MME CP Relocation Indication	MME CP RELOCATION INDICATION
Secondary RAT Data Usage Report	SECONDARY RAT DATA USAGE
	REPORT
Handover Success	HANDOVER SUCCESS
eNB Early Status Transfer	eNB EARLY STATUS TRANSFER
MME Early Status Transfer	MME EARLY STATUS TRANSFER

The following applies concerning interference between Elementary Procedures:

- The Reset procedure takes precedence over all other EPs.

- The UE Context Release procedure takes precedence over all other EPs that are using the UE-associated signalling.

8.2 E-RAB Management procedures

8.2.1 E-RAB Setup

8.2.1.1 General

The purpose of the E-RAB Setup procedure is to assign resources on Uu and S1 for one or several E-RABs and to setup corresponding Data Radio Bearers for a given UE. The procedure uses UE-associated signalling.

8.2.1.2 Successful Operation

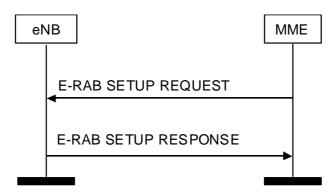


Figure 8.2.1.2-1: E-RAB Setup procedure. Successful operation.

The MME initiates the procedure by sending an E-RAB SETUP REQUEST message to the eNB.

- The E-RAB SETUP REQUEST message shall contain the information required by the eNB to build the E-RAB configuration consisting of at least one E-RAB and for each E-RAB to setup include an *E-RAB to be Setup Item* IE.

Upon reception of the E-RAB SETUP REQUEST message, and if resources are available for the requested configuration, the eNB shall execute the requested E-RAB configuration. For each E-RAB and based on the *E-RAB level QoS parameters* IE the eNB shall establish a Data Radio Bearer and allocate the required resources on Uu. The eNB shall pass the *NAS-PDU* IE and the value contained in the *E-RAB ID* IE received for the E-RAB for each established Data Radio Bearer to the UE. The eNB does not send the NAS PDUs associated to the failed Data radio bearers to the UE. The eNB shall allocate the required resources on S1 for the E-RABs requested to be established.

If the *Correlation ID* IE is included in the E-RAB SETUP REQUEST message towards the eNB with L-GW function for LIPA operation, then the eNB shall use this information for LIPA operation for the concerned E-RAB.

If the SIPTO Correlation ID IE is included in the E-RAB SETUP REQUEST message towards the eNB with L-GW function for SIPTO@LN operation, then the eNB shall use this information for SIPTO@LN operation for the concerned E-RAB.

If the *Bearer Type* IE is included in the E-RAB SETUP REQUEST message and is set to "non IP", then the eNB shall not perform IP header compression for the concerned E-RAB.

If the *Ethernet Type* IE is included in the E-RAB SETUP REQUEST message and is set to "True", then the eNB shall, if supported, take this into account to perform header compression appropriately for the concerned E-RAB.

The E-RAB SETUP REQUEST message may contain

- the UE Aggregate Maximum Bit Rate IE.

If the UE Aggregate Maximum Bit Rate IE is included in the E-RAB SETUP REQUEST the eNB shall

- replace the previously provided UE Aggregate Maximum Bit Rate by the received UE Aggregate Maximum Bit Rate in the UE context:
- use the received UE Aggregate Maximum Bit Rate for non-GBR Bearers for the concerned UE.

If the *UE Aggregate Maximum Bit Rate* IE is not contained in the E-RAB SETUP REQUEST message, the eNB shall use the previously provided UE Aggregate Maximum Bit Rate which is stored in the UE context.

The eNB shall establish or modify the resources according to the values of the *Allocation and Retention Priority* IE (priority level and pre-emption indicators) and the resource situation as follows:

- The eNB shall consider the priority level of the requested E-RAB, when deciding on the resource allocation.
- The priority levels and the pre-emption indicators may (individually or in combination) be used to determine whether the E-RAB setup has to be performed unconditionally and immediately. If the requested E-RAB is marked as "may trigger pre-emption" and the resource situation requires so, the eNB may trigger the pre-emption procedure which may then cause the forced release of a lower priority E-RAB which is marked as "pre-emptable". Whilst the process and the extent of the pre-emption procedure are operator-dependent, the pre-emption indicators shall be treated as follows:
 - 1. The values of the last received *Pre-emption Vulnerability* IE and *Priority Level* IE shall prevail.
 - 2. If the *Pre-emption Capability* IE is set to "may trigger pre-emption", then this allocation request may trigger the pre-emption procedure.
 - 3. If the *Pre-emption Capability* IE is set to "shall not trigger pre-emption", then this allocation request shall not trigger the pre-emption procedure.
 - 4. If the *Pre-emption Vulnerability* IE is set to "pre-emptable", then this E-RAB shall be included in the pre-emption process.
 - 5. If the *Pre-emption Vulnerability* IE is set to "not pre-emptable", then this E-RAB shall not be included in the pre-emption process.
 - 6. If the *Priority Level* IE is set to "no priority" the given values for the *Pre-emption Capability* IE and *Pre-emption Vulnerability* IE shall not be considered. Instead the values "shall not trigger pre-emption" and "not pre-emptable" shall prevail.
- The E-UTRAN pre-emption process shall keep the following rules:
 - 1. E-UTRAN shall only pre-empt E-RABs with lower priority, in ascending order of priority.
 - 2. The pre-emption may be done for E-RABs belonging to the same UE or to other UEs.

The eNB shall report to the MME, in the E-RAB SETUP RESPONSE message, the result for all the requested E-RABs.

- A list of E-RABs which are successfully established shall be included in the E-RAB Setup List IE.
- A list of E-RABs which failed to be established, if any, shall be included in the E-RAB Failed to Setup List IE.

In case of the establishment of an E-RAB the EPC must be prepared to receive user data before the E-RAB SETUP RESPONSE message has been received.

When the eNB reports unsuccessful establishment of an E-RAB, the cause value should be precise enough to enable the MME to know the reason for an unsuccessful establishment, e.g., "Radio resources not available", "Failure in the Radio Interface Procedure".

Interactions with Handover Preparation procedure:

If a handover becomes necessary during E-RAB Setup, the eNB may interrupt the ongoing E-RAB Setup procedure and initiate the Handover Preparation procedure as follows:

- 1. The eNB shall send the E-RAB SETUP RESPONSE message in which the eNB shall indicate, if necessary
 - all the E-RABs fail with an appropriate cause value, e.g., "S1 intra system Handover triggered", "S1 inter system Handover triggered" or "X2 Handover triggered".

2. The eNB shall trigger the handover procedure.

8.2.1.3 Unsuccessful Operation

The unsuccessful operation is specified in the successful operation section.

8.2.1.4 Abnormal Conditions

If the eNB receives a E-RAB SETUP REQUEST message containing a *E-RAB Level QoS Parameters* IE which contains a *QCI* IE indicating a GBR bearer (as defined in TS 23.203 [13]), and which does not contain the *GBR QoS Information* IE, the eNB shall consider the establishment of the corresponding E-RAB as failed.

If the eNB receives an E-RAB SETUP REQUEST message containing several *E-RAB ID* IEs (in the *E-RAB To Be Setup List* IE) set to the same value, the eNB shall report the establishment of the corresponding E-RABs as failed in the E-RAB SETUP RESPONSE with the appropriate cause value, e.g., "Multiple E-RAB ID instances".

If the eNB receives an E-RAB SETUP REQUEST message containing a *E-RAB ID* IE (in the *E-RAB To Be Setup List* IE) set to the value that identifies an active E-RAB (established before the E-RAB SETUP REQUEST message was received), the eNB shall report the establishment of the new E-RAB as failed in the E-RAB SETUP RESPONSE with the appropriate cause value, e.g., "Multiple E-RAB ID instances".

If the eNB receives an E-RAB SETUP REQUEST message containing both the *Correlation ID* and the *SIPTO Correlation ID* IEs for the same E-RAB, the eNB shall consider the establishment of the corresponding E-RAB as failed.

8.2.2 E-RAB Modify

8.2.2.1 General

The purpose of the E-RAB Modify procedure is to enable modifications of already established E-RABs for a given UE. The procedure uses UE-associated signalling.

8.2.2.2 Successful Operation

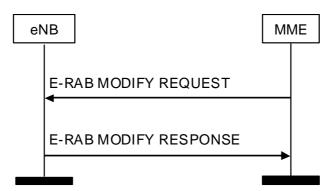


Figure 8.2.2.2-1: E-RAB Modify procedure. Successful operation.

The MME initiates the procedure by sending an E-RAB MODIFY REQUEST message to the eNB.

- The E-RAB MODIFY REQUEST message shall contain the information required by the eNB to modify one or several E-RABs of the existing E-RAB configuration.

Information shall be present in the E-RAB MODIFY REQUEST message only when any previously set value for the E-RAB configuration is requested to be modified.

Upon reception of the E-RAB MODIFY REQUEST message, and if resources are available for the requested target configuration, the eNB shall execute the modification of the requested E-RAB configuration. For each E-RAB that shall be modified and for which the *Transport Information* IE is not included and based on the new *E-RAB level QoS parameters* IE the eNB shall modify the Data Radio Bearer configuration and change allocation of resources on Uu according to the new resource request. The eNB shall pass the *NAS-PDU* IE received for the E-RAB to the UE when

modifying the Data Radio Bearer configuration. The eNB does not send the NAS PDUs associated to the failed Data radio bearers to the UE. The eNB shall change allocation of resources on S1 according to the new resource request.

If the E-UTRAN failed to modify an E-RAB the E-UTRAN shall keep the E-RAB configuration as it was configured prior the E-RAB MODIFY REQUEST.

The E-RAB MODIFY REQUEST message may contain the

- the UE Aggregate Maximum Bit Rate IE,
- the Secondary RAT Data Usage Request IE.

If the UE Aggregate Maximum Bit Rate IE is included in the E-RAB MODIFY REQUEST, the eNB shall

- replace the previously provided UE Aggregate Maximum Bit Rate by the received UE Aggregate Maximum Bit Rate in the UE context;
- use the received UE Aggregate Maximum Bit Rate for non-GBR Bearers for the concerned UE.

If the *UE Aggregate Maximum Bit Rate* IE is not contained in the E-RAB MODIFY REQUEST message, the eNB shall use the previously provided UE Aggregate Maximum Bit Rate which is stored in the UE context.

The modification of resources according to the values of the *Allocation and Retention Priority* IE shall follow the principles described for the E-RAB Setup procedure.

If the *Transport Information* IE is included in the E-RAB MODIFY REQUEST message, the eNB shall use the included information as the new S-GW address and uplink packet destination for the relevant E-RAB as defined in TS 23.401 [11], and it shall ignore the *E-RAB Level QoS Parameters* and *NAS-PDU* IEs for the same E-RAB.

The eNB shall report to the MME, in the E-RAB MODIFY RESPONSE message, the result for all the requested E-RABs to be modified.

- A list of E-RABs which are successfully modified shall be included in the E-RAB Modify List IE.
- A list of E-RABs which failed to be modified, if any, shall be included in the E-RAB Failed to Modify List IE.

When the eNB reports unsuccessful modification of an E-RAB, the cause value should be precise enough to enable the MME to know the reason for an unsuccessful modification, e.g., "Radio resources not available", "Failure in the Radio Interface Procedure".

In case of a modification of an E-RAB the EPC must be prepared to receive user data according to the modified E-RAB profile prior to the E-RAB MODIFY RESPONSE message.

If the *Secondary RAT Data Usage Request* IE set to "requested" was included in the E-RAB MODIFY REQUEST message, and the eNB supports EN-DC, LAA, LWA or LWIP and has secondary RAT usage data to report, then the *Secondary RAT Usage Report List* IE shall be included in the E-RAB MODIFY RESPONSE message.

Interactions with Handover Preparation procedure:

If a handover becomes necessary during E-RAB modify, the eNB may interrupt the ongoing E-RAB Modify procedure and initiate the Handover Preparation procedure as follows:

- 1. The eNB shall send the E-RAB MODIFY RESPONSE message in which the eNB shall indicate, if necessary
 - all the E-RABs fail with an appropriate cause value, e.g., "S1 intra system Handover triggered", "S1 inter system Handover triggered" or "X2 Handover triggered".
- 2. The eNB shall trigger the handover procedure.

8.2.2.3 Unsuccessful Operation

The unsuccessful operation is specified in the successful operation section.

8.2.2.4 Abnormal Conditions

If the eNB receives a E-RAB MODIFY REQUEST message containing a *E-RAB Level QoS Parameters* IE which contains a *QCI* IE indicating a GBR bearer (as defined in TS 23.203 [13]) for a E-RAB previously configured as a non-GBR bearer (as defined in TS 23.203 [13]), and which does not contain the *GBR QoS Information* IE, the eNB shall consider the modification of the corresponding E-RAB as failed.

If the eNB receives an E-RAB MODIFY REQUEST message containing several *E-RAB ID* IEs (in the *E-RAB to be Modified List* IE) set to the same value, the eNB shall report the modification of the corresponding E-RABs as failed in the E-RAB MODIFY RESPONSE with the appropriate cause value, e.g., "Multiple E-RAB ID instances".

If the eNB receives an E-RAB MODIFY REQUEST message containing some *E-RAB ID* IEs that eNB does not recognize, the eNB shall report the corresponding invalid E-RABs as failed in the E-RAB MODIFY RESPONSE with the appropriate cause value, e.g., "Unknown E-RAB ID".

8.2.3 E-RAB Release

8.2.3.1 General

The purpose of the E-RAB Release procedure is to enable the release of already established E-RABs for a given UE. The procedure uses UE-associated signalling.

8.2.3.2 Successful Operation

8.2.3.2.1 E-RAB Release – MME initiated

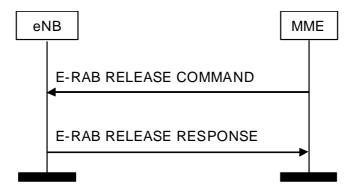


Figure 8.2.3.2.1-1: E-RAB Release procedure. Successful operation.

The MME initiates the procedure by sending an E-RAB RELEASE COMMAND message.

The E-RAB RELEASE COMMAND message shall contain the information required by the eNB to release at least one E-RAB in the *E-RAB To Be Released List* IE. If a *NAS-PDU* IE is contained in the message, the eNB shall pass it to the UE.

Upon reception of the E-RAB RELEASE COMMAND message the eNB shall execute the release of the requested E-RABs. For each E-RAB to be released the eNB shall release the corresponding Data Radio Bearer and release the allocated resources on Uu. The eNB shall pass the value contained in the *E-RAB ID* IE received for the E-RAB to the radio interface protocol for each Data Radio Bearer to be released. The eNB shall release allocated resources on S1 for the E-RABs requested to be released.

The E-RAB RELEASE COMMAND message may contain

- the UE Aggregate Maximum Bit Rate IE.

If the UE Aggregate Maximum Bit Rate IE is included in the E-RAB RELEASE COMMAND the eNB shall

- replace the previously provided UE Aggregate Maximum Bit Rate by the received UE Aggregate Maximum Bit Rate in the UE context; the eNB shall use the received UE Aggregate Maximum Bit Rate for non-GBR Bearers for the concerned UE.

If the *UE Aggregate Maximum Bit Rate* IE is not contained in the E-RAB RELEASE COMMAND message, the eNB shall use the previously provided UE Aggregate Maximum Bit Rate which is stored in the UE context.

The eNB shall report to the MME, in the E-RAB RELEASE RESPONSE message, the result for all the E-RABs to be released.

- A list of E-RABs which are released successfully shall be included in the E-RAB Release List IE.
- A list of E-RABs which failed to be released, if any, shall be included in the E-RAB Failed to Release List IE.

The eNB shall be prepared to receive an E-RAB RELEASE COMMAND message on an established UE-associated logical S1-connection containing an *E-RAB Release List* IE at any time and shall always reply to it with an E-RAB RELEASE RESPONSE message.

The eNB shall, if supported, report in the E-RAB RELEASE RESPONSE message location information of the UE in the *User Location Information* IE.

After sending an E-RAB RELEASE RESPONSE message containing an E-RAB ID within the *E-RAB Release List* IE, the eNB shall be prepared to receive an E-RAB SETUP REQUEST message requesting establishment of an E-RAB with this E-RAB ID.

If the *User Location Information* IE is included in the E-RAB RELEASE RESPONSE message, the MME shall handle this information as specified in TS 23.401 [11].

If the *Secondary RAT Usage Report List* IE is included in the E-RAB RELEASE RESPONSE message, the MME shall handle this information as specified in TS 23.401 [11].

8.2.3.2.2 E-RAB Release Indication – eNB initiated



Figure 8.2.3.2.2-1: E-RAB Release INDICATION procedure. Successful operation.

The eNB initiates the procedure by sending an E-RAB RELEASE INDICATION message towards the MME.

The E-RAB RELEASE INDICATION message shall contain at least one E-RAB released at the eNB, in the *E-RAB Released List* IE.

The eNB shall, if supported, report in the E-RAB RELEASE INDICATION message location information of the UE in the *User Location Information* IE.

Upon reception of the E-RAB RELEASE INDICATION message the MME shall normally initiate the appropriate release procedure on the core network side for the E-RABs identified in the E-RAB RELEASE INDICATION message.

If the *User Location Information* IE is included in the E-RAB RELEASE INDICATION message, the MME shall handle this information as specified in TS 23.401 [11].

If the *Secondary RAT Usage Report List* IE is included in the E-RAB RELEASE INDICATION message, the MME shall handle this information as specified in TS 23.401 [11].

Interaction with UE Context Release Request procedure:

If the eNB wants to remove all remaining E-RABs, e.g., for user inactivity, the UE Context Release Request procedure shall be used instead.

8.2.3.3 Abnormal Conditions

If the eNB receives an E-RAB RELEASE COMMAND message containing multiple *E-RAB ID* IEs (in the *E-RAB To Be Released List* IE) set to the same value, the eNB shall initiate the release of one corresponding E-RAB and ignore the duplication of the instances of the selected corresponding E-RABs.

If the MME receives an E-RAB RELEASE INDICATION message containing multiple *E-RAB ID* IEs (in the *E-RAB Released List* IE) set to the same value, the MME shall initiate the release of one corresponding E-RAB and ignore the duplication of the instances of the selected corresponding E-RABs.

If the eNB receives an E-RAB RELEASE COMMAND message containing some *E-RAB ID* IEs that eNB does not recognize, the eNB shall report the corresponding invalid E-RABs as failed in the E-RAB RELEASE RESPONSE message with the appropriate cause, e.g., "Unknown E-RAB ID".

8.2.4 E-RAB Modification Indication

8.2.4.1 General

The purpose of the E-RAB Modification Indication procedure is to enable the eNB to request modifications of already established E-RABs for a given UE. The procedure uses UE-associated signalling.

8.2.4.2 Successful Operation

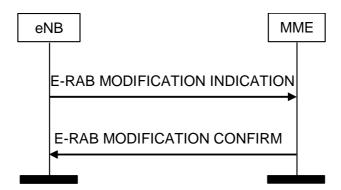


Figure 8.2.4.2-1: E-RAB Modification Indication procedure. Successful operation.

The eNB initiates the procedure by sending an E-RAB MODIFICATION INDICATION message to the MME.

The *Transport Layer Address* IE and *DL GTP TEID* IE included in the *E-RAB To Be Modified Item IEs* IE in the E-RAB MODIFICATION INDICATON message shall be considered by the MME as the new DL address of the E-RABs. The *Transport Layer Address* IE and *DL GTP TEID* IE included in the *E-RAB Not To Be Modified Item IEs* IE in the E-RAB MODIFICATION INDICATION message shall be considered by the MME as the E-RABs with unchanged DL address

If the *Secondary RAT Usage Report List* IE is included in the E-RAB MODIFICATION INDICATION message, the MME shall handle this information as specified in TS 23.401 [11].

The E-RAB MODIFICATION CONFIRM message shall contain the result for all the E-RABs that were requested to be modified according to the *E-RAB To Be Modified Item IEs* IE of the E-RAB MODIFICATION INDICATION message as follows:

- A list of E-RABs which are successfully modified shall be included in the E-RAB Modify List IE.
- A list of E-RABs which failed to be modified, if any, shall be included in the E-RAB Failed to Modify List IE.
- A list of E-RABs which are to be released, if any, shall be included in the E-RAB To Be Released List IE.

If the E-RAB Failed to Modify List IE is received in the E-RAB MODIFICATION CONFIRM message, the eNB shall either

- release all corresponding E-UTRA and E-UTRAN resources for the concerned E-RAB or

- keep the previous transport information before sending the E-RAB MODIFICATION INDICATION message unchanged for the concerned E-RAB.

If the *E-RAB To Be Released List* IE is received in the E-RAB MODIFICATION CONFIRM message, the eNB shall release all corresponding E-UTRA and E-UTRAN resources for the concerned E-RAB.

If the CSG Membership Info IE is included in the E-RAB MODIFICATION INDICATION message, the MME shall use the information for CSG membership verification as specified in TS 36.300 [14] and provide the result of the membership verification in the CSG Membership Status IE contained in the E-RAB MODIFICATION CONFIRM message.

If *PLMN Identity* IE is received in the *CSG Membership Info* IE in the E-RAB MODIFICATION INDICATION message, the MME shall use it for CSG membership verification as specified in TS 36.300 [14].

When the MME reports unsuccessful modification of an E-RAB, the cause value should be precise enough to enable the eNB to know the reason for an unsuccessful modification.

If the *Tunnel Information for BBF* IE is received in the E-RAB MODIFICATION INDICATION message, the MME shall, if supported, use it in the core network as specified in TS 23.139 [37].

If the *User Location Information* IE is included in the E-RAB MODIFICATION INDICATION message, the MME shall handle this information as specified in TS 23.401 [11].

Interactions with E-RAB Setup procedure or E-RAB Modify procedure:

If the E-RAB MODIFICATION INDICATION message is received by the MME during an ongoing E-RAB Setup procedure or an ongoing E-RAB Modify procedure, the MME shall proceed with the E-RAB Modification Indication procedure.

8.2.4.3 Unsuccessful Operation

The unsuccessful operation is specified in the successful operation section.

8.2.4.4 Abnormal Conditions

Interaction with UE Context Release Request procedure:

If the E-RAB MODIFICATION INDICATION message does not contain all the E-RABs previously included in the UE Context, the MME shall trigger the UE Context Release procedure.

If the E-RAB MODIFICATION INDICATION message contains several *E-RAB ID* IEs set to the same value, the MME shall trigger the UE Context Release procedure.

If the *CSG Membership Info* IE in the E-RAB MODIFICATION INDICATION message does not contain the *Cell Access Mode* IE set to "hybrid", the MME shall trigger the UE Context Release procedure.

8.3 Context Management procedures

8.3.1 Initial Context Setup

8.3.1.1 General

The purpose of the Initial Context Setup procedure is to establish the necessary overall initial UE Context including E-RAB context, the Security Key, Handover Restriction List, UE Radio capability and UE Security Capabilities etc. The procedure uses UE-associated signalling.

8.3.1.2 Successful Operation

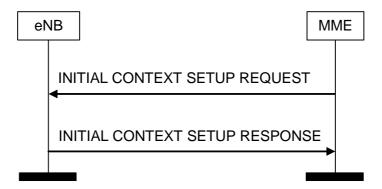


Figure 8.3.1.2-1: Initial Context Setup procedure. Successful operation.

In case of the establishment of an E-RAB the EPC must be prepared to receive user data before the INITIAL CONTEXT SETUP RESPONSE message has been received by the MME. If no UE-associated logical S1-connection exists, the UE-associated logical S1-connection shall be established at reception of the INITIAL CONTEXT SETUP REQUEST message.

The INITIAL CONTEXT SETUP REQUEST message shall contain within the *E-RAB to be Setup List* IE the information required by the eNB to build the new E-RAB configuration consisting of at least one additional E-RAB.

The *E-RAB to be Setup Item* IE may contain:

- the *NAS-PDU* IE,
- the Correlation ID IE in case of LIPA operation,
- the SIPTO Correlation ID IE in case of SIPTO@LN operation,
- the Bearer Type IE.

The INITIAL CONTEXT SETUP REQUEST message may contain

- the *Trace Activation* IE.
- the Handover Restriction List IE, which may contain roaming or access restrictions.
- the *UE Radio Capability* IE.
- the Subscriber Profile ID for RAT/Frequency priority IE.
- the Additional RRM Policy Index IE.
- the CS Fallback Indicator IE.
- the SRVCC Operation Possible IE.
- the CSG Membership Status IE.
- the *Registered LAI* IE.
- the *GUMMEI* IE, which indicates the MME serving the UE, and shall only be present according to subclauses 4.6.2 and 4.7.6.6 of TS 36.300 [14].
- the *MME UE S1AP ID 2* IE, which indicates the MME UE S1AP ID assigned by the MME, and shall only be present according to subclause 4.6.2 of TS 36.300 [14].
- the Management Based MDT Allowed IE.
- the Management Based MDT PLMN List IE.
- the Additional CS Fallback Indicator IE.

- the Masked IMEISV IE.
- the *Expected UE Behaviour* IE.
- the *ProSe Authorized* IE.
- the *UE User Plane CIoT Support Indicator* IE.
- the *V2X Services Authorized* IE.
- the UE Sidelink Aggregate Maximum Bit Rate IE.
- the NR UE Security Capabilities IE.
- the Aerial UE subscription information IE.
- the Pending Data Indication IE.
- the *IAB Authorized* IE.
- the NR V2X Services Authorized IE.
- the NR UE Sidelink Aggregate Maximum Bit Rate IE.
- the PC5 QoS Parameters IE.

The INITIAL CONTEXT SETUP REQUEST message shall contain the *Subscriber Profile ID for RAT/Frequency priority* IE, if available in the MME.

If the *Correlation ID* IE is included in the INITIAL CONTEXT SETUP REQUEST message towards the eNB with L-GW function for LIPA operation, then the eNB shall use this information for LIPA operation for the concerned E-RAB.

If the SIPTO Correlation ID IE is included in the INITIAL CONTEXT SETUP REQUEST message towards the eNB with L-GW function for SIPTO@LN operation, then the eNB shall use this information for SIPTO@LN operation for the concerned E-RAB.

If the *Bearer Type* IE is included in the INITIAL CONTEXT SETUP REQUEST message and is set to "non IP", then the eNB shall not perform IP header compression for the concerned E-RAB.

If the *Ethernet Type* IE is included in the INITIAL CONTEXT SETUP REQUEST message and is set to "True", then the eNB shall, if supported, take this into account to perform header compression appropriately for the concerned E-RAB.

If the *Masked IMEISV* IE is contained in the INITIAL CONTEXT SETUP REQUEST the target eNB shall, if supported, use it to determine the characteristics of the UE for subsequent handling.

If the *Expected UE Behaviour* IE is included in the INITIAL CONTEXT SETUP REQUEST message, the eNB shall, if supported, store this information and may use it to determine the RRC connection time.

Upon receipt of the INITIAL CONTEXT SETUP REQUEST message the eNB shall

- attempt to execute the requested E-RAB configuration.
- store the UE Aggregate Maximum Bit Rate in the UE context, and use the received UE Aggregate Maximum Bit Rate for non-GBR Bearers for the concerned UE.
- pass the value contained in the *E-RAB ID* IE and the *NAS-PDU* IE received for the E-RAB for each established Data radio bearer to the radio interface protocol. The eNB shall not send the NAS PDUs associated to the failed Data radio bearers to the UE.
- store the received Handover Restriction List in the UE context.
- store the received UE Radio Capability in the UE context.
- store the received Subscriber Profile ID for RAT/Frequency priority in the UE context and use it as defined in TS 36.300 [14].

- if supported, store the received *Additional RRM Policy Index* IE in the UE context and use it as defined in TS 36.300 [14].
- store the received SRVCC Operation Possible in the UE context and use it as defined in TS 23.216 [9].
- store the received UE Security Capabilities in the UE context.
- store the received Security Key in the UE context, take it into use and associate it with the initial value of NCC as defined in TS 33.401 [15].
- store the received CSG Membership Status, if supported, in the UE context.
- store the received Management Based MDT Allowed information, if supported, in the UE context.
- store the received Management Based MDT PLMN List information, if supported, in the UE context.
- store the received ProSe Authorization information, if supported, in the UE context.
- store the received V2X Services Authorization information, if supported, in the UE context.
- store the received UE Sidelink Aggregate Maximum Bit Rate, if supported, in the UE context, and use it for the concerned UE's sidelink communication in network scheduled mode for V2X services.
- store the received IAB Authorization Information, if supported, in the UE context.
- store the received NR V2X Services Authorization information, if supported, in the UE context.
- store the received NR UE Sidelink Aggregate Maximum Bit Rate, if supported, in the UE context, and use it for the concerned UE's sidelink communication in network scheduled mode for NR V2X services.
- store the received PC5 QoS Parameters, if supported, in the UE context, and use it for the concerned UE's NR sidelink communication as specified in TS 23.285 [49].

For the Initial Context Setup an initial value for the Next Hop Chaining Count is stored in the UE context.

The allocation of resources according to the values of the *Allocation and Retention Priority* IE shall follow the principles described for the E-RAB Setup procedure.

The eNB shall use the information in the *Handover Restriction List* IE if present in the INITIAL CONTEXT SETUP REQUEST message to

- determine a target for subsequent mobility action for which the eNB provides information about the target of the mobility action towards the UE, except if the *CS Fallback Indicator* IE is set to "CS Fallback High Priority" and the *Additional CS Fallback Indicator* IE is not present in which case the eNB may use the information in the *Handover Restriction List* IE;
- select a proper SCG during dual connectivity operation.

If the *Handover Restriction List* IE is not contained in the INITIAL CONTEXT SETUP REQUEST message, the eNB shall consider that no roaming and no access restriction apply to the UE. The eNB shall also consider that no roaming and no access restriction apply to the UE when:

- one of the setup E-RABs has a particular ARP value (TS 23.401 [11]);
- the CS Fallback Indicator IE is set to "CS Fallback High Priority" and the Additional CS Fallback Indicator IE is not present and, in case the Handover Restriction List IE is applied, no suitable target is found, in which case it shall process according to TS 23.272 [17];
- the *CS Fallback Indicator* IE is set to "CS Fallback High Priority" and the *Additional CS Fallback Indicator* IE is set to "no restriction", in which case it shall process according to TS 23.272 [17].

If the *Trace Activation* IE is included in the INITIAL CONTEXT SETUP REQUEST message then eNB shall, if supported, initiate the requested trace function as described in TS 32.422 [10]. In particular, the eNB shall, if supported:

- if the *Trace Activation* IE does not include the *MDT Configuration* IE, initiate the requested trace session as described in TS 32.422 [10];

- if the *Trace Activation* IE includes the *MDT Activation* IE, within the *MDT Configuration* IE, set to "Immediate MDT and Trace", initiate the requested trace session and MDT session as described in TS 32.422 [10];
- if the *Trace Activation* IE includes the *MDT Activation* IE, within the *MDT Configuration* IE, set to "Immediate MDT Only", "Logged MDT only" or "Logged MBSFN MDT", initiate the requested MDT session as described in TS 32.422 [10] and the eNB shall ignore *Interfaces To Trace* IE, and *Trace Depth* IE.
- if the *Trace Activation* IE includes the *MDT Location Information* IE, within the *MDT Configuration* IE, store this information and take it into account in the requested MDT session.
- if the *Trace Activation* IE includes the *Signalling based MDT PLMN List* IE, within the *MDT Configuration* IE, the eNB may use it to propagate the MDT Configuration as described in TS 37.320 [31].
- if the *Trace Activation* IE includes the *MBSFN-ResultToLog* IE, within the *MDT Configuration* IE, take it into account for MDT Configuration as described in TS 37.320 [31].
- if the *Trace Activation* IE includes the *MBSFN-Areald* IE in the *MBSFN-ResultToLog* IE, within the *MDT Configuration* IE, take it into account for MDT Configuration as described in TS 37.320 [31].
- if the *Trace Activation* IE includes the *UE Application layer measurement configuration* IE, initiate the requested trace session and QoE Measurement Collection function as described in TS 36.300 [14].
- if the *Trace Activation* IE includes the *Bluetooth Measurement Configuration* IE, within the *MDT Configuration* IE, take it into account for MDT Configuration as described in TS 37.320 [31].
- if the *Trace Activation* IE includes the *WLAN Measurement Configuration* IE, within the *MDT Configuration* IE, take it into account for MDT Configuration as described in TS 37.320 [31].
- if the *Trace Activation* IE includes the *MDT Configuration NR* IE, store and forward the *MDT Configuration NR* IE to the SgNB, if the eNB has configured EN-DC for the UE.

If the *CS Fallback Indicator* IE is included in the INITIAL CONTEXT SETUP REQUEST message, it indicates that the UE Context to be set-up is subject to CS Fallback. The eNB shall reply with the INITIAL CONTEXT SETUP RESPONSE message and then act as defined in TS 23.272 [17].

If the *Registered LAI* IE is included in the INITIAL CONTEXT SETUP REQUEST message, it indicates that the eNB may take the *Registered LAI* IE into account when selecting the target cell or frequency and then act as defined in TS 23.272 [17].

If the *UE Security Capabilities* IE included in the INITIAL CONTEXT SETUP REQUEST message only contains the EIA0 algorithm as defined in TS 33.401 [15] and if this EIA0 algorithm is defined in the configured list of allowed integrity protection algorithms in the eNB (TS 33.401 [15]), the eNB shall take it into use and ignore the keys received in the *Security Key* IE.

If the *GUMMEI* IE is contained in the INITIAL CONTEXT SETUP REQUEST message, the eNB shall, if supported, store this information in the UE context and use it for subsequent X2 handovers.

If the MME UE S1AP ID 2 IE is contained in the INITIAL CONTEXT SETUP REQUEST message, the eNB shall, if supported, store this information in the UE context and use it for subsequent X2 handovers.

If the *Management Based MDT Allowed* IE is contained in the INITIAL CONTEXT SETUP REQUEST message, the eNB shall use it, if supported, together with information in the *Management Based MDT PLMN List* IE, if available in the UE context, to allow subsequent selection of the UE for management based MDT defined in TS 32.422 [10].

If the *UE User Plane CloT Support Indicator* IE is included in the INITIAL CONTEXT SETUP REQUEST message and is set to "supported", the eNB shall, if supported, consider that User Plane CloT EPS Optimisation as specified in TS 23.401 [11] is supported for the UE.

If the *Enhanced Coverage Restricted* IE is included in the INITIAL CONTEXT SETUP REQUEST message, the eNB shall store this information in the UE context and use it as defined in TS 23.401 [11].

If the *CE-Mode-B Restricted* IE is included in the INITIAL CONTEXT SETUP REQUEST message and the *Enhanced Coverage Restricted* IE is not set to *restricted* and the Enhanced Coverage Restricted information stored in the UE context is not set to *restricted*, the eNB shall store this information in the UE context and use it as defined in TS 23.401 [11].

If the *NR UE Security Capabilities* IE is included in the INITIAL CONTEXT SETUP REQUEST message, the eNB shall, if supported, store this information in the UE context and use it as defined in TS 33.401 [15].

If the *Aerial UE subscription information* IE is included in the INITIAL CONTEXT SETUP REQUEST message, the eNB shall, if supported, store this information in the UE context and use it as defined in TS 36.300 [14].

If the *Pending Data Indication* IE is included in the INITIAL CONTEXT SETUP REQUEST message, the eNB shall use it as defined in TS 23.401 [11].

If the *Subscription Based UE Differentiation Information* IE is included in the INITIAL CONTEXT SETUP REQUEST message, the eNB shall, if supported, store this information in the UE context for further use according to TS 23.401 [11].

If the *UE Radio Capability ID* IE is included in the INITIAL CONTEXT SETUP REQUEST message, the eNB shall, if supported, use it as defined in TS 23.401 [11].

The eNB shall report to the MME, in the INITIAL CONTEXT SETUP RESPONSE message, the successful establishment of the security procedures with the UE, and, the result for all the requested E-RABs in the following way:

- A list of E-RABs which are successfully established shall be included in the E-RAB Setup List IE
- A list of E-RABs which failed to be established shall be included in the E-RAB Failed to Setup List IE.

When the eNB reports the unsuccessful establishment of an E-RAB, the cause value should be precise enough to enable the MME to know the reason for the unsuccessful establishment, e.g., "Radio resources not available", "Failure in the Radio Interface Procedure".

After sending the INITIAL CONTEXT SETUP RESPONSE message, the procedure is terminated in the eNB.

8.3.1.3 Unsuccessful Operation

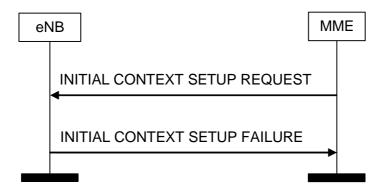


Figure 8.3.1.3-1: Initial Context Setup procedure. Unsuccessful operation.

If the eNB is not able to establish an S1 UE context, or cannot even establish one non GBR bearer it shall consider the procedure as failed and reply with the INITIAL CONTEXT SETUP FAILURE message.

8.3.1.4 Abnormal Conditions

If the eNB receives an INITIAL CONTEXT SETUP REQUEST message containing a *E-RAB Level QoS Parameters* IE which contains a *QCI* IE indicating a GBR bearer (as defined in TS 23.203 [13]), and which does not contain the *GBR QoS Information* IE, the eNB shall consider the establishment of the corresponding E-RAB as failed.

If the eNB receives an INITIAL CONTEXT SETUP REQUEST message containing several *E-RAB ID* IEs (in the *E-RAB to Be Setup List* IE) set to the same value, the eNB shall consider the establishment of the corresponding E-RABs as failed.

If the supported algorithms for encryption defined in the *Encryption Algorithms* IE in the *UE Security Capabilities* IE, plus the mandated support of EEA0 in all UEs (TS 33.401 [15]), do not match any allowed algorithms defined in the configured list of allowed encryption algorithms in the eNB (TS 33.401 [15]), the eNB shall reject the procedure using the INITIAL CONTEXT SETUP FAILURE message.

If the supported algorithms for integrity defined in the *Integrity Protection Algorithms* IE in the *UE Security Capabilities* IE, plus the mandated support of the EIA0 algorithm in all UEs (TS 33.401 [15]), do not match any allowed algorithms defined in the configured list of allowed integrity protection algorithms in the eNB (TS 33.401 [15]), the eNB shall reject the procedure using the INITIAL CONTEXT SETUP FAILURE message.

If the *CSG Membership Status* IE is not included in the INITIAL CONTEXT SETUP REQUEST message and the cell accessed by the UE is a hybrid cell, the eNB shall reject the procedure using the INITIAL CONTEXT SETUP FAILURE message.

If the eNB receives an INITIAL CONTEXT SETUP REQUEST message containing both the *Correlation ID* and the *SIPTO Correlation ID* IEs for the same E-RAB, the eNB shall consider the establishment of the corresponding E-RAB as failed.

8.3.2 UE Context Release Request (eNB initiated)

8.3.2.1 General

The purpose of the UE Context Release Request procedure is to enable the eNB to request the MME to release the UE-associated logical S1-connection due to E-UTRAN generated reasons, e.g., "TX2_{RELOCOverall} Expiry". The procedure uses UE-associated signalling.

8.3.2.2 Successful Operation



Figure 8.3.2.2-1: UE Context Release Request procedure. Successful operation.

The eNB controlling a UE-associated logical S1-connection initiates the procedure by generating a UE CONTEXT RELEASE REQUEST message towards the affected MME node.

The UE CONTEXT RELEASE REQUEST message shall indicate the appropriate cause value, e.g., "User Inactivity", "Radio Connection With UE Lost", "CSG Subscription Expiry", "CS Fallback triggered", "Redirection towards 1xRTT", "Inter-RAT Redirection", "UE Not Available for PS Service", "Release due to pre-emption", for the requested UE-associated logical S1-connection release.

If the *Secondary RAT Usage Report List* IE is included in the UE CONTEXT RELEASE REQUEST message, the MME shall handle this information as specified in TS 23.401 [11].

Interactions with UE Context Release procedure:

The UE Context Release procedure should be initiated upon reception of a UE CONTEXT RELEASE REQUEST message. If the UE was configured with EN-DC radio resources at the time UE Context Release Request procedure was triggered, and the PSCell information was available, the eNB shall store the PSCell information in the UE context.

8.3.3 UE Context Release (MME initiated)

8.3.3.1 General

The purpose of the UE Context Release procedure is to enable the MME to order the release of the UE-associated logical connection due to various reasons, e.g., completion of a transaction between the UE and the EPC, or completion of successful handover, or completion of handover cancellation, or release of the old UE-associated logical S1-connection when two UE-associated logical S1-connections toward the same UE is detected after the UE has initiated the establishment of a new UE-associated logical S1-connection, or the UE is no longer allowed to access the CSG cell (i.e., the UE becomes a non-member of the currently used CSG cell). The procedure uses UE-associated S1 connection.

8.3.3.2 Successful Operation

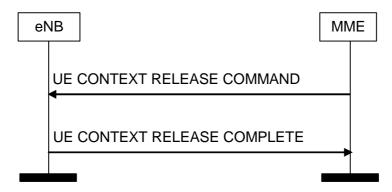


Figure 8.3.3.2-1: UE Context Release procedure. Successful operation.

The MME initiates the procedure by sending the UE CONTEXT RELEASE COMMAND message to the eNB.

The UE CONTEXT RELEASE COMMAND message shall contain the *UE S1AP ID pair* IE if available, otherwise the message shall contain the *MME UE S1AP ID* IE.

The MME provides the *cause* IE set to "Load Balancing TAU Required" in the UE CONTEXT RELEASE COMMAND message sent to the eNB for all load balancing and offload cases in the MME.

Upon reception of the UE CONTEXT RELEASE COMMAND message, the eNB shall release all related signalling and user data transport resources and reply with the UE CONTEXT RELEASE COMPLETE message. In case of eNB supporting L-GW function for LIPA and/or SIPTO@LN operation, the eNB shall also release any related tunnel resources. In case of successful handover, the eNB using L-GW function for SIPTO@LN operation shall also request using intra-node signalling the collocated L-GW to release the SIPTO@LN PDN connection as defined in TS 23.401 [11].

The eNB shall, if supported, report in the UE CONTEXT RELEASE COMPLETE message location information of the UE in the *User Location Information* IE. If the *PSCell Information* IE is included in the *User Location Information* IE, it indicates the UE was configured with EN-DC radio resources at the eNB . Also, if the *Time Since Secondary Node Release* IE is included in the UE CONTEXT RELEASE COMPLETE message, it indicates the time elapsed since EN-DC operation in the eNB was stopped for the UE.

If the *User Location Information* IE is included in the UE CONTEXT RELEASE COMPLETE message, the MME shall handle this information as specified in TS 23.401 [11].

If the *Information on Recommended Cells and eNBs for Paging* IE is included in the UE CONTEXT RELEASE COMPLETE message, the MME shall, if supported, store it and may use it for subsequent paging.

If the *Cell Identifier and Coverage Enhancement Level* IE is included in the UE CONTEXT RELEASE COMPLETE message, the MME shall, if supported, store it and use it for subsequent paging.

If the *Secondary RAT Usage Report List* IE is included in the UE CONTEXT RELEASE COMPLETE message, the MME shall handle this information as specified in TS 23.401 [11].

8.3.3.3 Abnormal Conditions

If the UE Context Release procedure is not initiated towards the eNB before the expiry of the timer $TS1_{RELOCOverall}$, the eNB shall request the MME to release the UE context.

If the UE returns to the eNB before the reception of the UE CONTEXT RELEASE COMMAND message or the expiry of the timer $TS1_{RELOCOverall}$, the eNB shall stop the $TS1_{RELOCOverall}$ and continue to serve the UE.

8.3.4 UE Context Modification

8.3.4.1 General

The purpose of the UE Context Modification procedure is to partly modify the established UE Context, e.g., with the Security Key or the Subscriber Profile ID for RAT/Frequency priority. The procedure uses UE-associated signalling.

8.3.4.2 Successful Operation

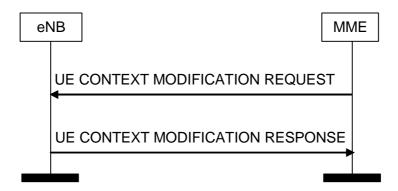


Figure 8.3.4.2-1: UE Context Modification procedure. Successful operation.

The UE CONTEXT MODIFICATION REQUEST message may contain.

- the Security Key IE.
- the Subscriber Profile ID for RAT/Frequency priority IE.
- the Additional RRM Policy Index IE.
- the UE Aggregate Maximum Bit Rate IE.
- the CS Fallback Indicator IE.
- the UE Security Capabilities IE.
- the CSG Membership Status IE.
- the Registered LAI IE.
- the Additional CS Fallback Indicator IE.
- the *ProSe Authorized* IE.
- the SRVCC Operation Possible IE.
- the SRVCC Operation Not Possible IE.
- the V2X Services Authorized IE.
- the UE Sidelink Aggregate Maximum Bit Rate IE.
- the NR UE Security Capabilities IE.
- the Aerial UE subscription information IE.

- the IAB Authorized IE.
- the NR V2X Services Authorized IE.
- the NR UE Sidelink Aggregate Maximum Bit Rate IE.
- the PC5 OoS Parameters IE.
- the UE Radio Capability ID IE.

Upon receipt of the UE CONTEXT MODIFICATION REQUEST message the eNB shall

- store the received *Security Key* IE, take it into use and associate it with the initial value of NCC as defined in TS 33.401 [15]
- store the *UE Security Capabilities* IE and take them into use together with the received keys according to TS 33.401 [15].
- if supported, store the NR UE Security Capabilities IE and use it as defined in TS 33.401 [15]
- store the Subscriber Profile ID for RAT/Frequency priority IE and use it as defined in TS 36.300 [14].
- if supported, store the Additional RRM Policy Index IE and use it as defined in TS 36.300 [14].
- store the received IAB Authorized IE, if supported, in the UE context.

If the *UE Aggregate Maximum Bit Rate* IE is included in the UE CONTEXT MODIFICATION REQUEST message the eNB shall:

- replace the previously provided UE Aggregate Maximum Bit Rate by the received UE Aggregate Maximum Bit Rate in the UE context;
- use the received UE Aggregate Maximum Bit Rate for non-GBR Bearers for the concerned UE.

If the *CSG Membership Status* IE is received in the UE CONTEXT MODIFICATION REQUEST message, the eNB shall take the following action:

- If the cell that serves the UE is a hybrid cell, the eNB shall store the value contained in the *CSG Membership Status* IE and replace any previously stored membership status value by this new one. It shall then use it as defined in TS 36.300 [14].
- If the cell that serves the UE is a CSG cell, and the *CSG Membership Status* IE is set to "not-member", the eNB should initiate actions to ensure that the UE is no longer served by the CSG cell as defined in TS 36.300 [14].
- If the UE is in dual connectivity operation and the cell configured as SCG is a hybrid cell, the eNB shall inform the eNB serving the SCG of the updated CSG membership status.

If the *UE Aggregate Maximum Bit Rate* IE is not contained in the UE CONTEXT MODIFICATION REQUEST message, the eNB shall use the previously provided UE Aggregate Maximum Bit Rate which is stored in the UE context.

If the *CS Fallback Indicator* IE is included in the UE CONTEXT MODIFICATION REQUEST message, it indicates that the concerned UE Context is subject to CS Fallback. The eNB shall reply with the UE CONTEXT MODIFICATION RESPONSE message and then act as defined in TS 23.272 [17]. If the *CS Fallback Indicator* IE is set to "CS Fallback High Priority" and the *Additional CS Fallback Indicator* IE is not present and, in case the Handover Restriction List information that may exist in the UE context is applied, no suitable target is found, or if the *CS Fallback Indicator* IE is set to "CS Fallback High Priority" and the *Additional CS Fallback Indicator* IE is set to "no restriction", the eNB shall consider that no roaming and no access restriction apply to the UE and process according to TS 23.272 [17].

If the *Registered LAI* IE is included in the UE CONTEXT MODIFICATION REQUEST message, it indicates that the eNB may take the *Registered LAI* IE into account when selecting the target cell or frequency and then act as defined in TS 23.272 [17].

If the *ProSe Authorized* IE is contained in the UE CONTEXT MODIFICATION REQUEST message, the eNB shall, if supported, update its ProSe authorization information for the UE accordingly. If the *ProSe Authorized* IE includes one

or more IEs set to "not authorized", the eNB shall, if supported, initiate actions to ensure that the UE is no longer accessing the relevant ProSe service(s).

If the *SRVCC Operation Possible* IE is included in UE CONTEXT MODIFICATION REQUEST message, the eNB shall store content of the received *SRVCC Operation Possible* IE in the UE context and, if supported, use it as defined in TS 23.216 [9].

If the *SRVCC Operation Not Possible* IE is included in UE CONTEXT MODIFICATION REQUEST message, the eNB shall, if supported, remove the SRVCC Operation Possible information from the UE context.

If the *V2X Services Authorized* IE is contained in the UE CONTEXT MODIFICATION REQUEST message, the eNB shall, if supported, update its V2X services authorization information for the UE accordingly. If the *V2X Services Authorized* IE includes one or more IEs set to "not authorized", the eNB shall, if supported, initiate actions to ensure that the UE is no longer accessing the relevant service(s).

If the *UE Sidelink Aggregate Maximum Bit Rate* IE is included in the UE CONTEXT MODIFICATION REQUEST message, the eNB shall, if supported:

- replace the previously provided UE Sidelink Aggregate Maximum Bit Rate, if available in the UE context, with the received value;
- use the received value for the concerned UE's sidelink communication in network scheduled mode for V2X services.

If the *Aerial UE subscription information* IE is included in the UE CONTEXT MODIFICATION REQUEST message, the eNB shall, if supported, store this information in the UE context and use it as defined in TS 36.300 [14].

If the *UE Radio Capability ID* IE is included in the UE CONTEXT MODIFICATION REQUEST message, the eNB shall, if supported, use it as defined in TS 23.401 [11].

The eNB shall report, in the UE CONTEXT MODIFICATION RESPONSE message to the MME the successful update of the UE context.

After sending the UE CONTEXT MODIFICATION RESPONSE message, the procedure is terminated in the eNB.

If the *NR V2X Services Authorized* IE is contained in the UE CONTEXT MODIFICATION REQUEST message, the eNB shall, if supported, update its V2X services authorization information for the UE accordingly. If the *NR V2X Services Authorized* IE includes one or more IEs set to "not authorized", the eNB shall, if supported, initiate actions to ensure that the UE is no longer accessing the relevant service(s).

If the NR UE Sidelink Aggregate Maximum Bit Rate IE is included in the UE CONTEXT MODIFICATION REQUEST message, the eNB shall, if supported:

- replace the previously provided NR UE Sidelink Aggregate Maximum Bit Rate, if available in the UE context, with the received value;
- use the received value for the concerned UE's sidelink communication in network scheduled mode for NR V2X services.

If the *PC5 QoS Parameters* IE is included in the UE CONTEXT MODIFICATION REQUEST message, the eNB shall, if supported, use it for the concerned UE's NR sidelink communication as specified in TS 23.285 [49].

8.3.4.3 Unsuccessful Operation

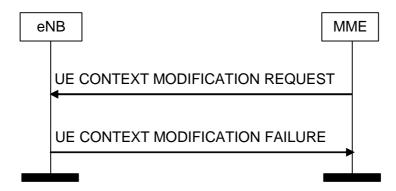


Figure 8.3.4.3-1: UE Context Modification procedure. Unsuccessful operation.

In case the UE context update cannot be performed successfully the eNB shall respond with the UE CONTEXT MODIFICATION FAILURE message to the MME with an appropriate cause value in the *Cause* IE.

8.3.4.4 Abnormal Conditions

If the eNB receives both the *CS Fallback Indicator* IE and one of the security IEs (either the *Security Key* IE or the *UE Security Capabilities* IE) in the UE Context Modification Request message, the eNB shall ignore both IEs and send back the UE CONTEXT MODIFICATION FAILURE message with an appropriate cause value.

8.3.5 UE Radio Capability Match

8.3.5.1 General

The purpose of the UE Radio Capability Match procedure is for the MME to request the eNB to derive and provide an indication to the MME whether the UE radio capabilities are compatible with the network configuration for voice continuity.

The procedure uses UE-associated signalling.

8.3.5.2 Successful Operation

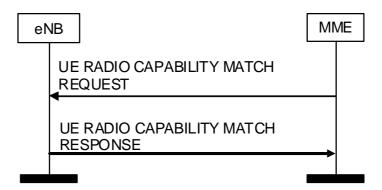


Figure 8.3.5.2-1: UE Radio Capability Match. Successful operation

The MME initiates the procedure by sending a UE RADIO CAPABILITY MATCH REQUEST message. If the UE-associated logical S1-connection is not established, the MME shall allocate a unique MME UE S1AP ID to be used for the UE and include the *MME UE S1AP ID* IE in the UE RADIO CAPABILITY MATCH REQUEST message; by receiving the *MME UE S1AP ID* IE in the UE RADIO CAPABILITY MATCH REQUEST message, the eNB establishes the UE-associated logical S1-connection.

Upon receipt of the UE RADIO CAPABILITY MATCH REQUEST message, the eNB shall act as defined in the TS 23.401 [11] and respond with a UE RADIO CAPABILITY MATCH RESPONSE message.

If the *UE Radio Capability* IE is contained in the UE RADIO CAPABILITY MATCH REQUEST message, the eNB shall use it to determine the value of the *Voice Support Match Indicator* IE to be included in the UE RADIO CAPABILITY MATCH RESPONSE message.

If the *UE Radio Capability ID* IE is included in the UE RADIO CAPABILITY MATCH REQUEST message, the eNB shall, if supported, use it as defined in TS 23.401 [11].

8.3.5.3 Unsuccessful Operation

Not applicable.

8.3.5.4 Abnormal Conditions

Not applicable.

8.3.6 UE Context Modification Indication

8.3.6.1 General

The purpose of the UE Context Modification Indication procedure is for the eNB to request the modifications on the established UE Context.

The procedure uses UE-associated signalling.

In the current version of the specification, this procedure is only used for membership verification, as described in TS 36.300 [14].

8.3.6.2 Successful Operation

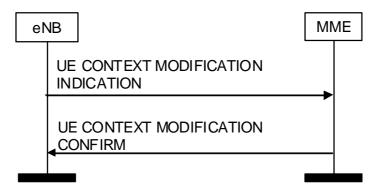


Figure 8.3.6.2-1: UE Context Modification Indication. Successful operation

If the *CSG Membership Info* IE is included in the UE CONTEXT MODIFICATION INDICATION message, the MME shall use the information for CSG membership verification as specified in TS 36.300 [14] and provide the result of the membership verification in the *CSG Membership Status* IE contained in the UE CONTEXT MODIFICATION CONFIRM message.

If no CSG Membership Info IE is received in the UE CONTEXT MODIFICATION INDICATION message and the UE was previously configured with resources from a hybrid cell, the MME shall consider that the UE has moved into an open access cell.

If *PLMN Identity* IE is received in the *CSG Membership Info* IE in the UE CONTEXT MODIFICATION INDICATION message, the MME shall use it for CSG membership verification as specified in TS 36.300 [14].

8.3.6.3 Unsuccessful Operation

Not applicable.

8.3.6.4 Abnormal Conditions

If the *CSG Membership Info* IE in the UE CONTEXT MODIFICATION message does not contain the *Cell Access Mode* IE set to "hybrid" the MME shall trigger the UE Context Release procedure.

8.3.7 UE Context Suspend

8.3.7.1 General

The purpose of the UE Context Suspend procedure is to suspend the UE context, the UE-associated logical S1-connection and the related bearer contexts in the E-UTRAN and the EPC.

8.3.7.2 Successful Operation

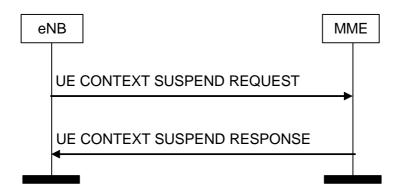


Figure 8.3.7.2-1: UE Context Suspend procedure. Successful operation.

The eNB initiates the procedure by sending the UE CONTEXT SUSPEND REQUEST message to the MME.

Upon receipt of the UE CONTEXT SUSPEND REQUEST the MME shall act as defined in TS 23.401 [11].

Upon receipt of the UE CONTEXT SUSPEND RESPONSE message the eNB shall suspend the UE context, the UE-associated logical S1-connection and the related bearer contexts and send the UE to RRC_IDLE.

If the *Information on Recommended Cells and eNBs for Paging* IE is included in the UE CONTEXT SUSPEND REQUEST message, the MME shall, if supported, store it and may use it for subsequent paging.

If the *Cell Identifier and Coverage Enhancement Level* IE is included in the UE CONTEXT SUSPEND REQUEST message, the MME shall, if supported, store it and use it for subsequent paging.

If the *Secondary RAT Usage Report List* IE is included in the UE CONTEXT SUSPEND REQUEST message, the MME shall handle this information as specified in TS 23.401 [11].

If the *Security Context* IE is included in the UE CONTEXT SUSPEND RESPONSE message, the eNB shall store the received *Security Context* IE in the UE context and remove any existing unused stored {NH, NCC} as specified in TS 33.401 [15].

The eNB shall, if supported, report in the UE CONTEXT SUSPEND REQUEST message location information of the UE in the *User Location Information* IE. If the *PSCell Information* IE is included in the *User Location Information* IE, it indicates the UE was configured with EN-DC radio resources at the eNB. Also, if the *Time Since Secondary Node Release* IE is included in the UE CONTEXT SUSPEND REQUEST message, it indicates the time elapsed since EN-DC operation in the eNB was stopped for the UE.

8.3.8 UE Context Resume

8.3.8.1 General

The purpose of the UE Context Resume procedure is to indicate to the MME that the UE has resumed the suspended RRC connection or accesses for early data transmission and to request the MME to resume the UE context, UE-associated logical S1-connection and the related bearer contexts in the EPC.

8.3.8.2 Successful Operation

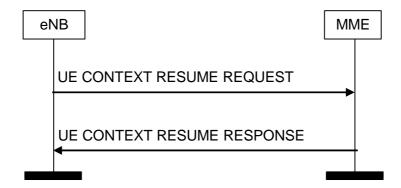


Figure 8.3.8.2-1: UE Context Resume procedure. Successful operation.

The eNB initiates the procedure by sending the UE CONTEXT RESUME REQUEST message to the MME. If the eNB is not able to admit all suspended E-RABs the eNB shall indicate this in the *E-RABs Failed To Resume List* IE.

Upon receipt of the UE CONTEXT RESUME REQUEST message the MME shall act as defined in TS 23.401 [11] and respond with the UE CONTEXT RESUME RESPONSE. If the MME is not able to admit all suspended E-RABs the MME shall indicate this in the *E-RABs Failed To Resume List* IE.

The eNB shall release resources for each E-RAB failed to resume and shall assume that the EPC has released respective resources as well.

If the *Security Context* IE is included in the UE CONTEXT RESUME RESPONSE message, the eNB shall store the received *Security Context* IE in the UE context and the eNB shall use it for the next suspend/resume or X2 handover or Intra eNB handovers as specified in TS 33.401 [15].

If the *Pending Data Indication* IE is included in the UE CONTEXT RESUME RESPONSE message, the eNB shall use it as defined in TS 23.401 [11].

If the UE Context Resume procedure was initiated as a result of an EDT session as described in TS 36.300 [14] and the *Pending Data Indication* IE is received in the UE CONTEXT RESUME RESPONSE message, the eNB shall, if supported, use it to decide whether to proceed to set up an RRC connection for the UE.

8.3.8.3 Unsuccessful Operation

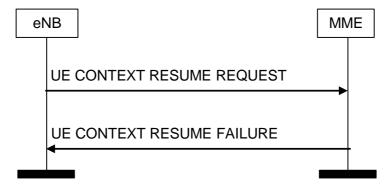


Figure 8.3.8.3-1: UE Context Resume procedure. Unsuccessful operation.

If the MME is not able to resume a single E-RAB it releases the UE-associated logical S1-connection by sending the UE CONTEXT RESUME FAILURE message to the eNB. Upon reception of the UE CONTEXT RESUME FAILURE message the eNB shall release the RRC connection as specified in TS 36.331 [16] and release all related signalling and user data transport resources.

8.3.9 Connection Establishment Indication

8.3.9.1 General

The purpose of the Connection Establishment Indication procedure is to enable the MME to complete the establishment of the UE-associated logical S1-connection, and/or trigger the eNB to obtain and report UE Radio Capability. The procedure uses UE-associated signalling.

8.3.9.2 Successful Operation



Figure 8.3.9.2-1: Connection Establishment Indication procedure. Successful operation.

The MME initiates the procedure by sending a CONNECTION ESTABLISHMENT INDICATION message to the eNB.

If the UE-associated logical S1-connection is not established, the MME shall allocate a unique MME UE S1AP ID to be used for the UE and include that in the CONNECTION ESTABLISHMENT INDICATION message.

If the *UE Radio Capability* IE is included in the CONNECTION ESTABLISHMENT INDICATION message, the eNB shall store this information in the UE context, use it as defined in TS 36.300 [14].

If the *Enhanced Coverage Restricted* IE is included in the CONNECTION ESTABLISHMENT INDICATION message, the eNB shall store this information in the UE context and use it as defined in TS 23.401 [11].

If the *DL CP Security Information* IE is included in the CONNECTION ESTABLISHMENT INDICATION message, the eNB shall forward this information to the UE as described in TS 36.300 [14].

If the *CE-Mode-B Restricted* IE is included in the CONNECTION ESTABLISHMENT INDICATION message and the *Enhanced Coverage Restricted* IE is not set to *restricted* and the Enhanced Coverage Restricted information stored in the UE context is not set to *restricted*, the eNB shall store this information in the UE context and use it as defined in TS 23.401 [11].

If the *End Indication* IE is included in the CONNECTION ESTABLISHMENT INDICATION message and set to "no further data", the eNB shall consider that there are no further NAS PDUs to be transmitted for this UE.

If the Subscription Based UE Differentiation Information IE is included in the CONNECTION ESTABLISHMENT INDICATION message, the eNB shall, if supported, store this information in the UE context for further use according to TS 23.401 [11].

If the *UE Level QoS Parameters* IE is contained in the CONNECTION ESTABLISHMENT INDICATION message, the eNB shall, if supported, store this information in the UE context, and use it as specified in TS 23.401 [11].

8.3.9.3 Unsuccessful Operation

Not applicable.

8.3.9.4 Abnormal Conditions

Not applicable.

8.3.10 Retrieve UE Information

8.3.10.1 General

The purpose of the Retrieve UE information procedure is for the eNB to request the UE information including QoS Parameters and UE Radio capability from MME, for a NB-IoT UE using Control Plane CIoT EPS Optimisation.

8.3.10.2 Successful Operation

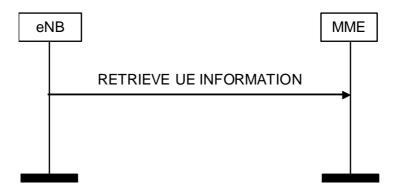


Figure 8.3.10.1: Retrieve UE Information Procedure. Successful operation.

The eNB initiates the procedure by sending the RETRIEVE UE INFORMATION message to the MME.

8.3.10.3 Unsuccessful Operation

Not applicable.

8.3.10.4 Abnormal Conditions

Not applicable.

8.3.11 UE Information Transfer

8.3.11.1 General

The purpose of the UE information transfer procedure is for the MME to send the UE information including QoS Parameters and UE Radio capability to the eNB, for a NB-IoT UE using Control Plane CIoT EPS Optimisation.

8.3.11.2 Successful Operation



Figure 8.3.11.1: UE Information Transfer Procedure. Successful operation.

The MME initiates the procedure by sending the UE INFORMATION TRANSFER message to the eNB.

If the *UE Level QoS Parameters* IE is contained in the UE INFORMATION TRANSFER message, the eNB shall store this information in the UE context, and use it as specified in TS 23.401 [11].

If the *UE Radio Capability* IE is contained in the UE INFORMATION TRANSFER message, the eNB shall store this information in the UE context, and use it as specified in TS 23.401 [11].

If the *Subscription Based UE Differentiation Information* IE is included in the UE INFORMATION TRANSFER message, the eNB shall, if supported, store this information in the UE context for further use according to TS 23.401 [11].

If the *Pending Data Indication* IE is contained in the UE INFORMATION TRANSFER message, the eNB shall store this information in the UE context, and use it as specified in TS 23.401 [11].

8.3.11.3 Unsuccessful Operation

Not applicable.

8.3.11.4 Abnormal Conditions

Not applicable.

8.3.12 eNB CP Relocation Indication

8.3.12.1 General

The purpose of the eNB CP Relocation Indication procedure is to request the MME to authenticate the UE's reestablishment request as described in TS 36.300 [14], and trigger the establishment of the respective UE-associated logical S1-connection, for a NB-IoT UE using Control Plane CIoT EPS Optimisation.

The procedure uses UE-associated signalling.

8.3.12.2 Successful Operation

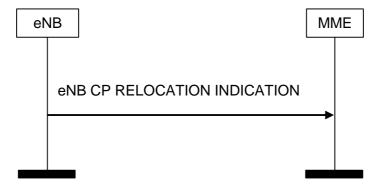


Figure 8.3.12.2-1: eNB CP Relocation Indication. Successful operation.

The eNB initiates the procedure by sending a eNB CP RELOCATION INDICATION message to the MME.

The eNB shall allocate a unique eNB UE S1AP ID to be used for the UE and the eNB shall include this identity in the eNB CP RELOCATION INDICATION message.

8.3.12.3 Unsuccessful Operation

Not applicable.

8.3.12.4 Abnormal Conditions

Not applicable.

8.3.13 MME CP Relocation Indication

8.3.13.1 General

The purpose of the MME CP Relocation Indication procedure is to inform the eNB that the UE's connection is to be relocated to another eNB as described in TS 36.300 [14], for a UE using Control Plane CIoT EPS Optimisation.

The procedure uses UE-associated signalling.

8.3.13.2 Successful Operation

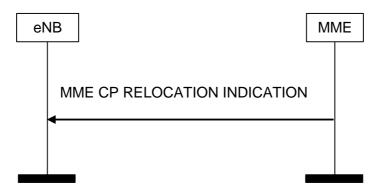


Figure 8.3.13.2-1: MME CP Relocation Indication. Successful operation.

The MME initiates the procedure by sending a MME CP RELOCATION INDICATION message to the eNB.

Upon reception of the MME CP RELOCATION INDICATION message, the eNB shall terminate the delivery of NAS messages that have been received from the MME, and proceed as described in TS 36.300 [14].

8.3.13.3 Unsuccessful Operation

Not applicable.

8.3.13.4 Abnormal Conditions

Not applicable.

8.4 Handover Signalling

8.4.1 Handover Preparation

8.4.1.1 General

The purpose of the Handover Preparation procedure is to request the preparation of resources at the target side via the EPC. There is only one Handover Preparation procedure ongoing at the same time for a certain UE.

8.4.1.2 Successful Operation

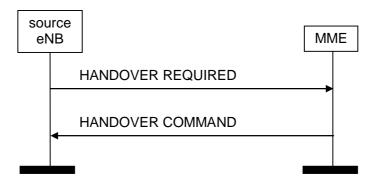


Figure 8.4.1.2-1: Handover preparation: successful operation

The source eNB initiates the handover preparation by sending the HANDOVER REQUIRED message to the serving MME. When the source eNB sends the HANDOVER REQUIRED message, it shall start the timer TS1_{RELOCprep}. The source eNB shall indicate the appropriate cause value for the handover in the *Cause* IE.

The source eNB shall include the *Source to Target Transparent Container* IE in the HANDOVER REQUIRED message.

In case of intra-system handover, the information in the *Source to Target Transparent Container* IE shall be encoded according to the definition of the *Source eNB to Target eNB Transparent Container* IE. In case of handover to UTRAN, the information in the *Source to Target Transparent Container* IE shall be encoded according to the *Source RNC to Target RNC Transparent Container* IE definition as specified in TS 25.413 [19] and the source eNB shall include the *UE History Information* IE in the *Source RNC to Target RNC Transparent Container* IE. If the handover is to GERAN A/Gb mode then the information in the *Source to Target Transparent Container* IE shall be encoded according to the definition of the *Source BSS to Target BSS Transparent Container* IE as described in TS 48.018 [18]. If the handover is to NG-RAN, the information in the *Source to Target Transparent Container* IE shall be encoded according to the *Source NG-RAN Node to Target NG-RAN Node Transparent Container* IE definition as specified in TS 38.413 [44].

When the preparation, including the reservation of resources at the target side is ready, the MME responds with the HANDOVER COMMAND message to the source eNB.

If the *Target to Source Transparent Container* IE has been received by the MME from the handover target then the transparent container shall be included in the HANDOVER COMMAND message.

Upon reception of the HANDOVER COMMAND message the source eNB shall stop the timer $TS1_{RELOCprep}$ and start the timer $TS1_{RELOCOverall}$.

In case of intra-system handover, the information in the *Target to Source Transparent Container* IE shall be encoded according to the definition of the *Target eNB to Source eNB Transparent Container* IE. In case of inter-system handover to UTRAN, the information in the *Target to Source Transparent Container* IE shall be encoded according to the *Target RNC to Source RNC Transparent Container* IE definition as specified in TS 25.413 [19]. In case of inter-system handover to GERAN A/Gb mode, the information in the *Target to Source Transparent Container* IE shall be encoded according to the *Target BSS to Source BSS Transparent Container* IE definition as described in TS 48.018 [18]. In case of inter-system handover to NG-RAN, the information in the *Target to Source Transparent Container* IE shall be encoded according to the *Target NG-RAN Node to Source NG-RAN Node Transparent Container* IE definition as specified in TS 38.413 [44].

If there are any E-RABs that could not be admitted in the target, they shall be indicated in the *E-RABs to Release List* IE.

If the *DL forwarding* IE is included within the *Source eNB to Target eNB Transparent Container* IE of the HANDOVER REQUIRED message and it is set to "DL forwarding proposed", it indicates that the source eNB proposes forwarding of downlink data.

If the MME receives the *Direct Forwarding Path Availability* IE in the HANDOVER REQUIRED message indicating that a direct data path is available, it shall handle it as specified in TS 23.401 [11].

If the CSG Id IE and no Cell Access Mode IE are received in the HANDOVER REQUIRED message, the MME shall perform the access control according to the CSG Subscription Data of that UE and, if the access control is successful or

if at least one of the E-RABs has a particular ARP value (see TS 23.401 [11]), it shall continue the handover and propagate the *CSG Id* IE to the target side. If the access control is unsuccessful but at least one of the E-RABs has a particular ARP value (see TS 23.401 [11]) the MME shall also provide the *CSG Membership Status* IE set to "non member" to the target side.

If the CSG Id IE and the Cell Access Mode IE set to "hybrid" are received in the HANDOVER REQUIRED message, the MME shall provide the membership status of the UE and the CSG Id to the target side.

The source eNB shall include the *SRVCC HO Indication* IE in the HANDOVER REQUIRED message if the SRVCC operation is needed as defined in TS 23.216 [9]. The source eNB shall indicate to the MME in the *SRVCC HO Indication* IE if the handover shall be prepared for PS and CS domain or only for CS domain. The *SRVCC HO Indication* IE is set according to the target cell capability and UE capability. In case the target system is GERAN without DTM support or the UE is without DTM support, the source eNB shall indicate "CS only" in the *SRVCC HO Indication* IE and "PS service not available" in *PS Service Not Available* IE. In case the target system is either GERAN with DTM but without DTM HO support and the UE is supporting DTM or the target system is UTRAN without PS HO support, the source eNB shall indicate "CS only" in the *SRVCC HO Indication* IE. Otherwise, the source eNB shall indicate "PS and CS" in the *SRVCC HO Indication* IE.

In case of inter-system handover from E-UTRAN, the source eNB shall indicate in the *Target ID* IE, in case the target system is UTRAN, the Target RNC-ID of the RNC (including the Routing Area Code only in case the UTRAN PS domain is involved), in case the target system is GERAN the Cell Global Identity (including the Routing Area Code only in case the GERAN PS domain is involved) of the cell, and in case the target system is NG-RAN the Target NG-RAN Node ID of the NG-RAN node in the target system.

In case of inter-system handover from E-UTRAN to UTRAN, the source eNB shall, if supported, include the *HO Cause Value* IE in the *UE History Information* IE of the HANDOVER REQUIRED message.

In case the SRVCC operation is performed and the SRVCC HO Indication IE indicates that handover shall be prepared only for CS domain, and if

- the target system is GERAN, then the source eNB
 - shall encode the information in the *Source to Target Transparent Container* IE within the HANDOVER REQUIRED message, according to the definition of the *Old BSS to New BSS information* IE as specified in TS 48.008 [23], and
 - shall not include the *Source to Target Transparent Container Secondary* IE in the HANDOVER REQUIRED message;
- the target system is UTRAN, then the source eNB
 - shall encode the information in the *Source to Target Transparent Container* IE within the HANDOVER REQUIRED message according to the definition of the *Source RNC to Target RNC Transparent Container* IE as specified in TS 25.413 [19],
 - shall include the *UE History Information* IE in the *Source RNC to Target RNC Transparent Container* IE, and
 - shall not include the *Source to Target Transparent Container Secondary* IE in the HANDOVER REQUIRED message.

In case the SRVCC operation is performed, the *SRVCC HO Indication* IE in the HANDOVER REQUIRED message indicates that handover shall be prepared for PS and CS domain, and if

- the target system is GERAN with DTM HO support, then the source eNB
 - shall encode the information in the *Source to Target Transparent Container* IE within the HANDOVER REQUIRED message according to the definition of the *Source BSS to Target BSS Transparent Container* IE as described in TS 48.018 [18],and
 - shall include the *Source to Target Transparent Container Secondary* IE in the HANDOVER REQUIRED message and encode information in it according to the definition of the *Old BSS to New BSS information* IE as specified in TS 48.008 [23];
- the target system is UTRAN, then the source eNB

- shall encode the information in the *Source to Target Transparent Container* IE within the HANDOVER REQUIRED message according to the definition of the *Source* RNC to *Target RNC Transparent Container* IE as specified in TS 25.413 [19],
- shall include the *UE History Information* IE in the *Source RNC to Target RNC Transparent Container* IE, and
- shall not include the *Source to Target Transparent Container Secondary* IE in the HANDOVER REQUIRED message.

In case the SRVCC operation is performed, the *SRVCC HO Indication* IE in the HANDOVER REQUIRED message indicates that handover shall be prepared only for CS domain, and if

- the target system is GERAN, then the MME
 - shall encode the information in the *Target to Source Transparent Container* IE within the HANDOVER COMMAND message according to the definition of the *Layer 3 Information* IE as specified in TS 48.008 [23], and
 - shall not include the *Target to Source Transparent Container Secondary* IE in the HANDOVER COMMAND message;
- the target system is UTRAN, then the MME
 - shall encode the information in the *Target to Source Transparent Container* IE within the HANDOVER COMMAND message according to the definition of the *Target RNC to Source RNC Transparent Container* IE as specified in TS 25.413 [19], and
 - shall not include the *Target to Source Transparent Container Secondary* IE in the HANDOVER COMMAND message.

In case the SRVCC operation is performed, the *SRVCC HO Indication* IE in the HANDOVER REQUIRED message indicates that handover shall be prepared for PS and CS domain,

- the target system is GERAN with DTM HO support, and if
 - the Handover Preparation procedure has succeeded in the CS and PS domain, then the MME
 - shall encode the information in the *Target to Source Transparent Container* IE within the HANDOVER COMMAND message according to the definition of the *Layer 3 Information* IE as specified in TS 48.008 [23], and
 - shall include the *Target to Source Transparent Container Secondary* IE in the HANDOVER COMMAND message and encode information in it according to the definition of the *Target BSS to Source BSS Transparent Container* IE as specified in TS 48.018 [18];
 - the Handover Preparation procedure has succeeded in the CS domain only, then the MME
 - shall encode the information in the *Target to Source Transparent Container* IE within the HANDOVER COMMAND message according to the definition of the *Layer 3 Information* IE as specified in TS 48.008 [23], and
 - shall not include the *Target to Source Transparent Container Secondary* IE in the HANDOVER COMMAND message;
- the target system is UTRAN, then the Handover Preparation procedure shall be considered successful if the Handover Preparation procedure has succeeded in the CS domain, and the MME
 - shall encode the information in the *Target to Source Transparent Container* IE within the HANDOVER COMMAND message according to the definition of the *Target RNC to Source RNC Transparent Container* IE as specified in TS 25.413 [19], and
 - shall not include the *Target to Source Transparent Container Secondary* IE in the HANDOVER COMMAND message.

If the HANDOVER COMMAND message contains the *DL GTP-TEID* IE and the *DL Transport Layer Address* IE for a given bearer in the *E-RABs Subject to Forwarding List* IE, then the source eNB shall consider that the forwarding of downlink data for this given bearer is possible.

If the HANDOVER COMMAND message contains the *UL GTP-TEID* IE and the *UL Transport Layer Address* IE for a given bearer in the *E-RABs Subject to Forwarding List* IE, then it means the target eNB has requested the forwarding of uplink data for this given bearer.

If the *DAPS Request Information* IE is included for an E-RAB in the *Source eNB to Target eNB Transparent Container* IE within the HANDOVER REQUIRED message, it indicates that the request concerns a DAPS Handover for that E-RAB, as described in TS 36.300 [14].

Interactions with E-RAB Management procedures:

If, after a HANDOVER REQUIRED message is sent and before the Handover Preparation procedure is terminated, the source eNB receives an MME initiated E-RAB Management procedure on the same UE associated signalling connection, the source eNB shall either:

cancel the Handover Preparation procedure by executing the Handover Cancel procedure with an appropriate
cause value. After successful completion of the Handover Cancel procedure, the source eNB shall continue the
MME initiated E-RAB Management procedure

or

2. terminate the MME initiated E-RAB Management procedure by sending the appropriate response message with an appropriate cause value, e.g., "S1 intra system Handover Triggered", "S1 inter system Handover Triggered" to the MME and then the source eNB shall continue with the handover procedure.

8.4.1.3 Unsuccessful Operation

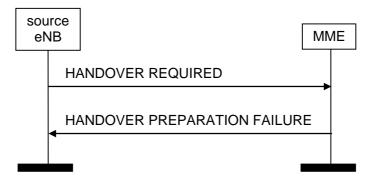


Figure 8.4.1.3-1: Handover preparation: unsuccessful operation

If the EPC or the target system is not able to accept any of the bearers or a failure occurs during the Handover Preparation, the MME sends the HANDOVER PREPARATION FAILURE message with an appropriate cause value to the source eNB.

If the CSG Id IE and no Cell Access Mode IE are received in the HANDOVER REQUIRED message and the access control is unsuccessful and none of the E-RABs has a particular ARP value (see TS 23.401 [11]) the MME shall send the HANDOVER PREPARATION FAILURE message with an appropriate cause value to the source eNB, except when one of the E-RABs has a particular ARP value (see TS 23.401 [11]). Upon reception, the source eNB may decide to prevent handover for that UE towards CSG (Closed Access Mode) cells with corresponding CSG Id.

Interaction with Handover Cancel procedure:

If there is no response from the EPC to the HANDOVER REQUIRED message before timer $TS1_{RELOCprep}$ expires in the source eNB, the source eNB should cancel the Handover Preparation procedure by initiating the Handover Cancel procedure with the appropriate value for the *Cause* IE. The source eNB shall ignore any HANDOVER COMMAND message or HANDOVER PREPARATION FAILURE message received after the initiation of the Handover Cancel procedure.

8.4.1.4 Abnormal Conditions

If the eNB receives at least one E-RAB ID included in the *E-RABs Subject to Forwarding List* IE without at least one valid associated tunnel address pair (in either UL or DL), then the eNB shall consider it as a logical error and act as described in subclause 10.4. A GTP tunnel address pair is considered valid if both the *GTP-TEID* IE and the *Transport Layer Address* IE are present.

8.4.2 Handover Resource Allocation

8.4.2.1 General

The purpose of the Handover Resource Allocation procedure is to reserve resources at the target eNB for the handover of a UE.

8.4.2.2 Successful Operation

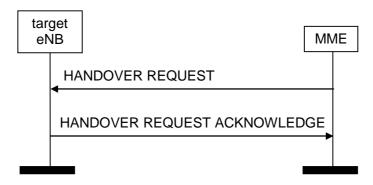


Figure 8.4.2.2-1: Handover resource allocation: successful operation

The MME initiates the procedure by sending the HANDOVER REQUEST message to the target eNB. The HANDOVER REQUEST message may contain the *Handover Restriction List* IE, which contains roaming or access restrictions.

If the *Handover Restriction List* IE is contained in the HANDOVER REQUEST message, the target eNB shall store this information in the UE context. This information shall however not be considered whenever one of the handed over E-RABs has a particular ARP value (TS 23.401 [11]).

The target eNB shall use the information in *Handover Restriction List* IE if present in the HANDOVER REQUEST message to

- determine a target for subsequent mobility action for which the eNB provides information about the target of the mobility action towards the UE;
- select a proper SCG during dual connectivity operation.

If the *Handover Restriction List* IE is not contained in the HANDOVER REQUEST message, the target eNB shall consider that no roaming and no access restriction apply to the UE.

Upon reception of the HANDOVER REQUEST message the eNB shall store the received *UE Security Capabilities* IE in the UE context and use it to prepare the configuration of the AS security relation with the UE.

If the *SRVCC Operation Possible* IE is included in the HANDOVER REQUEST message, the target eNB shall store the content of the received *SRVCC Operation Possible* IE in the UE context and, if supported, use it as defined in TS 23.216 [9].

Upon reception of the HANDOVER REQUEST message the eNB shall store the received *Security Context* IE in the UE context and the eNB shall use it to derive the security configuration as specified in TS 33.401 [15].

If the *Trace Activation* IE is included in the HANDOVER REQUEST message, the target eNB shall if supported, initiate the requested trace function as described in TS 32.422 [10]. In particular, the eNB shall, if supported:

- if the *Trace Activation* IE does not include the *MDT Configuration* IE, initiate the requested trace session as described in TS 32.422 [10];
- if the *Trace Activation* IE includes the *MDT Activation* IE, within the *MDT Configuration* IE, set to "Immediate MDT and Trace", initiate the requested trace session and MDT session as described in TS 32.422 [10];
- if the *Trace Activation* IE includes the *MDT Activation* IE, within the *MDT Configuration* IE, set to "Immediate MDT Only", "Logged MDT only" or "Logged MBSFN MDT", initiate the requested MDT session as described in TS 32.422 [10] and the target eNB shall ignore *Interfaces To Trace* IE, and *Trace Depth* IE.
- if the *Trace Activation* IE includes the *MDT Location Information* IE, within the *MDT Configuration* IE, store this information and take it into account in the requested MDT session.
- if the *Trace Activation* IE includes the *Signalling based MDT PLMN List* IE, within the *MDT Configuration* IE, the eNB may use it to propagate the MDT Configuration as described in TS 37.320 [31].
- if the *Trace Activation* IE includes the *MBSFN-ResultToLog* IE, within the *MDT Configuration* IE, take it into account for MDT Configuration as described in TS 37.320 [31].
- if the *Trace Activation* IE includes the *MBSFN-Areald* IE in the *MBSFN-ResultToLog* IE, within the *MDT Configuration* IE, take it into account for MDT Configuration as described in TS 37.320 [31].
- if the *Trace Activation* IE includes the *UE Application layer measurement configuration* IE, initiate the requested trace session and QoE Measurement Collection function as described in TS 36.300 [14].
- if the *Trace Activation* IE includes the *Bluetooth Measurement Configuration* IE, within the *MDT Configuration* IE, take it into account for MDT Configuration as described in TS 37.320 [31].
- if the *Trace Activation* IE includes the *WLAN Measurement Configuration* IE, within the *MDT Configuration* IE, take it into account for MDT Configuration as described in TS 37.320 [31].
- if the *Trace Activation* IE includes the *MDT Configuration NR* IE, store and forward the *MDT Configuration NR* IE to the SgNB, if the eNB has configured EN-DC for the UE.

If the CSG Id IE is received in the HANDOVER REQUEST message, the eNB shall compare the received value with the CSG Id broadcast by the target cell.

If the *CSG Membership Status* IE is received in the HANDOVER REQUEST message and the *CSG Membership Status* is set to "member", the eNB may provide the QoS to the UE as for member provided that the CSG Id received in the HANDOVER REQUEST messages corresponds to the CSG Id broadcast by the target cell.

If the *CSG Membership Status* IE and the *CSG Id* IE are received in the HANDOVER REQUEST message and the CSG Id does not correspond to the CSG Id broadcast by the target cell, the eNB may provide the QoS to the UE as for a non member and shall send back in the HANDOVER REQUEST ACKNOWLEDGE message the actual CSG Id broadcast by the target cell.

If the target cell is CSG cell or hybrid cell, the target eNB shall include the *CSG ID* IE in the HANDOVER REQUEST ACKNOWLEDGE message.

If the target eNB receives the *CSG Id* IE and the *CSG Membership Status* IE is set to "non member" in the HANDOVER REQUEST message and the target cell is a closed cell and at least one of the E-RABs has a particular ARP value (see TS 23.401 [11]), the eNB shall send back the HANDOVER REQUEST ACKNOWLEDGE message to the MME accepting those E-RABs and failing the other E-RABs.

If the Subscriber Profile ID for RAT/Frequency priority IE is contained in the Source eNB to Target eNB Transparent Container IE, the target eNB shall store the content of the received Subscriber Profile ID for RAT/Frequency priority IE in the UE context and use it as defined in TS 36.300 [14].

If the Additional RRM Policy Index IE is contained in the Source eNB to Target eNB Transparent Container IE, the target eNB shall, if supported, store it and use it as defined in TS 36.300 [14].

Upon reception of the *UE History Information* IE, which is included within the *Source eNB to Target eNB Transparent Container* IE in the HANDOVER REQUEST message, the target eNB shall collect the information defined as mandatory in the *UE History Information* IE and shall, if supported, collect the information defined as optional in the *UE History Information* IE, for as long as the UE stays in one of its cells, and store the collected information to be used for future handover preparations.

Upon reception of the *UE History Information from the UE* IE, which is included within the *Source eNB to Target eNB Transparent Container* IE in the HANDOVER REQUEST message, the target eNB shall, if supported, store the collected information, to be used for future handover preparations.

If the *Mobility Information* IE is included within the *Source eNB to Target eNB Transparent Container* IE in the HANDOVER REQUEST message, the target eNB shall, if supported, store this information and use it as defined in TS 36.300 [14].

If the *Expected UE Behaviour* IE is included in the HANDOVER REQUEST message, the eNB shall, if supported, store this information and may use it to determine the RRC connection time.

If the *Bearer Type* IE is included in the HANDOVER REQUEST message and is set to "non IP", then the eNB shall not perform IP header compression for the concerned E-RAB.

If the *Ethernet Type* IE is included in the HANDOVER REQUEST message and is set to "True", then the eNB shall, if supported, take this into account to perform header compression appropriately for the concerned E-RAB.

In case of inter-system handover from gNB with direct forwarding, if the target eNB receives the *UE Context Reference* at Source IE in the Source eNB to Target eNB Transparent Container IE, it may use it for internal forwarding as specified in TS 37.340 [47].

After all necessary resources for the admitted E-RABs have been allocated, the target eNB shall generate the HANDOVER REQUEST ACKNOWLEDGE message. The target eNB shall include in the *E-RABs Admitted List* IE the E-RABs for which resources have been prepared at the target cell. The E-RABs that have not been admitted in the target cell, if any, shall be included in the *E-RABs Failed to Setup List* IE.

If the HANDOVER REQUEST message contains the *Data Forwarding Not Possible* IE associated with a given E-RAB within the *E-RABs To Be Setup List* IE set to "Data forwarding not possible", then the target eNB may decide not to include the *DL Transport Layer Address* IE and the *DL GTP-TEID* IE and for intra LTE handover the *UL Transport Layer Address* IE and the *UL GTP-TEID* IE within the *E-RABs Admitted List* IE of the HANDOVER REQUEST ACKNOWLEDGE message for that E-RAB.

For each bearer that target eNB has decided to admit and for which *DL forwarding* IE is set to "DL forwarding proposed", the target eNB may include the *DL GTP-TEID* IE and the *DL Transport Layer Address* IE within the *E-RABs Admitted List* IE of the HANDOVER REQUEST ACKNOWLEDGE message indicating that it accepts the proposed forwarding of downlink data for this bearer.

If the HANDOVER REQUEST ACKNOWLEDGE message contains the *UL GTP-TEID* IE and the *UL Transport Layer Address* IE for a given bearer in the *E-RABs Admitted List* IE, then it means the target eNB has requested the forwarding of uplink data for this given bearer.

If the *Request Type* IE is included in the HANDOVER REQUEST message, then the target eNB should perform the requested location reporting functionality for the UE as described in subclause 8.11.

If the *UE Security Capabilities* IE included in the HANDOVER REQUEST message only contains the EIA0 algorithm as defined in TS 33.401 [15] and if this EIA0 algorithm is defined in the configured list of allowed integrity protection algorithms in the eNB (TS 33.401 [15]), the eNB shall take it into use and ignore the keys received in the *Security Context* IE.

The *GUMMEI* IE shall only be contained in the HANDOVER REQUEST message according to subclauses 4.6.2 and 4.7.6.6 of TS 36.300 [14]. If the *GUMMEI* IE is present, the target eNB shall store this information in the UE context and use it for subsequent X2 handovers.

The MME UE S1AP ID 2 IE shall only be contained in the HANDOVER REQUEST message according to subclause 4.6.2 of TS 36.300 [14]. If the MME UE S1AP ID 2 IE is present, the target eNB shall store this information in the UE context and use it for subsequent X2 handovers.

If the *Management Based MDT Allowed* IE only or the *Management Based MDT Allowed* IE and the *Management Based MDT PLMN List* IE is contained in the HANDOVER REQUEST message, the target eNB shall, if supported, store the received information in the UE context, and use this information to allow subsequent selections of the UE for management based MDT defined in TS 32.422 [10].

If the *Masked IMEISV* IE is contained in the HANDOVER REQUEST message the target eNB shall, if supported, use it to determine the characteristics of the UE for subsequent handling.

If the HANDOVER REQUEST contains a *Target Cell ID* IE, as part of the *Source eNB to Target eNB Transparent Container* IE, for a cell which is no longer active, the eNB may respond with an HANDOVER REQUEST ACKNOWLEDGE in case the PCI of the deactivated cell is in use by another active cell.

If the *ProSe Authorized* IE is contained in the HANDOVER REQUEST message and it contains one or more IEs set to "authorized", the eNB shall, if supported, consider that the UE is authorized for the relevant ProSe service(s).

If the *UE User Plane CIoT Support Indicator* IE is included in the HANDOVER REQUEST message and is set to "supported", the eNB shall, if supported, consider that User Plane CIoT EPS Optimisation as specified in TS 23.401 [11] is supported for the UE.

If the *CE-mode-B Support Indicator* IE is included in the HANDOVER REQUEST ACKNOWLEDGE message and set to "supported", the MME shall, if supported, take this information into account when setting NAS timer values for the UE as specified in TS 24.301[24].

If the *V2X Services Authorized* IE is contained in the HANDOVER REQUEST message and it contains one or more IEs set to "authorized", the eNB shall, if supported, consider that the UE is authorized for the relevant service(s).

If the *UE Sidelink Aggregate Maximum Bit Rate* IE is included in the HANDOVER REQUEST message, the eNB shall, if supported, use the received value for the concerned UE's sidelink communication in network scheduled mode for V2X services.

If the *Enhanced Coverage Restricted* IE is included in the HANDOVER REQUEST message, the eNB shall store this information in the UE context and use it as defined in TS 23.401 [11].

If the *CE-Mode-B Restricted* IE is included in the HANDOVER REQUEST message and the *Enhanced Coverage Restricted* IE is not set to *restricted* and the Enhanced Coverage Restricted information stored in the UE context is not set to *restricted*, the eNB shall store this information in the UE context and use it as defined in TS 23.401 [11].

If the *NR UE Security Capabilities* IE is included in the HANDOVER REQUEST message, the eNB shall, if supported, store this information in the UE context and use it as defined in TS 33.401 [15].

If the *Aerial UE subscription information* IE is included in the HANDOVER REQUEST message, the eNB shall, if supported, store this information in the UE context and use it as defined in TS 36.300 [14].

If the *Pending Data Indication* IE is included in the HANDOVER REQUEST message, the eNB shall use it as defined in TS 23.401 [11].

If the *Subscription Based UE Differentiation Information* IE is included in the HANDOVER REQUEST message, the eNB shall, if supported, store this information in the UE context for further use according to TS 23.401 [11].

If the *Additional RRM Policy Index* IE is contained in the HANDOVER REQUEST message, the eNB shall, if supported, store it and use it as defined in TS 36.300 [14].

If the HANDOVER REQUEST message is received for an handover originating from a source NG-RAN node, the list of E-RABs contained in the source eNB to target eNB Transparent Container which are not included in the HANDOVER REQUEST message shall be considered as not to be handed over and ignored.

If the *IAB Authorized* IE is contained in the HANDOVER REQUEST message, the target eNB shall, if supported, consider that the handover is for an IAB-node.

If the *NR V2X Services Authorized* IE is contained in the HANDOVER REQUEST message and it contains one or more IEs set to "authorized", the eNB shall, if supported, consider that the UE is authorized for the relevant service(s).

If the NR UE Sidelink Aggregate Maximum Bit Rate IE is included in the HANDOVER REQUEST message, the eNB shall, if supported, use the received value for the concerned UE's sidelink communication in network scheduled mode for NR V2X services.

If the *PC5 QoS Parameters* IE is included in the HANDOVER REQUEST message, the eNB shall, if supported, use it for the concerned UE's NR sidelink communication as specified in TS 23.285 [49].

If the *Inter-system measurement Configuration* IE is included within the *Source eNB to Target eNB Transparent Container* IE in the HANDOVER REQUEST message, the target eNB shall, if supported, use it as defined in TS 38.300 [45]. The *Inter System Measurement Configuration* IE shall contain at least one of the RSRP, RSRQ or SINR thresholds. If only one of the thresholds is present, the LTE eNB shall use the present threshold to compare against the measurement results received from the UE. If more than one thresholds are present, the received radio measurements

must exceed all thresholds in order to satisfy the indicated radio conditions. The target eNB shall, if supported, report the measurement results to the source NR node by including the *Inter-System Handover Report* IE (defined in TS 38. 413 [44]) in the eNB CONFIGURATION TRANSFER message only if:

- there is either a single source NR related cell whose measurement results exceed the threshold(s) for the whole measurement duration, or a group of source NR associated cells which together provide such coverage; and
- the above is fulfilled for the whole measurement duration, in which case the *Early IRAT HO* IE contained in the *Inter-System Handover Report* IE (defined in TS 38. 413 [44]) shall be set to "false", or the above is fulfilled until the UE is handed over back to NR within the measurement duration, in which case the *Early IRAT HO* IE contained in the *Inter-System Handover Report* IE (defined in TS 38. 413 [44]) shall be set to "true".

The cells that exceed the threshold in the first UE measurement report are included in the Inter-system Handover Report.

If the *UE Radio Capability ID* IE is included in the HANDOVER REQUEST message, the eNB shall, if supported, use it as defined in TS 23.401 [11].

If the *DAPS Request Information* IE is included for an E-RAB in the *Source eNB to Target eNB Transparent Container* IE within the HANDOVER REQUEST message, the target eNB shall consider that the request concerns a DAPS Handover for that E-RAB, as described in TS 36.300 [14]. The target eNB shall include the *DAPS Response information List* IE in the *Target eNB to Source eNB Transparent Container* IE within the HANDOVER REQUEST ACKNOWLEDGE message, containing the *DAPS Response Information* IE for each E-RAB requested to be configured with DAPS Handover.

8.4.2.3 Unsuccessful Operation

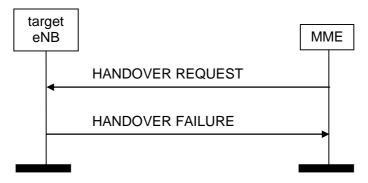


Figure 8.4.2.3-1: Handover resource allocation: unsuccessful operation

If the target eNB does not admit at least one non-GBR E-RAB, or a failure occurs during the Handover Preparation, it shall send the HANDOVER FAILURE message to the MME with an appropriate cause value.

If the target eNB does not receive the *CSG Membership Status* IE but does receive the *CSG Id* IE in the HANDOVER REQUEST message and the CSG Id does not correspond to the CSG Id of the target cell, the target eNB shall send the HANDOVER FAILURE message to the MME with an appropriate cause value.

If the target eNB receives a HANDOVER REQUEST message containing *RRC Container* IE that does not include required information as specified in TS 36.331 [16], the target eNB shall send the HANDOVER FAILURE message to the MME.

8.4.2.4 Abnormal Conditions

If the target eNB receives a HANDOVER REQUEST message containing a *E-RAB Level QoS Parameters* IE which contains a *QCI* IE indicating a GBR bearer (as defined in TS 23.203 [13]), and which does not contain the *GBR QoS Information* IE, the target eNB shall not admit the corresponding E-RAB.

If the target eNB receives a HANDOVER REQUEST message containing several *E-RAB ID* IEs (in the *E-RABs To Be Setup List* IE) set to the same value, the target eNB shall not admit the corresponding E-RABs.

If the Subscriber Profile ID for RAT/Frequency priority IE is not contained in the Source eNB to Target eNB Transparent Container IE whereas available in the source eNB, the target eNB shall trigger a local error handling.

NOTE: It is assumed that the information needed to verify this condition is visible within the system, see subclause 4.1.

If the supported algorithms for encryption defined in the *Encryption Algorithms* IE in the *UE Security Capabilities* IE, plus the mandated support of EEA0 in all UEs (TS 33.401 [15]), do not match any allowed algorithms defined in the configured list of allowed encryption algorithms in the eNB (TS 33.401 [15]), the target eNB shall reject the procedure using the HANDOVER FAILURE message.

If the supported algorithms for integrity defined in the *Integrity Protection Algorithms* IE in the *UE Security Capabilities* IE, plus the mandated support of the EIA0 algorithm in all UEs (TS 33.401 [15]), do not match any allowed algorithms defined in the configured list of allowed integrity protection algorithms in the eNB (TS 33.401 [15]), the target eNB shall reject the procedure using the HANDOVER FAILURE message.

If the target eNB receives a HANDOVER REQUEST message which does not contain the *Handover Restriction List* IE, and the serving PLMN cannot be determined otherwise by the eNB, the target eNB shall reject the procedure using the HANDOVER FAILURE message.

If the target eNB receives a HANDOVER REQUEST message containing the *Handover Restriction List* IE, and the serving PLMN indicated is not supported by the target cell, the target eNB shall reject the procedure using the HANDOVER FAILURE message.

8.4.3 Handover Notification

8.4.3.1 General

The purpose of the Handover Notification procedure is to indicate to the MME that the UE has arrived to the target cell and the S1 handover has been successfully completed.

8.4.3.2 Successful Operation



Figure 8.4.3.2-1: Handover notification

The target eNB shall send the HANDOVER NOTIFY message to the MME when the UE has been identified in the target cell and the S1 handover has been successfully completed.

If the *Tunnel Information for BBF* IE is received in the HANDOVER NOTIFY message, the MME shall, if supported, use it in the core network as specified in TS 23.139 [37].

If the *LHN ID* IE is included in the HANDOVER NOTIFY message, the MME shall, if supported, use it as specified in TS 23.401 [11].

If the UE is configured with EN-DC radio resources and the PSCell information is available, the *PSCell Information* IE shall be included in the HANDOVER NOTIFY message.

If the *Notify Source eNB* IE is included in the HANDOVER NOTIFY message, the MME shall, if supported, notify the source eNB that the UE has successfully accessed the target eNB.

8.4.3.3 Abnormal Conditions

Not applicable.

8.4.4 Path Switch Request

8.4.4.1 General

The purpose of the Path Switch Request procedure is to establish a UE associated signalling connection to the EPC and, if applicable, to request the switch of a downlink GTP tunnel towards a new GTP tunnel endpoint.

8.4.4.2 Successful Operation

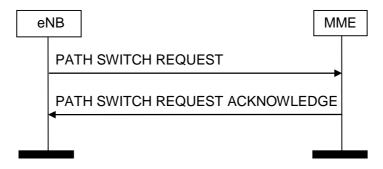


Figure 8.4.4.2-1: Path switch request: successful operation

The eNB initiates the procedure by sending the PATH SWITCH REQUEST message to the MME.

If the *E-RAB To Be Switched in Downlink List* IE in the PATH SWITCH REQUEST message does not include all E-RABs previously included in the UE Context, the MME shall consider the non included E-RABs as implicitly released by the eNB.

When the eNB has received from the radio interface the *RRC Resume Cause* IE, it shall include it in the PATH SWITCH REQUEST message.

After all necessary updates including the UP path switch have been successfully completed in the EPC for at least one of the E-RABs included in the PATH SWITCH REQUEST *E-RAB To Be Switched in Downlink List* IE, the MME shall send the PATH SWITCH REQUEST ACKNOWLEDGE message to the eNB and the procedure ends. The UE-associated logical S1-connection shall be established at reception of the PATH SWITCH REQUEST ACKNOWLEDGE message.

In case the EPC failed to perform the UP path switch for at least one, but not all, of the E-RABs included in the PATH SWITCH REQUEST *E-RAB To Be Switched in Downlink List* IE, the MME shall include the E-RABs it failed to perform UP path switch in the PATH SWITCH REQUEST ACKNOWLEDGE *E-RAB To Be Released List* IE. In this case, the eNB shall release the corresponding data radio bearers, and the eNB shall regard the E-RABs indicated in the *E-RAB To Be Released List* IE as being fully released.

If the CSG Id IE and no Cell Access Mode IE are received in the PATH SWITCH REQUEST message, the MME shall use it in the core network as specified in TS 23.401 [11]. If the CSG Id IE and the Cell Access Mode IE set to "hybrid" are received in the PATH SWITCH REQUEST message, the MME shall decide the membership status of the UE and use it in the core network as specified in TS 23.401 [11]. If no CSG Id IE and no Cell Access Mode IE are received in the PATH SWITCH REQUEST message and the UE was previously either in a CSG cell or in a hybrid cell, the MME shall consider that the UE has moved into a cell that is neither a CSG cell nor a hybrid cell and use this as specified in TS 23.401 [11].

If the GUMMEI of the MME currently serving the UE is available at the eNB (see TS 36.300 [14]) the eNB shall include the *Source MME GUMMEI* IE within the PATH SWITCH REQUEST message.

Upon reception of the PATH SWITCH REQUEST ACKNOWLEDGE message the eNB shall store the received *Security Context* IE in the UE context and the eNB shall use it for the next X2 handover or Intra eNB handovers as specified in TS 33.401 [15].

The PATH SWITCH REQUEST ACKNOWLEDGE message may contain

- the *UE Aggregate Maximum Bit Rate* IE.
- the MME UE S1AP ID 2 IE, which indicates the MME UE S1AP ID assigned by the MME.

If the *UE Aggregate Maximum Bit Rate* IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message the eNB shall

- replace the previously provided UE Aggregate Maximum Bit Rate by the received UE Aggregate Maximum Bit Rate in the UE context; the eNB shall use the received UE Aggregate Maximum Bit Rate for non-GBR Bearers for the concerned UE.

If the *UE Aggregate Maximum Bit Rate* IE is not contained in the PATH SWITCH REQUEST ACKNOWLEDGE message, the eNB shall use the previously provided UE Aggregate Maximum Bit Rate which is stored in the UE context.

In case the EPC decides to change the uplink termination point of the tunnels, it may include the *E-RAB To Be Switched* in *Uplink List* IE in the PATH SWITCH REQUEST ACKNOWLEDGE message to specify a new uplink transport layer address and uplink GTP-TEID for each respective E-RAB for which it wants to change the uplink tunnel termination point.

When the eNB receives the PATH SWITCH REQUEST ACKNOWLEDGE message and if this message includes the *E-RAB To Be Switched in Uplink List* IE, the eNB shall start delivering the uplink packets of the concerned E-RABs to the new uplink tunnel endpoints as indicated in the message.

When the eNB receives the PATH SWITCH REQUEST ACKNOWLEDGE message including the *CSG Membership Status* IE, and if the cell that serves the UE is a hybrid cell, the eNB shall use it as defined in TS 36.300 [14].

If the *MME UE S1AP ID 2* IE is contained in the PATH SWITCH REQUEST ACKNOWLEDGE message, the eNB shall store this information in the UE context and use it for subsequent X2 handovers.

If the *Tunnel Information for BBF* IE is received in the PATH SWITCH REQUEST message, the MME shall, if supported, use it in the core network as specified in TS 23.139 [37].

If the *LHN ID* IE is included in the PATH SWITCH REQUEST message, the MME shall, if supported, use it as specified in TS 23.401 [11].

If the *ProSe Authorized* IE is contained in the PATH SWITCH REQUEST ACKNOWLEDGE message, the eNB shall, if supported, update its ProSe authorization information for the UE accordingly. If the *ProSe Authorized* IE includes one or more IEs set to "not authorized", the eNB shall, if supported, initiate actions to ensure that the UE is no longer accessing the relevant ProSe service(s).

If the *UE User Plane CIoT Support Indicator* IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message and is set to "supported", the eNB shall, if supported, consider that User Plane CIoT EPS Optimisation as specified in TS 23.401 [11] is supported for the UE.

If the *V2X Services Authorized* IE is contained in the PATH SWITCH REQUEST ACKNOWLEDGE message, the eNB shall, if supported, update its V2X services authorization information for the UE accordingly. If the *V2X Services Authorized* IE includes one or more IEs set to "not authorized", the eNB shall, if supported, initiate actions to ensure that the UE is no longer accessing the relevant service(s).

If the *UE Sidelink Aggregate Maximum Bit Rate* IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message, the eNB shall, if supported:

- replace the previously provided UE Sidelink Aggregate Maximum Bit Rate, if available in the UE context, with the received value;
- use the received value for the concerned UE's sidelink communication in network scheduled mode for V2X services.

If the *Enhanced Coverage Restricted* IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message, the eNB shall store this information in the UE context and use it as defined in TS 23.401 [11].

If the *CE-Mode-B Restricted* IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message and the *Enhanced Coverage Restricted* IE is not set to *restricted* and the Enhanced Coverage Restricted information stored in the UE context is not set to *restricted*, the eNB shall store this information in the UE context and use it as defined in TS 23.401 [11].

If information on the UE's NR security capabilities is available at the eNB (see TS 33.401 [15]) the eNB shall include the *NR UE Security Capabilities* IE within the PATH SWITCH REQUEST message.

If the *NR UE Security Capabilities* IE is included in the PATH SWITCH REQUEST message, the MME shall, if supported, consider that the eNB has stored the respective information in the UE context, and proceed as defined in TS 33.401 [15].

If the NR UE Security Capabilities IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message, the eNB shall, if supported, store this information in the UE context and use it as defined in TS 33.401 [15].

If the *Aerial UE subscription information* IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message, the eNB shall, if supported, store this information in the UE context and use it as defined in TS 36.300 [14].

If the *Pending Data Indication* IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message, the eNB shall use it as defined in TS 23.401 [11].

If the *Subscription Based UE Differentiation Information* IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message, the eNB shall, if supported, store this information in the UE context for further use according to TS 23.401 [11].

If the *Handover Restriction List* IE is contained in the PATH SWITCH REQUEST ACKNOWLEDGE message, the eNB shall, if supported, overwrite any previously stored handover restriction information in the UE context and use the information in the *Handover Restriction List* IE to:

- determine a target for subsequent mobility action for which the eNB provides information about the target of the mobility action towards the UE;
- select a proper SCG during dual connectivity operation;

The PATH SWITCH REQUEST ACKNOWLEDGE message may contain the *Additional RRM Policy Index* IE, if available in the MME for cases specified in TS 23.401 [11]. The eNB shall, if supported, store it and use it as specified in TS 36.300 [14].

If the *UE Radio Capability ID* IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message, the eNB shall, if supported, use it as defined in TS 23.401 [11].

If the UE is configured with EN-DC radio resources and the PSCell information is available, the *PSCell Information* IE shall be included in the PATH SWITCH REQUEST message.

If the *NR V2X Services Authorized* IE is contained in the PATH SWITCH REQUEST ACKNOWLEDGE message, the eNB shall, if supported, update its V2X services authorization information for the UE accordingly. If the *NR V2X Services Authorized* IE includes one or more IEs set to "not authorized", the eNB shall, if supported, initiate actions to ensure that the UE is no longer accessing the relevant service(s).

If the NR UE Sidelink Aggregate Maximum Bit Rate IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message, the eNB shall, if supported:

- replace the previously provided NR UE Sidelink Aggregate Maximum Bit Rate, if available in the UE context, with the received value;
- use the received value for the concerned UE's sidelink communication in network scheduled mode for NR V2X services.

If the *PC5 QoS Parameters* IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message, the eNB shall, if supported, use it for the concerned UE's NR sidelink communication as specified in TS 23.285 [49].

8.4.4.3 Unsuccessful Operation

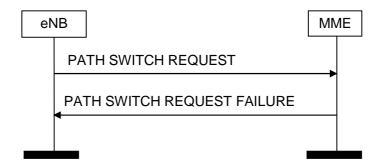


Figure 8.4.4.3-1: Path switch request: unsuccessful operation

If the EPC fails to switch the downlink GTP tunnel endpoint towards a new GTP tunnel endpoint for all E-RABs included in the *E-RAB To Be Switched in Downlink List* IE during the execution of the Path Switch Request procedure, the MME shall send the PATH SWITCH REQUEST FAILURE message to the eNB with an appropriate cause value. In this case, the eNB should decide its subsequent actions and the MME should behave as described in TS 23.401 [11].

8.4.4.4 Abnormal Conditions

If the MME receives a PATH SWITCH REQUEST message containing several *E-RAB ID* IEs (in the *E-RAB To Be Switched in Downlink List* IE) set to the same value, the MME shall send the PATH SWITCH REQUEST FAILURE message to the eNB.

If the MME receives a PATH SWITCH REQUEST message without the *CSG Membership Status* IE, and the cell accessed by the UE is a hybrid cell with a different CSG from the source cell or the source cell does not have a CSG ID, the MME shall send the PATH SWITCH REQUEST FAILURE message to the eNB.

If the *CSG Membership Status* IE is not included in the PATH SWITCH REQUEST ACKNOWLEDGE message and the cell accessed by the UE is a hybrid cell with a different CSG from the source cell or the source cell does not have a CSG ID, the eNB shall consider the procedure as unsuccessfully terminated and initiate local error handling.

8.4.5 Handover Cancellation

8.4.5.1 General

The purpose of the Handover Cancel procedure is to enable a source eNB to cancel an ongoing handover preparation or an already prepared handover.

The procedure uses UE-associated signalling.

8.4.5.2 Successful Operation

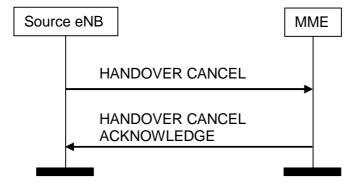


Figure 8.4.5.2-1: Handover Cancel procedure. Successful operation.

The source eNB initiates the procedure by sending a HANDOVER CANCEL message to the EPC.

The HANDOVER CANCEL message shall indicate the reason for cancelling the handover with the appropriate value of the *Cause* IE.

Upon reception of a HANDOVER CANCEL message, the EPC shall terminate the ongoing Handover Preparation procedure, release any resources associated with the handover preparation and send a HANDOVER CANCEL ACKNOWLEDGE message to the source eNB.

Transmission and reception of a HANDOVER CANCEL ACKNOWLEDGE message terminate the procedure in the EPC and in the source eNB. After this, the source eNB does not have a prepared handover for that UE-associated logical S1-connection.

8.4.5.3 Unsuccessful Operation

Not applicable.

8.4.5.4 Abnormal Conditions

If the source eNB becomes aware of the fact that an expected HANDOVER CANCEL ACKNOWLEDGE message is missing, the source eNB shall consider the Handover Cancellation as successfully terminated.

8.4.6 eNB Status Transfer

8.4.6.1 General

The purpose of the eNB Status Transfer procedure is to transfer the uplink PDCP-SN and HFN receiver status and the downlink PDCP-SN and HFN transmitter status from the source to the target eNB via the MME during an intra LTE S1 handover for each respective E-RAB for which PDCP-SN and HFN status preservation applies.

8.4.6.2 Successful Operation

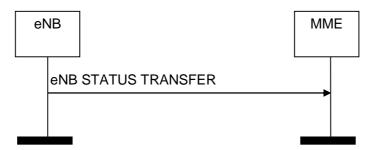


Figure 8.4.6.2-1: eNB Status Transfer procedure

The source eNB initiates the procedure by stopping assigning PDCP-SNs to downlink SDUs and sending the eNB STATUS TRANSFER message to the MME at the point in time when it considers the transmitter/receiver status to be frozen.

- For each E-RAB for which PDCP-SN and HFN status preservation applies the source eNB shall include the *E-RAB ID* IE, the *UL COUNT value* IE and the *DL COUNT value* IE within the *E-RABs Subject to Status Transfer Item* IE in the *eNB Status Transfer Transparent Container* IE of the eNB STATUS TRANSFER message.
- In case of 15 bit long PDCP-SN, for each E-RAB for which PDCP-SN and HFN status preservation applies, the source eNB shall additionally include the *UL COUNT Value Extended* IE and the *DL COUNT Value Extended* IE within the *E-RABs Subject to Status Transfer Item* IE.
- In case of 18 bit long PDCP-SN, for each E-RAB for which PDCP-SN and HFN status preservation applies, the source eNB shall additionally include the *UL COUNT Value for PDCP SN Length 18* IE and the *DL COUNT Value for PDCP SN Length 18* IE within the *E-RABs Subject to Status Transfer Item* IE.

The source eNB may also include in the eNB STATUS TRANSFER message the missing and the received uplink SDUs in the *Receive Status Of UL PDCP SDUs* IE, or in the *Receive Status Of UL PDCP SDUs Extended* IE in case of 15 bit long PDCP-SN, or in the *Receive Status Of UL PDCP SDUs for PDCP SN Length 18* IE in case of 18 bit long

PDCP-SN, for each bearer for which the source eNB has accepted the request from the target eNB for uplink forwarding.

8.4.6.3 Unsuccessful Operation

Not applicable.

8.4.6.4 Abnormal Conditions

Not applicable.

8.4.7 MME Status Transfer

8.4.7.1 General

The purpose of the MME Status Transfer procedure is to transfer the uplink PDCP-SN and HFN receiver status and the downlink PDCP-SN and HFN transmitter status from the source to the target eNB via the MME during an S1 handover for each respective E-RAB for which PDCP-SN and HFN status preservation applies.

8.4.7.2 Successful Operation

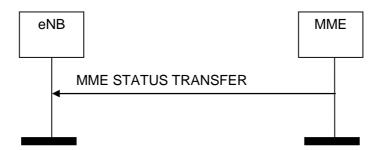


Figure 8.4.7.2-1: MME Status Transfer procedure

The MME initiates the procedure by sending the MME STATUS TRANSFER message to the eNB. The target eNB using Full Configuration for this handover as per TS 36.300 [14] shall ignore the information received in this message.

For each bearer within the *E-RABs Subject to Status Transfer List* IE within the *eNB Status Transfer Transparent Container* IE for which the *UL COUNT value* IE is received in the MME STATUS TRANSFER message, the target eNB shall apply the contained information and shall not deliver any uplink packet which has a PDCP-SN lower than the value contained in the *PDCP-SN* IE of this IE. If the *UL COUNT Value Extended* IE or *UL COUNT Value for PDCP SN Length 18* IE is included in the *E-RABs Subject to Status Transfer Item* IE, the target eNB shall, if supported, use the value contained in the *PDCP-SN Extended* IE in the *UL COUNT Value Extended* IE or *PDCP-SN Length 18* IE of the *UL COUNT Value for PDCP SN Length 18* IE instead of the value contained in the *PDCP-SN* IE of the *UL COUNT value* IE.

For each bearer in *E-RABs Subject to Status Transfer List* IE within the *eNB Status Transfer Transparent Container* IE received in the MME STATUS TRANSFER message, the target eNB shall use *DL COUNT value* IE for the first downlink packet for which there is no PDCP-SN yet assigned. If the *DL COUNT Value Extended* IE or *DL COUNT Value for PDCP SN Length 18* IE is included in the *E-RABs Subject to Status Transfer Item* IE, the target eNB shall, if supported, use the *DL COUNT Value Extended* IE or *DL COUNT Value for PDCP SN Length 18* IE instead of the *DL COUNT value* IE.

If the Receive Status Of UL PDCP SDUs IE or the Receive Status Of UL PDCP SDUs Extended IE or the Receive Status Of UL PDCP SDUs for PDCP SN Length 18 IE is included for at least one bearer in the eNB Status Transfer Transparent Container IE of the MME STATUS TRANSFER message, the target eNB may use it in a Status Report message sent to the UE over the radio interface.

8.4.7.3 Unsuccessful Operation

Not applicable.

8.4.7.4 Abnormal Conditions

If the target eNB receives this message for a UE for which no prepared handover exists at the target eNB, the target eNB shall ignore the message.

8.4.8 Handover Success

8.4.8.1 General

The Handover Success procedure is used during a DAPS Handover, to inform the source eNB that the UE has successfully accessed the target eNB. The procedure uses UE-associated signalling.

8.4.8.2 Successful Operation



Figure 8.4.8.2-1: Handover Success

The MME initiates the procedure by sending the HANDOVER SUCCESS message to the source eNB.

8.4.8.3 Abnormal Conditions

If the HANDOVER SUCCESS message refers to a context that does not exist, the source eNB shall ignore the message.

8.4.9 eNB Early Status Transfer

8.4.9.1 General

The purpose of the eNB Early Status Transfer procedure is to transfer the COUNT of the first downlink SDU that the source eNB forwards to the target eNB, for each respective E-RAB for which DAPS Handover applies, from the source eNB to the target eNB via the MME during an intra LTE S1 handover.

8.4.9.2 Successful Operation



Figure 8.4.9.2-1: eNB Early Status Transfer procedure

The source eNB initiates the procedure by sending the eNB EARLY STATUS TRANSFER message to the MME at the point in time when it considers starting early data forwarding to the target eNB.

For each E-RAB for which DAPS Handover applies, the source eNB shall include the *E-RAB ID* IE and the COUNT of the first downlink SDU that the source eNB forwards to the target eNB within the *E-RABs Subject to Early Status*

Transfer Item IE in the eNB Early Status Transfer Transparent Container IE of the eNB EARLY STATUS TRANSFER message.

8.4.9.3 Unsuccessful Operation

Not applicable.

8.4.9.4 Abnormal Conditions

Not applicable.

8.4.10 MME Early Status Transfer

8.4.10.1 General

The purpose of the MME Early Status Transfer procedure is to transfer the COUNT of the first downlink SDU that the source eNB forwards to the target eNB, for each respective E-RAB for which DAPS Handover applies, from the source eNB to the target eNB via the MME during an S1 handover.

8.4.10.2 Successful Operation



Figure 8.4.10.2-1: MME Early Status Transfer procedure

The MME initiates the procedure by sending the MME EARLY STATUS TRANSFER message to the eNB.

The *E-RABs Subject To Early Status Transfer List* IE within the *eNB Early Status Transfer Transparent Container* IE included in the MME EARLY STATUS TRANSFER message contains the E-RAB ID(s) corresponding to the E-RAB(s) subject to be simultaneously served by the source eNB and the target eNB during DAPS Handover.

For each E-RAB in the *E-RABs Subject to Early Status Transfer List* IE, the target eNB shall use the information contained in the *DL COUNT PDCP-SN length* IE as the COUNT of the first downlink SDU that the source eNB forwards to the target eNB.

8.4.10.3 Unsuccessful Operation

Not applicable.

8.4.10.4 Abnormal Conditions

If the target eNB receives this message for a UE for which no prepared DAPS handover exists at the target eNB, the target eNB shall ignore the message.

8.5 Paging

8.5.1 General

The purpose of the Paging procedure is to enable the MME to page a UE in the specific eNB.

8.5.2 Successful Operation

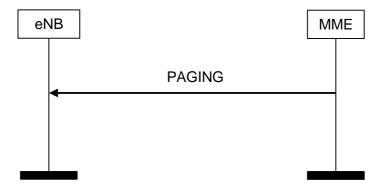


Figure 8.5.2-1: Paging procedure

The MME initiates the paging procedure by sending the PAGING message to the eNB.

At the reception of the PAGING message, the eNB shall perform paging of the UE in cells which belong to tracking areas as indicated in the *List of TAIs* IE.

The *CN Domain* IE shall be transferred transparently to the UE.

The *Paging DRX* IE may be included in the PAGING message, and if present the eNB shall use it according to TS 36.304 [20].

A list of CSG IDs may be included in the PAGING message.

If included, the E-UTRAN may use the list of CSG IDs to avoid paging the UE at CSG cells whose CSG ID does not appear in the list.

For each cell that belongs to any of the TAs indicated in the *List of TAIs* IE, the eNB shall generate one page on the radio interface.

The *Paging Priority* IE may be included in the PAGING message, and if present the eNB may use it according to TS 23.401 [11] and TS 23.272 [17].

If the *UE Radio Capability for Paging* IE is included in the PAGING message, the eNB may use it to apply specific paging schemes. If the *Enhanced Coverage Restricted* IE is included in the PAGING message, the eNB shall, if supported, use it as defined in TS 23.401 [11].

If the Assistance Data for Recommended Cells IE is included in the Assistance Data for Paging IE it may be used, together with the Paging Attempt Information IE if also present according to TS 36.300 [14].

If the Assistance Data for CE capable UEs IE is included in the Assistance Data for Paging IE, it may be used for paging the indicated CE capable UE, together with the Paging Attempt Information IE according to TS 36.300 [14].

If the *Next Paging Area Scope* IE is included in the *Paging Attempt Information* IE it may be used for paging the UE according to TS 36.300 [14].

If the *Paging eDRX Information* IE is included in the PAGING message, the eNB shall, if supported, use it according to TS 36.304 [20]. If the *Paging Time Window* IE is included in the *Paging eDRX Information* IE, the eNB shall take this information into account to determine the UE's paging occasion according to TS 36.304 [20]. The eNB should take into account the reception time of the PAGING message on the S1-MME interface to determine when to page the UE.

If the *Extended UE Identity Index Value* IE is included in the PAGING message, the eNB shall, if supported, use it to identify the paging resources to be used according to TS 36.304 [20]. The MME shall, if supported, include the *Extended UE Identity Index Value* IE in the PAGING message.

If the *NB-IoT Paging eDRX Information* IE is included in the PAGING message, the eNB shall, if supported, use it according to TS 36.304 [20]. If the *NB-IoT Paging Time Window* IE is included in the *NB-IoT Paging eDRX Information* IE, the eNB shall take this information into account to determine the UE's paging occasion according to TS 36.304 [20]. The eNB should take into account the reception time of the PAGING message on the S1-MME interface to determine when to page the UE.

If the *NB-IoT UE Identity Index Value* IE is included in the PAGING message, the eNB shall, if supported, use it to identify the paging resources to be used according to TS 36.304 [20].

If the *CE-Mode-B Restricted* IE is included in the PAGING message and the *Enhanced Coverage Restricted* IE is not set to *restricted*, the eNB shall use it as defined in TS 23.401 [11].

If the *Data Size* IE is included in the PAGING message, the eNB shall, if supported, use it to decide whether to initiate Mobile Terminated EDT procedures towards the UE as described in TS 36.300 [14].

If the WUS Assistance Information IE is included in the PAGING message, the eNB shall, if supported, use it to determine the WUS group for the UE, as specified in TS 36.304 [20].

If the NB-IoT Paging DRX IE is included in the PAGING message, the eNB shall use it according to TS 36.304 [20].

8.5.3 Unsuccessful Operation

Not applicable.

8.5.4 Abnormal Conditions

Not applicable.

8.6 NAS transport

8.6.1 General

The purpose of the NAS Transport procedure is to carry UE – MME signalling over the S1 Interface. The NAS messages are not interpreted by the eNB, and their content is outside the scope of this specification. The procedure may use an existing UE-associated logical S1-connection. If no UE-associated logical S1-connection exists, the establishment of the UE-associated logical S1-connection is initiated (and may be established) as part of the procedure.

The NAS messages are transported in an IE of the INITIAL UE MESSAGE, DOWNLINK NAS TRANSPORT, UPLINK NAS TRANSPORT or REROUTE NAS REQUEST messages.

8.6.2 Successful Operations

8.6.2.1 Initial UE Message



Figure 8.6.2.1-1: Initial UE Message procedure

When the eNB has received from the radio interface the first UL NAS message transmitted via RRC message to be forwarded to an MME, the eNB shall invoke the NAS Transport procedure and send the INITIAL UE MESSAGE message to the MME including the NAS message as a *NAS-PDU* IE. The eNB shall allocate a unique eNB UE S1AP ID to be used for the UE and the eNB shall include this identity in the INITIAL UE MESSAGE message. In case of network sharing, the selected PLMN is indicated by the *PLMN Identity* IE within the *TAI* IE included in the INITIAL UE MESSAGE message. When the eNB has received from the radio interface the *S-TMSI* IE, it shall include it in the INITIAL UE MESSAGE message. If the eNB does not support NNSF and the eNB has received from the radio

interface the *GUMMEI* IE, the eNB may include it in the INITIAL UE MESSAGE message. If the eNB does not support NNSF and the eNB has received from the radio interface the *GUMMEI Type* IE, the eNB may include it in the INITIAL UE MESSAGE message.

If the establishment of the UE-associated logical S1-connection towards the CN is performed due to an RRC connection establishment originating from a CSG cell, the *CSG Id* IE shall be included in the INITIAL UE MESSAGE message.

If the establishment of the UE-associated logical S1-connection towards the CN is performed due to an RRC connection establishment originating from a Hybrid cell, the *CSG Id* IE and the *Cell Access Mode* IE shall be included in the INITIAL UE MESSAGE message.

If the establishment of the UE-associated logical S1-connection towards the CN is performed due to an RRC connection establishment triggered by a Relay Node as defined in TS 36.300 [14], the *GW Transport Layer Address* IE and the *Relay Node Indicator* IE shall be included in the INITIAL UE MESSAGE message.

If the eNB has a L-GW function for LIPA operation, it shall include the GW Transport Layer Address IE in the INITIAL UE MESSAGE message.

If the SIPTO L-GW Transport Layer Address IE is received in the INITIAL UE MESSAGE message, the MME shall, if supported, use it for SIPTO@LN operation as sepecified in TS 23.401 [11].

If the *LHN ID* IE is included in the INITIAL UE MESSAGE message, the MME shall, if supported, use it as specified in TS 23.401 [11].

If the *Tunnel Information for BBF* IE is received in the INITIAL UE MESSAGE message, the MME shall, if supported, use it in the core network as specified in TS 23.139 [37].

If the *MME Group ID* IE is included in the INITIAL UE MESSAGE message this indicates that the message is a rerouted message and the MME shall, if supported, use the IE as described in TS 23.401 [11].

If the *UE Usage Type* IE is included in the INITIAL UE MESSAGE message, then the selected MME in the DCN shall if supported, use it as defined in TS 23.401 [11].

If the *DCN ID* IE is included in the INITIAL UE MESSAGE message, the MME shall, if supported, use it as defined in TS 23.401 [11].

NOTE: The first UL NAS message is always received in the RRC CONNECTION SETUP COMPLETE message, except that in cases of NB-IoT and MTC the first UL NAS message may be received in RRCEarlyDataRequest message.

If the *CE-mode-B Support Indicator* IE is included in the INITIAL UE MESSAGE message and set to "supported", the MME shall, if supported, use the extended NAS timer settings for the UE as specified in TS 24.301[24].

If the *Coverage Level* IE is included in the INITIAL UE MESSAGE message, the MME shall, if supported, use it as specified in TS 24.301[24].

If the *UE Application Layer Measurement Capability* IE is included in the INITIAL UE MESSAGE message, the MME shall, if supported, use it when initiating UE Application Layer Measurement.

If the *EDT Session* IE set to "true" is included in the INITIAL UE MESSAGE message, the MME shall, if supported, consider that the message has been received as a result of an EDT session as described in TS 36.300 [14].

If the *IAB Node Indication* IE is included in the INITIAL UE MESSAGE message, the MME shall consider that the message is related to an IAB-node.

8.6.2.2 DOWNLINK NAS TRANSPORT



Figure 8.6.2.2-1: DOWNLINK NAS Transport Procedure

If the MME only needs to send a NAS message transparently via the eNB to the UE and a UE-associated logical S1-connection exists for the UE or if the MME has received the *eNB UE S1AP ID* IE in an INITIAL UE MESSAGE message, the MME shall send a DOWNLINK NAS TRANSPORT message to the eNB including the NAS message as a *NAS-PDU* IE. If the UE-associated logical S1-connection is not established, the MME shall allocate a unique MME UE S1AP ID to be used for the UE and include that in the DOWNLINK NAS TRANSPORT message; by receiving the *MME UE S1AP ID* IE in the DOWNLINK NAS TRANSPORT, the eNB establishes the UE-associated logical S1-connection.

The NAS-PDU IE contains an MME – UE message that is transferred without interpretation in the eNB.

The DOWNLINK NAS TRANSPORT message may contain the *Handover Restriction List* IE, which may contain roaming or access restrictions.

If the *Handover Restriction List* IE is contained in the DOWNLINK NAS TRANSPORT message, the eNB shall store this information in the UE context.

The eNB shall use the information in *Handover Restriction List* IE if present in the DOWNLINK NAS TRANSPORT message to:

- determine a target for subsequent mobility action for which the eNB provides information about the target of the mobility action towards the UE;
- select a proper SCG during dual connectivity operation.

If the *Handover Restriction List* IE is not contained in the DOWNLINK NAS TRANSPORT message and there is no previously stored Handover restriction information, the eNB shall consider that no roaming and no access restriction apply to the UE.

If the *Subscriber Profile ID for RAT/Frequency priority* IE is included in DOWNLINK NAS TRANSPORT message, the eNB shall, if supported, use it as defined in TS 36.300 [14].

If the *Additional RRM Policy Index* IE is included in DOWNLINK NAS TRANSPORT message, the eNB shall, if supported, use it as defined in TS 36.300 [14].

If the SRVCC Operation Possible IE is included in DOWNLINK NAS TRANSPORT message, the eNB shall store it in the UE context and, if supported, use it as defined in TS 23.216 [9].

If the *UE Radio Capability* IE is included in the DOWNLINK NAS TRANSPORT message, the eNB shall store this information in the UE context, use it as defined in TS 36.300 [14].

If the *Enhanced Coverage Restricted* IE is included in the DOWNLINK NAS TRANSPORT message, the eNB shall store this information in the UE context and use it as defined in TS 23.401 [11].

If the *CE-Mode-B Restricted* IE is included in the DOWNLINK NAS TRANSPORT message and the *Enhanced Coverage Restricted* IE is not set to *restricted* and the Enhanced Coverage Restricted information stored in the UE context is not set to *restricted*, the eNB shall store this information in the UE context and use it as defined in TS 23.401 [11].

If the NR UE Security Capabilities IE is included in the DOWNLINK NAS TRANSPORT message, the eNB shall, if supported, store this information in the UE context and use it as defined in TS 33.401 [15].

If the *End Indication* IE is included in the DOWNLINK NAS TRANSPORT message and set to "no further data", the eNB shall consider that besides the included NAS PDU in this message, there are no further NAS PDUs to be transmitted for this UE.

If the *Pending Data Indication* IE is included in the DOWNLINK NAS TRANSPORT message, the eNB shall use it as defined in TS 23.401 [11].

If the *Subscription Based UE Differentiation Information* IE is included in the DOWNLINK NAS TRANSPORT message, the eNB shall, if supported, store this information in the UE context for further use according to TS 23.401 [11].

If the *UE Radio Capability ID* IE is included in the DOWNLINK NAS TRANSPORT message, the eNB shall, if supported, use it as defined in TS 23.401 [11].

Interaction with the NAS Delivery Indication procedure:

If the *DL NAS PDU Delivery Acknowledgment Request* IE set to "requested" was included in the DOWNLINK NAS TRANSPORT message (see 23.401 [11]), the eNB shall trigger the NAS Delivery Indication procedure, if the downlink NAS PDU was successfully delivered to the UE.

Interaction with the UE Capability Info Indication procedure:

If the *UE Capability Info Request* IE set to "requested" is included in the DOWNLINK NAS TRANSPORT message, the eNB shall trigger the UE Capability Info Indication procedure if UE capability related information was successfully retrieved from the UE.

8.6.2.3 UPLINK NAS TRANSPORT



Figure 8.6.2.3-1: UPLINK NAS TRANSPORT Procedure

When the eNB has received from the radio interface a NAS message to be forwarded to the MME to which a UE-associated logical S1-connection for the UE exists, the eNB shall send the UPLINK NAS TRANSPORT message to the MME including the NAS message as a *NAS-PDU* IE. The eNB shall include the TAI and ECGI of the current cell in every S1-AP UPLINK NAS TRANSPORT message.

The NAS-PDU IE contains a UE – MME message that is transferred without interpretation in the eNB.

If the *GW Transport Layer Address* IE is received in the UPLINK NAS TRANSPORT message, the MME shall, if supported, use it for LIPA operation as specified in TS 23.401 [11].

If the SIPTO L-GW Transport Layer Address IE is received in the UPLINK NAS TRANSPORT message, the MME shall, if supported, use it for SIPTO@LN operation as specified in TS 23.401 [11].

If the *LHN ID* IE is included in the UPLINK NAS TRANSPORT message, the MME shall, if supported, use it as specified in TS 23.401 [11].

If the UE is configured with EN-DC radio resources and the PSCell information is available, the *PSCell Information* IE shall be included in the UPLINK NAS TRANSPORT message.

8.6.2.4 NAS NON DELIVERY INDICATION



Figure 8.6.2.4-1: NAS NON DELIVERY INDICATION Procedure

When the eNB decides not to start the delivery of a NAS message that has been received over a UE-associated logical S1-connection or the eNB is unable to ensure that the message has been received by the UE, it shall report the non-delivery of this NAS message by sending a NAS NON DELIVERY INDICATION message to the MME including the non-delivered NAS message within the *NAS-PDU* IE and an appropriate cause value within an appropriate *Cause* IE, e.g., "S1 intra system Handover Triggered", "S1 inter system Handover Triggered" or "X2 Handover Triggered".

8.6.2.4a NAS DELIVERY INDICATION



Figure 8.6.2.4a-1: NAS DELIVERY INDICATION Procedure

If the eNB has been requested by the MME to provide an indication upon successful delivery of a downlink NAS PDU the eNB sends the NAS DELIVERY INDICATION message to the MME upon successful delivery of the downlink NAS PDU to the UE, see TS 23.401 [11].

8.6.2.5 Reroute NAS Request



Figure 8.6.2.5-1: Reroute NAS Request Procedure

The purpose of the Reroute NAS Request procedure is to enable the MME to request for a rerouting of the INITIAL UE MESSAGE message to the MME in the indicated DCN.

The MME initiates the procedure by sending a REROUTE NAS REQUEST message to the eNB. The eNB shall, if supported, reroute the INITIAL UE MESSAGE message to the MME in the DCN indicated by the *MME Group ID* IE as described in TS 23.401 [11].

If the *Additional GUTI* IE is included in the REROUTE NAS REQUEST message, then the eNB shall if supported, use it when selecting the MME in the DCN as defined in TS 23.401 [11].

If the *UE Usage Type* IE is included in the REROUTE NAS REQUEST message, then the eNB shall if supported, include it towards the selected MME in the DCN as defined in TS 23.401 [11].

8.6.3 Unsuccessful Operation

Not applicable.

8.6.4 Abnormal Conditions

If the S-TMSI is not received by the MME in the INITIAL UE MESSAGE message whereas expected, the MME shall consider the procedure as failed.

The behaviour of an eNB that has been requested by the MME to provide an indication upon successful delivery of a downlink NAS PDU to the UE and that receives a DOWNLINK NAS TRANSPORT message before it has reported to the MME either successful or unsuccessful delivery of the NAS PDU to the UE, is not specified.

8.7 Management procedures

8.7.1 Reset

8.7.1.1 General

The purpose of the Reset procedure is to initialise or re-initialise the E-UTRAN, or part of E-UTRAN S1AP UE-related contexts, in the event of a failure in the EPC or vice versa. This procedure does not affect the application level configuration data exchanged during, e.g., the S1 Setup procedure.

The procedure uses non-UE associated signalling.

8.7.1.2 Successful Operation

8.7.1.2.1 Reset Procedure Initiated from the MME

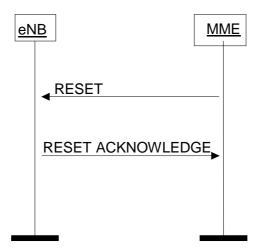


Figure 8.7.1.2.1-1: Reset procedure initiated from the MME. Successful operation.

In the event of a failure at the MME, which has resulted in the loss of some or all transaction reference information, a RESET message shall be sent to the eNB.

At reception of the RESET message the eNB shall release all allocated resources on S1 and Uu related to the UE association(s) indicated explicitly or implicitly in the RESET message and remove the indicated UE contexts including S1AP ID.

After the eNB has released all assigned S1 resources and the UE S1AP IDs for all indicated UE associations which can be used for new UE-associated logical S1-connections over the S1 interface, the eNB shall respond with the RESET ACKNOWLEDGE message. The eNB does not need to wait for the release of radio resources to be completed before returning the RESET ACKNOWLEDGE message.

If the RESET message contains the *UE-associated logical S1-connection list* IE, then:

- The eNB shall use the *MME UE S1AP ID* IE and/or the *eNB UE S1AP ID* IE to explicitly identify the UE association(s) to be reset.
- The eNB shall include in the RESET ACKNOWLEDGE message, for each UE association to be reset, the *UE-associated logical S1-connection Item* IE in the *UE-associated logical S1-connection list* IE. The *UE-associated logical S1-connection Item* IEs shall be in the same order as received in the RESET message and shall include also unknown UE-associated logical S1-connections. Empty *UE-associated logical S1-connection Item* IEs, received in the RESET message, may be omitted in the RESET ACKNOWLEDGE message.
- If the *MME UE S1AP ID* IE is included in the *UE-associated logical S1-connection Item* IE for a UE association, the eNB shall include the *MME UE S1AP ID* IE in the corresponding *UE-associated logical S1-connection Item* IE in the RESET ACKNOWLEDGE message.
- If the *eNB UE S1AP ID* IE is included in the *UE-associated logical S1-connection Item* IE for a UE association, the eNB shall include the *eNB UE S1AP ID* IE in the corresponding *UE-associated logical S1-connection Item* IE in the RESET ACKNOWLEDGE message.

Interactions with other procedures:

If the RESET message is received, any other ongoing procedure (except for another Reset procedure) on the same S1 interface related to a UE association, indicated explicitly or implicitly in the RESET message, shall be aborted.

8.7.1.2.2 Reset Procedure Initiated from the E-UTRAN

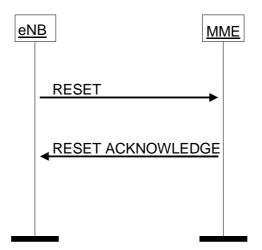


Figure 8.7.1.2.2-1: Reset procedure initiated from the E-UTRAN. Successful operation.

In the event of a failure at the eNB, which has resulted in the loss of some or all transaction reference information, a RESET message shall be sent to the MME.

At reception of the RESET message the MME shall release all allocated resources on S1 related to the UE association(s) indicated explicitly or implicitly in the RESET message and remove the S1AP ID for the indicated UE associations.

After the MME has released all assigned S1 resources and the UE S1AP IDs for all indicated UE associations which can be used for new UE-associated logical S1-connections over the S1 interface, the MME shall respond with the RESET ACKNOWLEDGE message.

If the RESET message contains the UE-associated logical S1-connection list IE, then:

- The MME shall use the MME UE S1AP ID IE and/or the eNB UE S1AP ID IE to explicitly identify the UE association(s) to be reset.
- The MME shall include in the RESET ACKNOWLEDGE message, for each UE association to be reset, the *UE-associated logical S1-connection Item* IE in the *UE-associated logical S1-connection Item* IEs shall be in the same order as received in the RESET message and shall include also unknown UE-associated logical S1-connections. Empty *UE-associated logical S1-connection Item* IEs, received in the RESET message, may be omitted in the RESET ACKNOWLEDGE message.
- If the *MME UE S1AP ID* IE is included in the *UE-associated logical S1-connection Item* IE for a UE association, the MME shall include the *MME UE S1AP ID* IE in the corresponding *UE-associated logical S1-connection Item* IE in the RESET ACKNOWLEDGE message.
- If the *eNB UE SIAP ID* IE is included in a *UE-associated logical S1-connection Item* IE for a UE association, the MME shall include the *eNB UE SIAP ID* IE in the corresponding *UE-associated logical S1-connection Item* IE in the RESET ACKNOWLEDGE message.

Interactions with other procedures:

If the RESET message is received, any other ongoing procedure (except for another Reset procedure) on the same S1 interface related to a UE association, indicated explicitly or implicitly in the RESET message, shall be aborted.

8.7.1.3 Abnormal Conditions

8.7.1.3.1 Abnormal Condition at the EPC

If the RESET message includes the *UE-associated logical S1-connection list* IE, but neither the *MME UE S1AP ID* IE nor the *eNB UE S1AP ID* IE is present for a *UE-associated logical S1-connection Item* IE, then the MME shall ignore

the *UE-associated logical S1-connection Item* IE. The MME may return the empty *UE-associated logical S1-connection Item* IE in the *UE-associated logical S1-connection list* IE in the RESET ACKNOWLEDGE message.

8.7.1.3.2 Abnormal Condition at the E-UTRAN

If the RESET message includes the *UE-associated logical S1-connection list* IE, but neither the *MME UE S1AP ID* IE nor the *eNB UE S1AP ID* IE is present for a *UE-associated logical S1-connection Item* IE, then the eNB shall ignore the *UE-associated logical S1-connection Item* IE. The eNB may return the empty *UE-associated logical S1-connection Item* IE in the *UE-associated logical S1-connection list* IE in the RESET ACKNOWLEDGE message.

8.7.1.3.3 Crossing of Reset Messages

If a Reset procedure is ongoing in the eNB and the eNB receives a RESET message from the peer entity on the same S1 interface related to one or several UE associations previously requested to be reset, indicated explicitly or implicitly in the received RESET message, the eNB shall respond with the RESET ACKNOWLEDGE message as described in 8.7.1.2.1.

If a Reset procedure is ongoing in the MME and the MME receives a RESET message from the peer entity on the same S1 interface related to one or several UE associations previously requested to be reset, indicated explicitly or implicitly in the received RESET message, the MME shall respond with the RESET ACKNOWLEDGE message as described in 8.7.1.2.2.

8.7.2 Error Indication

8.7.2.1 General

The Error Indication procedure is initiated by a node in order to report detected errors in one incoming message, provided they cannot be reported by an appropriate failure message.

If the error situation arises due to reception of a message utilising UE associated signalling, then the Error Indication procedure uses UE associated signalling. Otherwise the procedure uses non-UE associated signalling.

8.7.2.2 Successful Operation



Figure 8.7.2.2-1: Error Indication procedure, MME originated. Successful operation.



Figure 8.7.2.2-2: Error Indication procedure, eNB originated. Successful operation.

When the conditions defined in clause 10 are fulfilled, the Error Indication procedure is initiated by an ERROR INDICATION message sent from the receiving node.

The ERROR INDICATION message shall contain at least either the *Cause* IE or the *Criticality Diagnostics* IE. In case the Error Indication procedure is triggered by utilising UE associated signalling the *MME UE S1AP ID* IE and the *eNB UE S1AP ID* IE shall be included in the ERROR INDICATION message. If one or both of *MME UE S1AP ID* IE and

the *eNB UE S1AP ID* IE are not correct, the cause shall be set to appropriate value, e.g., "Unknown or already allocated MME UE S1AP ID", "Unknown or already allocated eNB UE S1AP ID" or "Unknown or inconsistent pair of UE S1AP ID".

8.7.2.3 Abnormal Conditions

Not applicable.

8.7.3 S1 Setup

8.7.3.1 General

The purpose of the S1 Setup procedure is to exchange application level data needed for the eNB and the MME to correctly interoperate on the S1 interface. This procedure shall be the first S1AP procedure triggered after the TNL association has become operational. The procedure uses non-UE associated signalling.

This procedure erases any existing application level configuration data in the two nodes and replaces it by the one received and clears MME overload state information at the eNB. If the eNB and MME do not agree on retaining the UE Contexts this procedure also re-initialises the E-UTRAN S1AP UE-related contexts (if any) and erases all related signalling connections in the two nodes like a Reset procedure would do. If the eNB initiating the S1 Setup procedure supports a CSG cell, the procedure shall report the CSG ID(s) of the supported CSGs.

8.7.3.2 Successful Operation

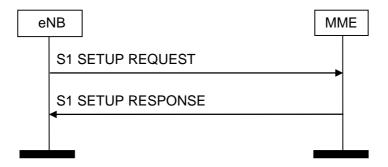


Figure 8.7.3.2-1: S1 Setup procedure: Successful Operation.

The eNB initiates the procedure by sending a S1 SETUP REQUEST message including the appropriate data to the MME. The MME responds with a S1 SETUP RESPONSE message including the appropriate data.

The exchanged data shall be stored in respective node and used for the duration of the TNL association. When this procedure is finished, the S1 interface is operational and other S1 messages can be exchanged.

If the eNB initiating the S1 SETUP procedure supports one (or more) CSG cell(s), the S1 SETUP REQUEST message shall contain the CSG ID(s) of the supported CSG(s).

If the S1 SETUP REQUEST message contains the *eNB Name* IE the MME may use this IE as a human readable name of the eNB.

If the S1 SETUP RESPONSE message contains the *MME Name* IE the eNB may use this IE as a human readable name of the MME.

If the *MME Relay Support Indicator* IE is included in the S1 SETUP RESPONSE message, the eNB shall consider this information when selecting an appropriate MME for the Relay Node.

If the *UE Retention Information* IE set to "ues-retained" was included in the S1 SETUP REQUEST message, then the MME may accept the proposal to retain the existing UE related contexts and signalling connections by including the *UE Retention Information* IE set to "ues-retained" in the S1 SETUP RESPONSE message.

If the NB-IoT Default Paging DRX IE is included in the S1 SETUP REQUEST message, the MME will take it into account as specified in TS36.300 [14].

If the *Connected en-gNB List* IE is included in the S1 SETUP REQUEST message, the MME shall take it into account as specified in TS 36.300 [14].

If the S1 SETUP RESPONSE message contains the *ServedDCNs* IE then the eNB shall, if supported, use it as defined in TS 23.401 [11].

If the S1 SETUP RESPONSE message contains the *GUMMEI Type* IE then the eNB shall, if supported, use it to route the UE to the correct MME as specified in TS 23.401 [11].

If the MME supports IAB, the MME shall include the IAB Supported IE in the S1 SETUP RESPONSE message.

8.7.3.3 Unsuccessful Operation

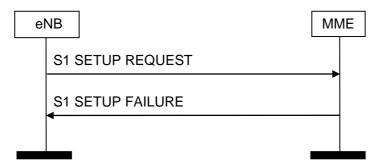


Figure 8.7.3.3-1: S1 Setup procedure: Unsuccessful Operation.

If the MME cannot accept the setup, it should respond with a S1 SETUP FAILURE and appropriate cause value.

If the S1 SETUP FAILURE message includes the *Time To Wait* IE, the eNB shall wait at least for the indicated time before reinitiating the S1 setup towards the same MME.

8.7.3.4 Abnormal Conditions

If the eNB initiates the procedure by sending a S1 SETUP REQUEST message including the *PLMN Identity* IEs and none of the PLMNs provided by the eNB is identified by the MME, then the MME shall reject the eNB S1 Setup Request procedure with the appropriate cause value, e.g., "Unknown PLMN".

8.7.4 eNB Configuration Update

8.7.4.1 General

The purpose of the eNB Configuration Update procedure is to update application level configuration data needed for the eNB and the MME to interoperate correctly on the S1 interface. This procedure does not affect existing UE-related contexts, if any.

8.7.4.2 Successful Operation

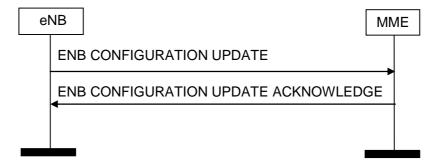


Figure 8.7.4.2-1: ENB Configuration Update procedure: Successful Operation.

The eNB initiates the procedure by sending an ENB CONFIGURATION UPDATE message to the MME including an appropriate set of updated configuration data that it has just taken into operational use. The MME responds with ENB CONFIGURATION UPDATE ACKNOWLEDGE message to acknowledge that it successfully updated the configuration data. If information element(s) is/are not included in the ENB CONFIGURATION UPDATE message, the MME shall interpret that the corresponding configuration data is/are not changed and shall continue to operate the S1 with the existing related configuration data.

If the supported TA(s) is/are to be updated, the whole list of supported TAs, including those that are not to be updated, shall be included in the *Supported TAs* IE. The MME shall overwrite the whole list of TAs.

If the supported CSG ID(s) is/are to be updated, the whole list of supported CSG IDs, including those that are not to be updated, shall be included in the *CSG Id List* IE. The MME shall overwrite the whole list of CSG Ids.

If the ENB CONFIGURATION UPDATE message contains the *eNB Name* IE, the MME may use this IE as a human readable name of the eNB.

If the *Default Paging DRX* IE is included, the MME shall overwrite any previously stored default paging DRX value for the eNB.

If the *NB-IoT Default Paging DRX* IE is included in the ENB CONFIGURATION UPDATE message, the MME shall overwrite any previously stored NB-IoT default paging DRX value for the eNB.

If the *Connected en-gNB to be Added List* IE is included in the ENB CONFIGURATION UPDATE message, the MME shall replace, if applicable, any previously received information for the concerned en-gNBs and take it into account as specified in TS 36.300 [14].

If the *Connected en-gNB to be Removed List* IE is included in the ENB CONFIGURATION UPDATE message, the MME shall remove any stored information for the concerned en-gNBs.

The updated configuration data shall be stored in both the eNB and the MME and used for the duration of the TNL association or until any further update is triggered by the eNB.

The eNB may initiate a further eNB Configuration Update procedure only after a previous eNB Configuration Update procedure has been completed.

8.7.4.3 Unsuccessful Operation

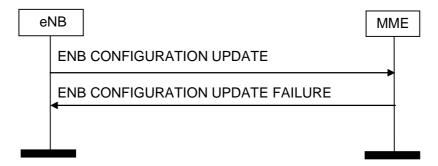


Figure 8.7.4.3-1: ENB Configuration Update procedure: Unsuccessful Operation.

If the MME cannot accept the update, it shall respond with an ENB CONFIGURATION UPDATE FAILURE message and appropriate cause value.

If the ENB CONFIGURATION UPDATE FAILURE message includes the *Time To Wait* IE, the eNB shall wait at least for the indicated time before reinitiating the ENB Configuration Update procedure towards the same MME. Both nodes shall continue to operate the S1 with their respective configuration data.

8.7.4.4 Abnormal Conditions

If the eNB after initiating eNB Configuration Update procedure receives neither an ENB CONFIGURATION UPDATE ACKOWLEDGE nor an ENB CONFIGURATION UPDATE FAILURE message, the eNB may reinitiate a further eNB Configuration Update procedure towards the same MME, provided that the content of the new ENB

CONFIGURATION UPDATE message is identical to the content of the previously unacknowledged ENB CONFIGURATION UPDATE message.

8.7.5 MME Configuration Update

8.7.5.1 General

The purpose of the MME Configuration Update procedure is to update application level configuration data needed for the eNB and MME to interoperate correctly on the S1 interface. This procedure does not affect existing UE-related contexts, if any.

8.7.5.2 Successful Operation

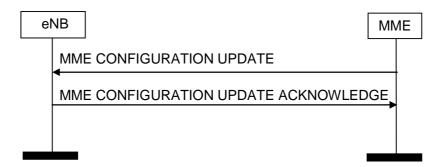


Figure 8.7.5.2-1: MME Configuration Update procedure: Successful Operation.

The MME initiates the procedure by sending an MME CONFIGURATION UPDATE message including the appropriate updated configuration data to the eNB. The eNB responds with an MME CONFIGURATION UPDATE ACKNOWLEDGE message to acknowledge that it successfully updated the configuration data. If information element(s) is/are not included in the MME CONFIGURATION UPDATE message, the eNB shall interpret that the corresponding configuration data is not changed and shall continue to operate the S1 with the existing related configuration data.

If the served PLMNs is/are to be updated, the eNB shall overwrite the whole list of PLMNs.

If the MME CONFIGURATION UPDATE message contains the *MME Name* IE, the eNB may use this IE as a human readable name of the MME.

The updated configuration data shall be stored in the respective node and used for the duration of the TNL association or until any further update is performed from the MME.

The MME may initiate a further MME Configuration Update procedure only after a previous MME Configuration Update procedure has been completed.

If the MME CONFIGURATION UPDATE message contains the *ServedDCNs* IE then the eNB shall, if supported, use it as defined in TS 23.401 [11].

If the MME CONFIGURATION UPDATE message contains the *GUMMEI Type* IE then the eNB shall, if supported, use it to route the UE to the correct MME as specified in TS 23.401 [11].

8.7.5.3 Unsuccessful Operation



Figure 8.7.5.3-1: MME Configuration Update: Unsuccessful Operation.

If the eNB cannot accept the update, it shall respond with an MME CONFIGURATION UPDATE FAILURE message and appropriate cause value.

If the MME CONFIGURATION UPDATE FAILURE message includes the *Time To Wait* IE the MME shall wait at least for the indicated time before reinitiating the MME Configuration Update procedure towards the same eNB. Both nodes shall continue to operate the S1 with the existing configuration data.

8.7.5.4 Abnormal Conditions

If the MME neither receives an MME CONFIGURATION UPDATE ACKOWLEDGE nor an MME CONFIGURATION UPDATE FAILURE message, the MME may reinitiate MME Configuration Update procedure towards the same eNB provided that the content of the new MME CONFIGURATION UPDATE message is identical to the content of the previously unacknowledged MME CONFIGURATION UPDATE message.

8.7.6 Overload Start

8.7.6.1 General

The purpose of the Overload Start procedure is to inform an eNB to reduce the signalling load towards the concerned MME.

The procedure uses non-UE associated signalling.

8.7.6.2 Successful Operation



Figure 8.7.6.2-1: Overload Start procedure

The eNB receiving the OVERLOAD START message shall assume the MME from which it receives the message as being in an overloaded state.

If the Overload Action IE in the Overload Response IE within the OVERLOAD START message is set to

- "reject RRC connection establishments for non-emergency mobile originated data transfer" (i.e., reject traffic corresponding to RRC cause "mo-data", "mo-VoiceCall" and "delayTolerantAccess" in TS 36.331 [16]), or

- "reject RRC connection establishments for signalling" (i.e., reject traffic corresponding to RRC cause "mo-data", "mo-signalling", "mo-VoiceCall" and "delayTolerantAccess" in TS 36.331 [16]), or
- "only permit RRC connection establishments for emergency sessions and mobile terminated services" (i.e., only permit traffic corresponding to RRC cause "emergency" and "mt-Access" in TS 36.331 [16]), or
- "only permit RRC connection establishments for high priority sessions and mobile terminated services" (i.e., only permit traffic corresponding to RRC cause "highPriorityAccess" and "mt-Access" in TS 36.331 [16]), or
- "reject only RRC connection establishment for delay tolerant access" (i.e., only reject traffic corresponding to RRC cause "delayTolerantAccess" in TS 36.331 [16]), or
- "not accept RRC connection requests for data transmission from UEs that only support Control Plane CIoT EPS Optimisation" (i.e. not accept traffic corresponding to RRC cause "mo-data" or "delayTolerantAccess" in TS36.331 [16] for those UEs), or
- "only permit RRC connection establishments for high priority sessions, exception reporting and mobile terminated services" (i.e., only permit traffic corresponding to RRC cause "highPriorityAccess", "mo-ExceptionData" and "mt-Access" in TS 36.331 [16]),

the eNB shall:

- if the *Traffic Load Reduction Indication* IE is included in the OVERLOAD START message and, if supported, reduce the signalling traffic indicated as to be rejected by the indicated percentage,
- otherwise ensure that only the signalling traffic not indicated as to be rejected/not accepted is sent to the MME.

NOTE: When the Overload Action IE is set to "only permit RRC connection establishments for emergency sessions and mobile terminated services", emergency calls with RRC cause "highPriorityAccess" from high priority users are rejected (see TS 24.301 [24]).

If the *GUMMEI List* IE is present, the eNB shall, if supported, use this information to identify to which traffic the above defined rejections shall be applied.

If an overload action is ongoing and the eNB receives a further OVERLOAD START message, the eNB shall replace the ongoing overload action with the newly requested one. If the *GUMMEI List* IE is present, the eNB replaces applicable ongoing actions according to TS 36.300 [14], clauses 4.6.2, 4.7.4 and 19.2.2.12.

8.7.6.3 Unsuccessful Operation

Not applicable.

8.7.7 Overload Stop

8.7.7.1 General

The purpose of the Overload Stop procedure is to signal to an eNB the MME is connected to that the overload situation at the MME has ended and normal operation shall resume.

The procedure uses non-UE associated signalling.

8.7.7.2 Successful Operation

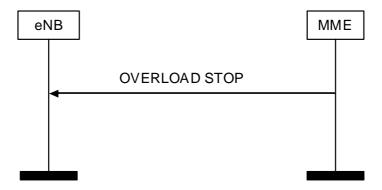


Figure 8.7.7.2.-1: Overload Stop procedure

The eNB receiving the OVERLOAD STOP message shall assume that the overload situation at the MME from which it receives the message has ended and shall resume normal operation for the applicable traffic towards this MME.

If the *GUMMEI List* IE is present, the eNB shall, if supported, use this information to identify which traffic to cease rejecting, and proceed according to TS 36.300 [14], clauses 4.6.2, 4.7.4 and 19.2.2.12. If no particular overload action is ongoing for a particular GUMMEI value, the eNB shall ignore this value.

8.7.7.3 Unsuccessful Operation

Not applicable.

8.8 S1 CDMA2000 Tunnelling Procedures

8.8.1 General

The purpose of S1 CDMA2000 Tunnelling procedures is to carry CDMA2000 signalling between UE and CDMA2000 RAT over the S1 Interface. This includes signalling for pre-registration of UE with CDMA2000 HRPD network, signalling for handover preparation for handover from E-UTRAN to CDMA2000 HRPD/1xRTT and pre-registration and paging of UE with CDMA2000 1xRTT CS system. The CDMA2000 messages are not interpreted by the eNB, and their content is outside the scope of this specification, however, additional information may be sent along with the tunnelled CDMA2000 message to assist the eNB and the MME in the tunnelling procedure. These procedures use an established UE-associated logical S1-connection.

The CDMA2000 messages are transported in an IE of the DOWNLINK S1 CDMA2000 TUNNELLING or UPLINK S1 CDMA2000 TUNNELLING messages.

8.8.2 Successful Operations

8.8.2.1 Downlink S1 CDMA2000 Tunnelling

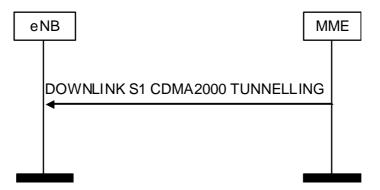


Figure 8.8.2.1-1: Downlink S1 CDMA2000 Tunnelling Procedure

If a CDMA2000 message needs to be sent from the MME to a given UE and a UE-associated logical S1-connection exists for that given UE, the MME should send a DOWNLINK S1 CDMA2000 TUNNELLING message to the eNB including the CDMA2000 message in the *CDMA2000-PDU* IE. The eNB forwards the received *CDMA2000-PDU* IE to the UE along with an indication of the RAT Type associated with the *CDMA2000-PDU* IE based on the *CDMA2000 RAT Type* IE.

If the MME receives handover status information along with the tunnelled downlink CDMA2000 message, the MME should include the handover status information in the *CDMA2000 HO Status* IE in the DOWNLINK S1 CDMA2000 TUNNELLING message.

If the DOWNLINK S1 CDMA2000 TUNNELLING message contains the *E-RABs Subject to Forwarding List* IE, it indicates that DL forwarding is available for the indicated E-RABs towards the tunnel endpoint identified by the *DL GTP-TEID* IE for those E-RABs.

8.8.2.2 Uplink S1 CDMA2000 Tunnelling



Figure 8.8.2.2-1: Uplink S1 CDMA2000 Tunnelling Procedure

When the eNB has received from the radio interface a CDMA2000 message to be forwarded to the MME in which a UE-associated logical S1-connection for a given UE exists, the eNB shall send the UPLINK S1 CDMA2000 TUNNELLING message to the MME including the CDMA2000 message in the *CDMA2000-PDU* IE.

If the MME receives the *CDMA2000 HO Required Indication* IE set to "true" in UPLINK S1 CDMA2000 TUNNELLING message, the MME shall send the necessary handover preparation information to the CDMA2000 target RAT.

If the MME receives any of the *CDMA2000 1xRTT SRVCC Info* IE, or the *CDMA2000 1xRTT RAND* IE in the UPLINK S1 CDMA2000 TUNNELLING message, the MME shall forward the received information to the CDMA2000 1xRTT RAT.

If the MME receives the *E-UTRAN Round Trip Delay Estimation Info* IE in the UPLINK S1 CDMA2000 TUNNELLING message, the MME shall forward the received information to the target HRPD access. The MME shall forward the received *CDMA2000 Sector ID* IE and *CDMA2000-PDU* IE to the proper destination node in the CDMA2000 RAT.

Interactions with E-RAB Management procedures:

If, after an UPLINK S1 CDMA2000 TUNNELLING message with *CDMA2000 HO Required Indication* IE set to "true" is sent before the DOWNLINK S1 CDMA2000 TUNNELLING message with *CDMA2000 HO Status* IE is received, the source eNB receives an MME initiated E-RAB Management procedure on the same UE associated signalling connection, the source eNB shall terminate the MME initiated E-RAB Management procedure by sending the appropriate response message with an appropriate cause value, e.g., "S1 inter system Handover Triggered", to the MME.

8.8.3 Unsuccessful Operation

Not applicable

8.8.4 Abnormal Conditions

If the eNB receives at least one E-RAB ID included in the *E-RABs Subject to Forwarding Items* IE without any associated DL GTP-TEID and DL Transport Layer Address pair in the DOWNLINK S1 CDMA2000 TUNNELLING message, the eNB shall consider it as a logical error and act as described in subclause 10.4.

The eNB shall ignore the *UL GTP-TEID* IE and/or *UL Transport Layer Address* IE in the *E-RABs Subject to Forwarding Items* IE, when the IEs are included in the DOWNLINK S1 CDMA2000 TUNNELLING message.

8.9 UE Capability Info Indication

8.9.1 General

The purpose of the UE Capability Info Indication procedure is to enable the eNB to provide to the MME UE capability-related information.

8.9.2 Successful Operation

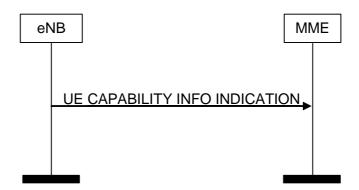


Figure 8.9.2-1: UE Capability Info Indication procedure. Successful operation.

The eNB controlling a UE-associated logical S1-connection initiates the procedure by sending a UE CAPABILITY INFO INDICATION message to the MME including the UE capability information. The UE CAPABILITY INFO INDICATION message may also include paging specific UE capability information within the *UE Radio Capability for Paging* IE. The UE capability information received by the MME shall replace previously stored corresponding UE capability information in the MME for the UE, as described in TS 23.401 [11].

If UE CAPABILITY INFO INDICATION message contains the *LTE-M indication* IE, the MME shall, if supported, store this information in the UE context and use it according to TS 23.401 [11].

If the UE indicates the support for UE Application Layer Measurement, the eNB shall if supported include the UE Application Layer Measurement Capability IE in the UE CAPABILITY INFO INDICATION message. The MME shall, if supported, store and use thie information when initiating UE Application Layer Measurement.

If UE CAPABILITY INFO INDICATION message contains the *UE Radio Capability – NR Format* IE, the MME shall, if supported, use it according to TS 23.401 [11].

8.10 Trace Procedures

8.10.1 Trace Start

8.10.1.1 General

The purpose of the Trace Start procedure is to allow the MME to request the eNB to initiate a trace function for a UE. The procedure uses UE-associated signalling. If no UE-associated logical S1-connection exists, the UE-associated logical S1-connection shall be established as part of the procedure.

8.10.1.2 Successful Operation



Figure 8.10.1.2-1: Trace Start procedure.

The MME initiates the procedure by sending a TRACE START message. On receipt of a TRACE START message, the eNB shall initiate the requested trace function as described in TS 32.422 [10].

If the *Trace Activation* IE is included in the TRACE START message which includes the *MDT Activation* IE set to "Immediate MDT and Trace", the eNB shall if supported, initiate the requested trace session and MDT session as described in TS 32.422 [10].

If the *Trace Activation* IE is included in the TRACE START message which includes the *MDT Activation* IE set to "Immediate MDT Only", "Logged MDT only" or "Logged MBSFN MDT", the target eNB shall, if supported, initiate the requested MDT session as described in TS 32.422 [10] and the target eNB shall ignore *Interfaces To Trace* IE, and *Trace Depth* IE.

If the *Trace Activation* IE includes the *MDT Location Information* IE, within the *MDT Configuration* IE, the eNB shall, if supported, store this information and take it into account in the requested MDT session.

If the *Trace Activation* IE is included in the TRACE START message which includes the *MDT Activation* IE set to "Immediate MDT Only", "Logged MDT only" or "Logged MBSFN MDT" and if the *Signalling based MDT PLMN List* IE is included in the *MDT Configuration* IE, the eNB may use it to propagate the MDT Configuration as described in TS 37.320 [31].

If the *Trace Activation* IE includes the *MBSFN-ResultToLog* IE, within the *MDT Configuration* IE, the eNB shall, if supported, take it into account for MDT Configuration as described in TS 37.320 [31].

If the *Trace Activation* IE includes the *MBSFN-Areald* IE in the *MBSFN-ResultToLog* IE, within the *MDT Configuration* IE, the eNB shall, if supported, take it into account for MDT Configuration as described in TS 37.320 [31].

If the *Trace Activation* IE includes the *UE Application layer measurement configuration* IE, the eNB shall, if supported, initiate the requested trace session and QoE Measurement Collection function as described in TS 36.300 [14].

If the *Trace Activation* IE includes the *Bluetooth Measurement Configuration* IE, within the *MDT Configuration* IE, the eNB shall, if supported, take it into account for MDT Configuration as described in TS 37.320 [31].

If the *Trace Activation* IE includes the *WLAN Measurement Configuration* IE, within the *MDT Configuration* IE, the eNB shall, if supported, take it into account for MDT Configuration as described in TS 37.320 [31].

If the *Trace Activation* IE includes the *MDT Configuration NR* IE, the eNB shall, if supported, store and forward *MDT Configuration NR* IE to the SgNB, if the eNB has configured EN-DC for the UE.

Interactions with other procedures:

If the eNB is not able to initiate the trace session due to ongoing handover of the UE to another eNB, the eNB shall initiate a Trace Failure Indication procedure with the appropriate cause value.

8.10.2 Trace Failure Indication

8.10.2.1 General

The purpose of the Trace Failure Indication procedure is to allow the eNB to inform the MME that a Trace Start procedure or a Deactivate Trace procedure has failed due to an interaction with a handover procedure. The procedure uses UE-associated signalling.

8.10.2.2 Successful Operation



Figure 8.10.2.2-1: Trace Failure Indication procedure.

The eNB initiates the procedure by sending a TRACE FAILURE INDICATION message. Upon reception of the TRACE FAILURE INDICATION message, the MME shall take appropriate actions based on the failure reason indicated by the *Cause* IE.

8.10.3 Deactivate Trace

8.10.3.1 General

The purpose of the Deactivate Trace procedure is to allow the MME to request the eNB to stop the trace session, for the indicated trace reference.

8.10.3.2 Successful Operation



Figure 8.10.3.2-1: Deactivate Trace procedure. Successful operation.

The MME invokes the Deactivate Trace procedure by sending a DEACTIVATE TRACE message to the eNB as described in TS 32.422 [10].

Upon reception of this message, the eNB shall stop the trace session for the indicated trace reference in the *E-UTRAN Trace ID* IE.

Interactions with other procedures:

If the eNB is not able to stop the trace session due to ongoing handover of the UE to another eNB, the eNB shall initiate a Trace Failure Indication procedure with the appropriate cause value.

8.10.4 Cell Traffic Trace

8.10.4.1 General

The purpose of the Cell Traffic Trace procedure is to send the allocated Trace Recording Session Reference and the Trace Reference to MME. The procedure uses UE-associated signalling.

8.10.4.2 Successful Operation



Figure 8.10.4.2-1: Cell Traffic Trace procedure. Successful operation.

The procedure is initiated with a CELL TRAFFIC TRACE message sent from the eNB to the MME.

If the *Privacy Indicator* IE is included in the message, the MME shall take the information into account for anonymisation of MDT data (TS 32.422 [10]).

8.11 Location Reporting Procedures

8.11.1 Location Reporting Control

8.11.1.1 General

The purpose of Location Reporting Control procedure is to allow the MME to request the eNB to report where the UE is currently located. The procedure uses UE-associated signalling.

8.11.1.2 Successful Operation



Figure 8.11.1.2-1: Location Reporting Control procedure. Successful operation.

The MME initiates the procedure by sending a LOCATION REPORTING CONTROL message. On receipt of a LOCATION REPORTING CONTROL message the eNB shall perform the requested location reporting control action for the UE.

The Request Type IE indicates to the eNB whether:

- to report directly;
- to report upon change of serving cell, or
- to stop reporting at change of serving cell.

If reporting upon change of serving cell is requested, the eNB shall report whenever the UE changes its serving cell to another cell belonging to the eNB.

If the *Additional Location Information* IE is included in the LOCATION REPORTING CONTROL message and set to "Include PSCell" then, if EN-DC is activated, the eNB shall include the current PSCell in the report. If a report upon change of serving cell is requested, the eNB shall provide the report also whenever the UE changes the PSCell, and when EN-DC is activated, as specified in TS 23.401 [11].

The *Request Type* IE also indicates what type of location information the eNB shall report. The location information is E-UTRAN CGI and TAI, or E-UTRAN CGI, PSCell and TAI.

8.11.1.3 Abnormal Conditions

Not applicable.

8.11.2 Location Report Failure Indication

8.11.2.1 General

The Location Report Failure Indication procedure is initiated by an eNB in order to inform the MME that a Location Reporting Control procedure has failed due to an interaction with a handover procedure. The procedure uses UE-associated signalling.

8.11.2.2 Successful Operation



Figure 8.11.2.2-1: Location Report Failure Indication procedure.

Upon reception of the LOCATION REPORT FAILURE INDICATION message the MME shall take appropriate actions based on the failure reason indicated by the *Cause* IE.

8.11.3 Location Report

8.11.3.1 General

The purpose of Location Report procedure is to provide the UE's current location to the MME. The procedure uses UE-associated signalling.

8.11.3.2 Successful Operation



Figure 8.11.3.2-1: Location Report procedure. Successful operation.

The eNB initiates the procedure by generating a LOCATION REPORT message. The LOCATION REPORT message may be used as a response to a LOCATION REPORTING CONTROL message.

In case reporting at change of serving cell has been requested, the eNB shall send a LOCATION REPORT message whenever the information given to the EPC in any S1AP message is not anymore valid.

If the *PSCell Information* IE is included in the LOCATION REPORT message, then the MME may consider both *E-UTRAN CGI* IE and *PSCell Information* IE to determine the UE's location.

8.11.3.3 Abnormal Conditions

Not applicable.

8.12 Warning Message Transmission Procedures

8.12.1 Write-Replace Warning

8.12.1.1 General

The purpose of Write-Replace Warning procedure is to start or overwrite the broadcasting of warning messages.

The procedure uses non UE-associated signalling.

8.12.1.2 Successful Operation

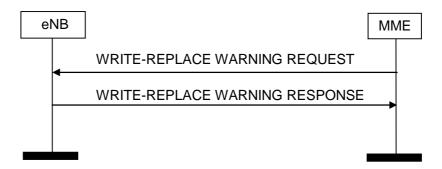


Figure 8.12.1.2-1: Write-Replace Warning procedure. Successful operation.

The MME initiates the procedure by sending a WRITE-REPLACE WARNING REQUEST message to the eNB.

Upon receipt of the WRITE-REPLACE WARNING REQUEST, eNB shall prioritise its resources to process the warning message.

If, in a certain area, broadcast of a warning message is already ongoing and the eNB receives a WRITE-REPLACE WARNING REQUEST message with *Message Identifier* IE and/or *Serial Number* IE which are different from those in the warning message being broadcast, and if the *Concurrent Warning Message Indicator* IE is not present, the eNB shall replace the warning message being broadcast with the newly received one for that area.

If the eNB receives a WRITE-REPLACE WARNING REQUEST message with a warning message identified by the *Message Identifier* IE and *Serial Number* IE and if there are no prior warning messages being broadcast in any of warning areas indicated in the *Warning Area List* IE, the eNB shall broadcast the received warning message for those area(s).

If, in a certain area, broadcast of one or more warning messages are already ongoing and the eNB receives a WRITE-REPLACE WARNING REQUEST message with a *Message Identifier* IE and/or *Serial Number* IE which are different from those in any of the warning messages being broadcast, and if the *Concurrent Warning Message Indictor* IE is present, the eNB shall schedule the received warning message for broadcast, for that area.

If the *Concurrent Warning Message Indicator* IE is present and if a value "0" is received in the *Number of Broadcast Requested* IE, the eNB shall broadcast the received warning message indefinitely until requested otherwise to stop broadcasting, except if the *Repetition Period* IE is set to "0".

If, in a certain area, broadcast of one or more warning messages are already ongoing and the eNB receives a WRITE-REPLACE WARNING REQUEST message with *Message Identifier* IE and *Serial Number* IE which correspond to one of the warning messages already being broadcast in that area, the eNB shall not start a new broadcast or replace an existing one but it shall still reply by sending a WRITE-REPLACE WARNING RESPONSE message which includes the *Broadcast Completed Area List* IE set according to the ongoing broadcast.

If Warning Area List IE is not included in the WRITE-REPLACE WARNING REQUEST message, the eNB shall broadcast the indicated message in all of the cells within the eNB.

If Warning Type IE is included in WRITE-REPLACE WARNING REQUEST message, the eNB shall broadcast the Primary Notification irrespective of the setting of the Repetition Period IE and the Number of Broadcasts Requested IE, and process the Primary Notification according to TS 36.331 [16].

If the *Warning Security Information* IE is included in the WRITE-REPLACE WARNING REQUEST message, the eNB shall include this information together with the warning type in the Primary Notification.

If the *Data Coding Scheme* IE and the *Warning Message Contents* IE are both included in the WRITE-REPLACE WARNING REQUEST message, the eNB shall schedule a broadcast of the warning message according to the value of the *Repetition Period* IE and *Number of Broadcasts Requested* IE and process the warning message according to TS 36.331 [16].

If the Warning Area Coordinates IE is included in the WRITE-REPLACE WARNING REQUEST message, the eNB shall include this information together with the warning message being broadcast according to TS 36.331 [16].

The eNB acknowledges the WRITE-REPLACE WARNING REQUEST message by sending a WRITE-REPLACE WARNING RESPONSE message to the MME.

If the *Broadcast Completed Area List* IE is not included in the WRITE-REPLACE WARNING RESPONSE message, the MME shall consider that the broadcast is unsuccessful in all the cells within the eNB.

If the *Extended Repetition Period* IE is included in the WRITE-REPLACE WARNING REQUEST message, the eNB shall ignore the value in the *Repetition Period* IE.

8.12.1.3 Abnormal Conditions

If the Concurrent Warning Message Indicator IE is not present and if a value "0" is received in the Number of Broadcast Requested IE, the eNB shall not broadcast the received secondary notification.

If Concurrent Warning Message Indicator IE is included and if a value "0" is received in the Repetition Period IE, the eNB shall not broadcast the received warning message except if the Number of Broadcast Requested IE is set to "1".

If Concurrent Warning Message Indicator IE is not included and if a value "0" is received in the Repetition Period IE, the eNB shall not broadcast the received secondary notification except if the Number of Broadcast Requested IE is set to "1".

8.12.2 Kill

8.12.2.1 General

The purpose of Kill procedure is to cancel an already ongoing broadcast of a warning message.

The procedure uses non UE-associated signalling.

8.12.2.2 Successful Operation

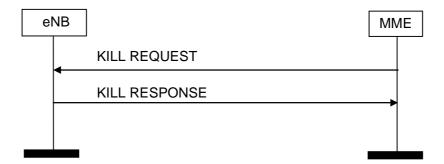


Figure 8.12.2.2-1: Kill procedure. Successful operation.

The MME initiates the procedure by sending a KILL REQUEST message to the eNB.

If the eNB receives a KILL REQUEST message and broadcast of the warning message identified by the *Message Identifier* and *Serial Number* IE is ongoing in an area indicated within the *Warning Area List* IE, the eNB shall stop broadcasting the warning message within that area and discard the warning message for that area.

If the *Warning Area List* IE is not included in the KILL REQUEST message, the eNB shall stop broadcasting and discard the warning message identified by the *Message Identifier* IE and the *Serial Number* IE in all of the cells in the eNB.

The eNB shall acknowledge the KILL REQUEST message by sending the KILL RESPONSE message, with the *Message Identifier* IE and the *Serial Number* IE copied from the KILL REQUEST message and shall, if there is an area to report where an ongoing broadcast was stopped successfully, include the *Broadcast Cancelled Area List* IE.

If an area included in the *Warning Area List* IE in the KILL REQUEST message does not appear in the *Broadcast Cancelled Area List* IE, the MME shall consider that the eNB had no ongoing broadcast to stop for the same *Message Identifier* and *Serial Number* in that area.

If the *Broadcast Cancelled Area List* IE is not included in the KILL RESPONSE message, the MME shall consider that the eNB had no ongoing broadcast to stop for the same *Message Identifier* and *Serial Number*.

If the *Kill-all Warning Messages Indicator* IE is present in the KILL REQUEST message, then the eNB shall stop broadcasting and discard all warning messages for the area as indicated in the *Warning Area List* IE or in all the cells of the eNB if the *Warning Area List* IE is not included. The eNB shall acknowledge the KILL REQUEST message by sending the KILL RESPONSE message, with the *Message Identifier* IE and the *Serial Number* IE copied from the KILL REQUEST message and shall, if there is area to report where an ongoing broadcast was stopped successfully, include the *Broadcast Cancelled Area List* IE with the *Number of Broadcasts* IE set to 0.

8.12.3 PWS Restart Indication

8.12.3.1 General

The purpose of PWS Restart Indication procedure is to inform the MME that PWS information for some or all cells of the eNB are available for reloading from the CBC if needed. The procedure uses non UE-associated signalling.

8.12.3.2 Successful Operation



Figure 8.12.3.2-1: PWS Restart Indication procedure. Successful operation.

The eNB initiates the procedure by sending a PWS RESTART INDICATION message to the MME. On receipt of a PWS RESTART INDICATION message, the MME shall act as defined in TS 23.007 [38].

If the Emergency Area ID is available, the eNB shall also include it in the Emergency Area ID List for Restart IE.

8.12.4 PWS Failure Indication

8.12.4.1 General

The purpose of PWS Failure Indication procedure is to inform the MME that ongoing PWS operation for one or more cells of the eNB has failed. The procedure uses non UE-associated signalling.

8.12.4.2 Successful Operation



Figure 8.12.4.2-1: PWS Failure Indication procedure. Successful operation.

The eNB initiates the procedure by sending a PWS FAILURE INDICATION message to the MME. On receipt of a PWS FAILURE INDICATION message, the MME shall act as defined in TS 23.041 [29].

8.13 eNB Direct Information Transfer

8.13.1 General

The purpose of the eNB Direct Information Transfer procedure is to transfer RAN information from the eNB to the MME in unacknowledged mode. The MME does not interpret the transferred RAN information.

This procedure uses non-UE associated signalling.

8.13.2 Successful Operation

8.13.2.1 eNB Direct Information Transfer



Figure 8.13.1.2-1: ENB Direct Information Transfer procedure. Successful operation.

The procedure is initiated with an ENB DIRECT INFORMATION TRANSFER message sent from the eNB to the MME.

The RIM Transfer IE within the Inter-system Information Transfer Type IE shall contain the RIM Routing Address IE that identifies the final RAN destination node where the RIM information needs to be transferred to by the core network. In case of transfer to UTRAN the source eNB shall include the RAC IE in the Target RNC-ID IE within the RIM Routing Address IE.

8.13.3 Abnormal Conditions

Not applicable.

8.14 MME Direct Information Transfer

8.14.1 General

The purpose of the MME Direct Information Transfer procedure is to transfer RAN information from the MME to the eNB in unacknowledged mode.

This procedure uses non-UE associated signalling.

8.14.2 Successful Operation

8.14.2.1 MME Direct Information Transfer



Figure 8.14.1.2-1: MME Direct Information Transfer procedure. Successful operation.

The procedure is initiated with a MME DIRECT INFORMATION TRANSFER message sent from the MME to the eNB.

The *Inter-system Information Transfer Type* IE indicates the nature of the transferred information. When the transferred information is of RIM nature, the *RIM Information* IE within the *RIM Transfer* IE shall contain a BSSGP RIM PDU. The *RIM Routing Address* IE shall not be present since the eNB is the final destination node.

8.14.3 Abnormal Conditions

Not applicable.

8.15 eNB Configuration Transfer

8.15.1 General

The purpose of the eNB Configuration Transfer procedure is to transfer RAN configuration information from the eNB to the MME in unacknowledged mode. The MME does not interpret the transferred RAN configuration information.

This procedure uses non-UE associated signalling.

8.15.2 Successful Operation

8.15.2.1 eNB Configuration Transfer



Figure 8.15.2.1-1: eNB Configuration Transfer procedure. Successful operation.

The procedure is initiated with an ENB CONFIGURATION TRANSFER message sent from the eNB to the MME.

If the MME receives the SON Configuration Transfer IE, it shall transparently transfer the SON Configuration Transfer IE towards the eNB indicated in the Target eNB-ID IE which is included in the SON Configuration Transfer IE.

If the MME receives the *EN-DC SON Configuration Transfer* IE, it shall transparently transfer the *EN-DC SON Configuration Transfer* IE either towards the eNB indicated in the *Target eNB-ID* IE or towards an eNB connected to the en-gNB indicated in the *Target en-gNB-ID* IE which is included in the *EN-DC SON Configuration Transfer* IE. The *EN-DC SON Configuration Transfer* IE may also contain, if available,

- the Target eNB ID IE,
- the Associated TAI IE,
- the Broadcast 5GS TAI IE,

for purposes described in TS 36.300 [14].

If the MME receives the *Inter-system SON Configuration Transfer* IE, it shall transparently transfer the *Inter-system SON Configuration Transfer* IE towards the AMF serving the NG-RAN Node indicated in the *Target gNB-ID* IE which is included in the *Inter-system SON Configuration Transfer* IE.

8.15.3 Abnormal Conditions

Not applicable.

8.16 MME Configuration Transfer

8.16.1 General

The purpose of the MME Configuration Transfer procedure is to transfer RAN configuration information from the MME to the eNB in unacknowledged mode.

This procedure uses non-UE associated signalling.

8.16.2 Successful Operation

8.16.2.1 MME Configuration Transfer



Figure 8.16.2.1-1: MME Configuration Transfer procedure. Successful operation.

The procedure is initiated with an MME CONFIGURATION TRANSFER message sent from the MME to the eNB.

If the eNB receives, in the SON Configuration Transfer IE or the EN-DC SON Configuration Transfer IE, the SON Information IE containing the SON Information Request IE, it may transfer back the requested information either towards the eNB indicated in the Source eNB-ID IE of the SON Configuration Transfer IE or towards the eNB indicated in the Source eNB-ID IE of the EN-DC SON Configuration Transfer IE by initiating the eNB Configuration Transfer procedure. If the X2 TNL Configuration Info IE contains the eNB Indirect X2 Transport Layer Addresses IE, the eNB may use it for the X2 TNL establishment, and may transfer back the received eNB Indirect X2 Transport Layer Addresses towards the eNB indicated in the Source eNB-ID IE of the SON Configuration Transfer IE by initiating the eNB Configu

If the eNB receives, in the SON Configuration Transfer IE, the X2 TNL Configuration Info IE containing the eNB X2 Extended Transport Layer Addresses IE, it may use it as part of its ACL functionality configuration actions, if such ACL functionality is deployed.

If the eNB receives, in the SON Configuration Transfer IE or the EN-DC SON Configuration Transfer IE, the SON Information IE containing the SON Information Reply IE including the X2 TNL Configuration Info IE as an answer to a former request, it may use it to initiate the X2 TNL establishment. If the X2 TNL Configuration Info IE contains the eNB Indirect X2 Transport Layer Addresses IE, the eNB may use it for the X2 TNL establishment.

In case the *IP-Sec Transport Layer Addresss* IE is present and the *GTP Transport Layer Addresses* IE within the *eNB X2 Extended Transport Layer Addresses* IE is not empty, GTP traffic is conveyed within an IP-Sec tunnel terminated at the IP-Sec tunnel end point given in by the *IP-Sec Transport Layer Address* IE.

In case the *IP-Sec Transport Layer Addresss* IE is not present, GTP traffic is terminated at the end points given by the list of addresses in *eNB GTP Transport Layer Addresses* IE within the *eNB X2 Extended Transport Layer Addresses* IE.

In case the *eNB GTP Transport Layer Addresses* IE is empty and the *IP-Sec Transport Layer Address* IE is present, SCTP traffic is conveyed within an IP-Sec tunnel terminated at the IP-Sec tunnel end point given in the *IP-Sec Transport Layer Address* IE, within the *eNB X2 Extended Transport Layer Addresses* IE.

If the eNB is configured to use one IPsec tunnel for all S1 and X2 traffic (IPsec star topology) then the traffic to the peer eNB shall be routed through this IPsec tunnel and the *IP-Sec Transport Layer Address* IE shall be ignored.

If the eNB receives the *SON Information* IE containing the *SON Information Reply* IE including the *Time Synchronisation Info* IE as an answer to a former request, it may use it for over-the-air synchronisation by means of network listening and for triggering muting activation request.

If the eNB receives the SON Information IE containing the SON Information Report IE, it may use it as specified in TS 36.300 [14].

If the eNB receives the *Inter-system SON Configuration Transfer* IE containing the *Inter-system SON Information Report* IE, it may use it as specified in TS 38.300 [45] or in TS 36.300 [14].

If the eNB receives the *SON Information* IE containing the *SON Information Request* IE set to "Activate Muting", the eNB should consider activating for over-the-air synchronisation by means of network listening, taking into account

information on the selected source of synchronisation cell and the cells as indicated by the *Aggressor E-CGI List* IE. In case the *Aggressor E-CGI List* IE is not present, the eNB may consider the request applicable to all cells.

If the eNB receives the SON Information IE containing the SON Information Reply IE including the Muting Pattern Information IE as an answer to a former request, it may use it for over-the-air synchronisation by means of network listening. The Muting Pattern Information IE may apply to all cells that were requested to mute.

If the eNB receives the SON Information IE containing the SON Information Request IE set to "Deactivate Muting", the eNB may consider deactivating muting for over-the-air synchronisation that was activated by a former muting request from the corresponding eNB.

8.16.3 Abnormal Conditions

Not applicable.

8.17 LPPa transport

8.17.1 General

The purpose of the LPPa Transport procedure is to carry LPPa signalling (defined in TS 36.455 [34]) between eNB and E-SMLC over the S1 Interface as defined in TS 36.455 [34]. The procedure may use UE-associated signalling or non-UE associated signalling. The UE-associated signalling is used to support E-CID and UTDOA positioning of a specific UE. The non-UE associated signalling is used to obtain assistance data from an eNB to support OTDOA positioning for any UE.

8.17.2 Successful Operations

8.17.2.1 DOWNLINK UE ASSOCIATED LPPA TRANSPORT



Figure 8.17.2.1-1: DOWNLINK UE ASSOCIATED LPPA Transport Procedure

The MME initiates the procedure by sending the DOWNLINK UE ASSOCIATED LPPA TRANSPORT message to eNB.

8.17.2.2 UPLINK UE ASSOCIATED LPPA TRANSPORT

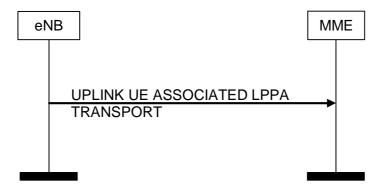


Figure 8.17.2.2-1: UPLINK UE ASSOCIATED LPPA TRANSPORT Procedure

The eNB initiates the procedure by sending the UPLINK UE ASSOCIATED LPPA TRANSPORT message to MME.

8.17.2.3 DOWNLINK NON UE ASSOCIATED LPPA TRANSPORT



Figure 8.17.2.3-1: DOWNLINK NON UE ASSOCIATED LPPA Transport Procedure

The MME initiates the procedure by sending the DOWNLINK NON UE ASSOCIATED LPPA TRANSPORT message to eNB.

8.17.2.4 UPLINK NON UE ASSOCIATED LPPA TRANSPORT



Figure 8.17.2.4-1: UPLINK NON UE ASSOCIATED LPPA TRANSPORT Procedure

The eNB initiates the procedure by sending the UPLINK NON UE ASSOCIATED LPPA TRANSPORT message to MME.

8.17.3 Unsuccessful Operation

Not applicable

8.17.4 Abnormal Conditions

If an MME receives an UPLINK UE ASSOCIATED LPPA TRANSPORT message with an unknown Routing ID for the UE, the MME shall ignore the message.

If an MME receives an UPLINK NON UE ASSOCIATED LPPA TRANSPORT message indicating an unknown or unreachable Routing ID, the MME shall ignore the message.

8.18 Secondary RAT Data Usage Report

8.18.1 General

The purpose of the Secondary RAT Data Usage Report procedure is to provides information on the used resources of the secondary RAT (e.g. NR resources during EN-DC operation) as specified in TS 23.401 [11].

8.18.2 Successful Operations

8.18.2.1 SECONDARY RAT DATA USAGE REPORT



Figure 8.18.2.1-1: Secondary RAT Data Usage Report Procedure

The eNB initiates the procedure by sending the SECONDARY RAT DATA USAGE REPORT message to MME.

If the *PSCell Information* IE is included in the SECONDARY RAT DATA USAGE REPORT message, then the MME may use it to determine the UE's location.

If the *Time Since Secondary Node Release* IE is included in the SECONDARY RAT DATA USAGE REPORT message, it indicates the time elapsed since EN-DC operation in the eNB was stopped for the UE.

8.18.3 Unsuccessful Operation

Not applicable

8.18.4 Abnormal Conditions

Not applicable

8.19 UE Radio Capability ID Mapping

8.19.1 General

The purpose of the UE Radio Capability ID Mapping procedure is to enable the eNB to request the MME to provide the UE Radio Capability information that maps to a specific UE Radio Capability ID. The procedure uses non UE-associated signalling.

8.19.2 Successful Operation

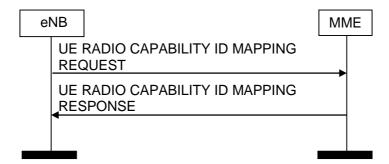


Figure 8.19.2-1: UE Radio Capability ID mapping Request procedure. Successful operation.

The eNB initiates the procedure by sending a UE RADIO CAPABILITY ID MAPPING REQUEST message to the MME.

Upon receipt of the UE RADIO CAPABILITY ID MAPPING REQUEST message, the MME shall include the UE Radio Capability information that maps to the UE Radio Capability ID indicated in the UE RADIO CAPABILITY ID MAPPING REQUEST message in the UE RADIO CAPABILITY ID MAPPING RESPONSE message.

8.19.3 Unsuccessful Operation

Not applicable.

8.19.4 Abnormal Conditions

Void.

9 Elements for S1AP Communication

9.1 Message Functional Definition and Content

9.1.1 General

9.1.2 Message Contents

9.1.2.1 Presence

All information elements in the message descriptions below are marked mandatory, optional or conditional according to table 4.

Table 4: Meaning of abbreviations used in S1AP messages

Abbreviation	Meaning
M	IEs marked as Mandatory (M) shall always be included in the
	message.
0	IEs marked as Optional (O) may or may not be included in the
	message.
С	IEs marked as Conditional (C) shall be included in a message only if the condition is satisfied. Otherwise the IE shall not be included.

9.1.2.2 Criticality

Each Information Element or Group of Information Elements may have criticality information applied to it. Following cases are possible:

Table 5: Meaning of content within "Criticality" column

Abbreviation	Meaning
_	No criticality information is applied explicitly.
YES	Criticality information is applied. This is usable only for non-repeatable IEs
GLOBAL	The IE and all its repetitions together have one common criticality information. This is usable only for repeatable IEs.
EACH	Each repetition of the IE has its own criticality information. It is not allowed to assign different criticality values to the repetitions. This is usable only for repeatable IEs.

9.1.2.3 Range

The Range column indicates the allowed number of copies of repetitive IEs/IE groups.

9.1.2.4 Assigned Criticality

This column provides the actual criticality information as defined in subclause 10.3.2, if applicable.

9.1.3 E-RAB Management Messages

9.1.3.1 E-RAB SETUP REQUEST

This message is sent by the MME and is used to request the eNB to assign resources on Uu and S1 for one or several E-RABs.

IE/Group Name	Presence	Range	IE type and	Semantics	Criticality	Assigned
			reference	description		Criticality
Message Type	M		9.2.1.1		YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
UE Aggregate Maximum Bit Rate	0		9.2.1.20		YES	reject
E-RAB to be Setup List		1			YES	reject
>E-RAB To Be Setup		1 <maxnoof< td=""><td></td><td></td><td>EACH</td><td>reject</td></maxnoof<>			EACH	reject
Item IEs		E-RABs>				
>>E-RAB ID	M		9.2.1.2		-	
>>E-RAB Level QoS	M		9.2.1.15	Includes	-	
Parameters				necessary QoS parameters.		
>>Transport Layer Address	M		9.2.2.1		-	
>>GTP-TEID	M		9.2.2.2	EPC TEID.	-	
>>NAS-PDU	M		9.2.3.5		-	
>>Correlation ID	0		9.2.1.80		YES	ignore
>>SIPTO Correlation	0		Correlation		YES	ignore
ID			ID			
			9.2.1.80			
>>Bearer Type	0		9.2.1.116		YES	reject
>>Ethernet Type	0		9.2.1.147		YES	ignore

Range bound	Explanation
maxnoofE-RABs	Maximum no. of E-RAB allowed towards one UE, the maximum
	value is 256.

9.1.3.2 E-RAB SETUP RESPONSE

This message is sent by the eNB and is used to report the outcome of the request from the E-RAB SETUP REQUEST message.

IE/Group Name	Presence	Range	IE type and	Semantics	Criticality	Assigned
			reference	description		Criticality
Message Type	M		9.2.1.1		YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	ignore
eNB UE S1AP ID	M		9.2.3.4		YES	ignore
E-RAB Setup List		01			YES	ignore
>E-RAB Setup Item IEs		1 <maxnoof e-<br="">RABs></maxnoof>			EACH	ignore
>>E-RAB ID	M				-	
>>Transport Layer Address	М		9.2.2.1		-	
>>GTP-TEID	M		9.2.2.2	eNB TEID.	-	
E-RAB Failed to Setup List	0		E-RAB List 9.2.1.36	A value for E-RAB ID shall only be present once in E-RAB Setup List IE and in E- RAB Failed to Setup List IE.	YES	ignore
Criticality Diagnostics	0		9.2.1.21		YES	ignore

Range bound	Explanation
maxnoofE-RABs	Maximum no. of E-RAB allowed towards one UE, the maximum
	value is 256.

9.1.3.3 E-RAB MODIFY REQUEST

This message is sent by the MME and is used to request the eNB to modify the Data Radio Bearers and the allocated resources on Uu and S1 for one or several E-RABs or to change the S-GW as defined in TS 23.401 [11].

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	М		9.2.1.1	•	YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	М		9.2.3.4		YES	reject
UE Aggregate Maximum Bit Rate	0		9.2.1.20		YES	reject
E-RAB to be Modified List		1			YES	reject
>E-RAB To Be Modified Item IEs		1 <maxnoofe- RABs></maxnoofe- 			EACH	reject
>>E-RAB ID	M		9.2.1.2		-	
>>E-RAB Level QoS Parameters	M		9.2.1.15	Includes necessary QoS parameters.	-	
>>NAS-PDU	M		9.2.3.5		-	
>>Transport Information	0				YES	reject
>>>Transport Layer Address	М		9.2.2.1		-	
>>>UL GTP TEID	М		GTP-TEID 9.2.2.2		-	
Secondary RAT Data Usage Request	0		ENUMERAT ED (requested,)		Yes	ignore

Range bound	Explanation
maxnoofE-RABs	Maximum no. of E-RAB allowed towards one UE, the maximum
	value is 256.

9.1.3.4 E-RAB MODIFY RESPONSE

This message is sent by the eNB and is used to report the outcome of the request from the E-RAB MODIFY REQUEST message.

Direction: $eNB \rightarrow MME$

IE/Group Name	Presence	Range	IE type and	Semantics	Criticality	Assigned
			reference	description		Criticality
Message Type	M		9.2.1.1		YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	ignore
eNB UE S1AP ID	M		9.2.3.4		YES	ignore
E-RAB Modify List		01			YES	ignore
>E-RAB Modify Item		1 <maxnoofe-< td=""><td></td><td></td><td>EACH</td><td>ignore</td></maxnoofe-<>			EACH	ignore
IEs		RABs>				
>>E-RAB ID	M		9.2.1.2		-	
E-RAB Failed to Modify List	0		E-RAB List 9.2.1.36	A value for E-RAB ID shall only be present once in E-RAB Modify List IE and E- RAB Failed to Modify List IE.	YES	ignore
Criticality Diagnostics	0		9.2.1.21		YES	ignore
Secondary RAT Usage Report List	0		9.2.1.124		Yes	ignore

Range bound	Explanation
maxnoofE-RABs	Maximum no. of E-RAB allowed towards one UE, the maximum
	value is 256.

9.1.3.5 E-RAB RELEASE COMMAND

This message is sent by the MME and is used to request the eNB to release allocated resources on Uu and S1 for one or several E-RABs.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
UE Aggregate Maximum Bit Rate	0		9.2.1.20		YES	reject
E-RAB To Be Released List	M		E-RAB List 9.2.1.36	A value for E-RAB ID shall only be present once in E-RAB To Be Released List IE.	YES	ignore
NAS-PDU	0		9.2.3.5		YES	ignore

Range bound	Explanation
maxnoofE-RABs	Maximum no. of E-RAB allowed towards one UE, the maximum
	value is 256.

9.1.3.6 E-RAB RELEASE RESPONSE

This message is sent by the eNB and is used to report the outcome of the request from the E-RAB RELEASE COMMAND message.

Direction: $eNB \rightarrow MME$

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1	description	YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	ignore
eNB UE S1AP ID	M		9.2.3.4		YES	ignore
E-RAB Release List		01			YES	ignore
>E-RAB Release Item IEs		1 <maxnoofe- RABs></maxnoofe- 			EACH	ignore
>>E-RAB ID	М		9.2.1.2		-	
E-RAB Failed to Release List	0		E-RAB List 9.2.1.36	A value for E-RAB ID shall only be present once in E-RAB Release List IE and E- RAB Failed to Release List IE.	YES	ignore
Criticality Diagnostics	0		9.2.1.21		YES	ignore
User Location Information	0		9.2.1.93		YES	ignore
Secondary RAT Usage Report List	0		9.2.1.124		Yes	ignore

Range bound	Explanation
maxnoofE-RABs	Maximum no. of E-RAB allowed towards one UE, the maximum
	value is 256.

9.1.3.7 E-RAB RELEASE INDICATION

This message is sent by the eNB and is used to indicate the MME to release one or several E-RABs for one UE.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1	ucscription	YES	ignore
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
E-RAB Released List	M		E-RAB List 9.2.1.36	A value for E-RAB ID shall only be present once in E-RAB Released List IE.	YES	ignore
User Location Information	0		9.2.1.93		YES	ignore
Secondary RAT Usage Report List	0		9.2.1.124		Yes	ignore

Range bound	Explanation
maxnoofE-RABs	Maximum no. of E-RAB allowed towards one UE, the maximum
	value is 256.

9.1.3.8 E-RAB MODIFICATION INDICATION

This message is sent by the eNB and is used to request the MME to apply the indicated modification for one or several E-RABs.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	М		9.2.1.1		YES	reject
MME UE SIAP ID	М		9.2.3.3		YES	reject
eNB UE S1AP ID	М		9.2.3.4		YES	reject
E-RAB to be Modified List		1			YES	reject
>E-RAB to Be Modified Item IEs		1 <maxnoofe- RABs></maxnoofe- 			EACH	reject
>>E-RAB ID	М		9.2.1.2		-	
>>Transport Layer Address	M		9.2.2.1		-	
>>DL GTP TEID	М		GTP-TEID 9.2.2.2		-	
E-RAB not to be Modified List		01			YES	reject
>E-RAB not to Be Modified Item IEs		1 <maxnoofe- RABs></maxnoofe- 			EACH	reject
>>E-RAB ID	М		9.2.1.2		-	
>>Transport Layer Address	М		9.2.2.1		-	
>>DL GTP TEID	М		GTP-TEID 9.2.2.2		-	
CSG Membership Info		01			YES	reject
>CSG Membership Status	М		9.2.1.73		-	•
>CSG Id	М		9.2.1.62		-	
>Cell Access Mode	0		9.2.1.74		-	
>PLMN Identity	0		9.2.3.8		-	
Tunnel Information for BBF	0		Tunnel Information 9.2.2.3	Indicating HeNB's Local IP Address assigned by the broadband access provider, UDP port Number.	YES	ignore
Secondary RAT Usage Report List	0		9.2.1.124		Yes	ignore
User Location Information	0		9.2.1.93		Yes	ignore

Range bound	Explanation
maxnoofE-RABs	Maximum no. of E-RAB allowed towards one UE, the maximum value is 256.

9.1.3.9 E-RAB MODIFICATION CONFIRM

This message is sent by the MME and is used to report the outcome of the request from the E-RAB MODIFICATION INDICATION message.

Direction: $MME \rightarrow eNB$

IE/Group Name	Presence	Range	IE type and	Semantics	Criticality	Assigned
_			reference	description		Criticality
Message Type	M		9.2.1.1		YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	ignore
eNB UE S1AP ID	M		9.2.3.4		YES	ignore
E-RAB Modify List		01			YES	ignore
>E-RAB Modify Item		1 <maxnoofe-< td=""><td></td><td></td><td>EACH</td><td>ignore</td></maxnoofe-<>			EACH	ignore
IEs		RABs>				
>>E-RAB ID	M		9.2.1.2		-	
E-RAB Failed to Modify List	0		E-RAB List 9.2.1.36	A value for <i>E-RAB ID</i> shall only be present once in the E-RAB MODIFICATION CONFIRM message.	YES	ignore
E-RAB To Be Released List	0		E-RAB List 9.2.1.36	A value for E-RAB ID shall only be present once in the E-RAB MODIFICATION CONFIRM message.	YES	ignore
Criticality Diagnostics	0		9.2.1.21		YES	ignore
CSG Membership Status	0		9.2.1.73		YES	ignore

Range bound	Explanation
maxnoofE-RABs	Maximum no. of E-RAB allowed towards one UE, the maximum value is 256.

9.1.4 Context Management Messages

9.1.4.1 INITIAL CONTEXT SETUP REQUEST

This message is sent by the MME to request the setup of a UE context.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
UE Aggregate Maximum Bit Rate	M		9.2.1.20		YES	reject
E-RAB to Be Setup List		1			YES	reject
>E-RAB to Be Setup Item IEs		1 <maxnoofe- RABs></maxnoofe- 			EACH	reject
>>E-RAB ID	М		9.2.1.2		-	
>>E-RAB Level QoS Parameters	M		9.2.1.15	Includes necessary QoS parameters.	-	
>>Transport Layer Address	M		9.2.2.1		-	
>>GTP-TEID	M		9.2.2.2		-	
>>NAS-PDU	0		9.2.3.5		-	
>>Correlation ID	0		9.2.1.80		YES	ignore

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
>>SIPTO Correlation ID	0		Correlation ID 9.2.1.80		YES	ignore
>>Bearer Type	0		9.2.1.116		YES	roicot
>>Ethernet Type	0		9.2.1.110		YES	reject ignore
UE Security Capabilities	M		9.2.1.147		YES	
Security Key	M			The KeNB is	YES	reject
Security Key	IVI		9.2.1.41	provided after the key-generation in the MME, see TS 33.401 [15].	YES	reject
Trace Activation	0		9.2.1.4	-	YES	ignore
Handover Restriction List	0		9.2.1.22		YES	ignore
UE Radio Capability	0		9.2.1.27		YES	ignore
Subscriber Profile ID for	0		9.2.1.39		YES	ignore
RAT/Frequency priority	~		0.2.1.00		125	ignore
CS Fallback Indicator	0		9.2.3.21		YES	reject
SRVCC Operation	0		9.2.1.58		YES	ignore
Possible	-		0.2.1.00			19.1010
CSG Membership Status	0		9.2.1.73		YES	ignore
Registered LAI	0		9.2.3.1		YES	ignore
GUMMEI	0		9.2.3.9	This IE indicates the MME serving the UE.	YES	ignore
MME UE S1AP ID 2	0		9.2.3.3	This IE indicates the MME UE S1AP ID assigned by the MME.	YES	ignore
Management Based MDT Allowed	0		9.2.1.83		YES	ignore
Management Based MDT PLMN List	0		MDT PLMN List 9.2.1.89		YES	ignore
Additional CS Fallback Indicator	C- ifCSFBhighp riority		9.2.3.37		YES	ignore
Masked IMEISV	0		9.2.3.38		YES	ignore
Expected UE Behaviour	0		9.2.1.96		YES	ignore
ProSe Authorized	0		9.2.1.99		YES	ignore
UE User Plane CloT Support Indicator	0		9.2.1.113		YES	ignore
V2X Services Authorized	0		9.2.1.120		YES	ignore
UE Sidelink Aggregate Maximum Bit Rate	0		9.2.1.122	This IE applies only if the UE is authorized for V2X services.	YES	ignore
Enhanced Coverage Restricted	0		9.2.1.123		YES	ignore
NR UE Security Capabilities	0		9.2.1.127		YES	ignore
CE-mode-B Restricted	0		9.2.1.129		YES	ignore
Aerial UE subscription	0		9.2.1.136		YES	ignore
information						
Pending Data Indication	0		9.2.3.55		YES	ignore
Subscription Based UE Differentiation Information	0		9.2.1.140		YES	ignore
Additional RRM Policy Index	0		9.2.1.39a		YES	ignore
IAB Authorized	0		9.2.1.146		YES	ignore
NR V2X Services	0		9.2.1.148		YES	ignore
Authorized			0.2.1.170		120	ignore

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
NR UE Sidelink Aggregate Maximum Bit Rate	0		9.2.1.149	This IE applies only if the UE is authorized for NR V2X services.	YES	ignore
PC5 QoS Parameters	0		9.2.1.150	This IE applies only if the UE is authorized for NR V2X services.	YES	ignore
UE Radio Capability ID	0		9.2.1.153		YES	reject

Range bound	Explanation
maxnoofE-RABs	Maximum no. of E-RAB allowed towards one UE, the maximum
	value is 256.

Condition	Explanation
ifCSFBhighpriority	This IE shall be present if the CS Fallback Indicator IE is set to "CS
	Fallback High Priority".

9.1.4.2 Void

9.1.4.3 INITIAL CONTEXT SETUP RESPONSE

This message is sent by the eNB to confirm the setup of a UE context.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	М		9.2.1.1	_	YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	ignore
eNB UE S1AP ID	M		9.2.3.4		YES	ignore
E-RAB Setup List		1			YES	ignore
>E-RAB Setup Item IEs		1 <maxnoofe- RABs></maxnoofe- 			EACH	ignore
>>E-RAB ID	М		9.2.1.2		-	
>>Transport Layer Address	М		9.2.2.1		-	
>>GTP-TEID	M		9.2.2.2		1	
E-RAB Failed to Setup List	0		E-RAB List 9.2.1.36	A value for E- RAB ID shall only be present once in E-RAB Setup List IE and E-RAB Failed to Setup List IE.	YES	ignore
Criticality Diagnostics	0		9.2.1.21		YES	ignore

Range bound	Explanation
maxnoofE-RABs	Maximum no. of E-RAB allowed towards one UE, the maximum
	value is 256.

9.1.4.4 INITIAL CONTEXT SETUP FAILURE

This message is sent by the eNB to indicate that the setup of the UE context was unsuccessful.

Direction: $eNB \rightarrow MME$

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	М		9.2.1.1		YES	reject
MME UE S1AP ID	М		9.2.3.3		YES	ignore
eNB UE S1AP ID	М		9.2.3.4		YES	ignore
Cause	M		9.2.1.3		YES	ignore
Criticality Diagnostics	0		9.2.1.21		YES	ignore

9.1.4.5 UE CONTEXT RELEASE REQUEST

This message is sent by the eNB to request the release of the UE-associated S1-logical connection over the S1 interface.

Direction: $eNB \rightarrow MME$

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	ignore
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
Cause	M		9.2.1.3		YES	ignore
GW Context Release Indication	0		9.2.1.84		YES	reject
Secondary RAT Usage Report List	0		9.2.1.124		Yes	ignore

9.1.4.6 UE CONTEXT RELEASE COMMAND

This message is sent by the MME to request the release of the UE-associated S1-logical connection over the S1 interface.

Direction: MME \rightarrow eNB

IE/Group Name	Presence	Range	IE type and	Semantics	Criticality	Assigned
			reference	description		Criticality
Message Type	M		9.2.1.1		YES	reject
CHOICE UE S1AP IDs	M				YES	reject
>UE S1AP ID pair						
>>UE S1AP ID pair	M		9.2.3.18			
>MME UE S1AP ID						
>>MME UE S1AP ID	M		9.2.3.3			
Cause	M		9.2.1.3		YES	ignore

9.1.4.7 UE CONTEXT RELEASE COMPLETE

This message is sent by the eNB to confirm the release of the UE-associated S1-logical connection over the S1 interface.

Direction: eNB → MME

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	ignore
eNB UE S1AP ID	M		9.2.3.4		YES	ignore
Criticality Diagnostics	0		9.2.1.21		YES	ignore
User Location Information	0		9.2.1.93		YES	ignore
Information on Recommended Cells and eNBs for Paging	0		9.2.1.105		YES	ignore
Cell Identifier and Coverage Enhancement Level	0		9.2.1.109		YES	ignore
Secondary RAT Usage Report List	0		9.2.1.124		Yes	ignore
Time Since Secondary Node Release	0		9.2.1.143		Yes	ignore

9.1.4.8 UE CONTEXT MODIFICATION REQUEST

This message is sent by the MME to provide UE Context information changes to the eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	М		9.2.1.1		YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	М		9.2.3.4		YES	reject
Security Key	0		9.2.1.41	A fresh KeNB is provided after performing a keychange on the fly procedure in the MME, see TS 33.401 [15].	YES	reject
Subscriber Profile ID for RAT/Frequency priority	0		9.2.1.39		YES	ignore
UE Aggregate Maximum Bit Rate	0		9.2.1.20		YES	ignore
CS Fallback Indicator	0		9.2.3.21		YES	reject
UE Security Capabilities	0		9.2.1.40		YES	reject
CSG Membership Status	0		9.2.1.73		YES	ignore
Registered LAI	0		9.2.3.1		YES	ignore
Additional CS Fallback Indicator	C- ifCSFBhig hpriority		9.2.3.37		YES	ignore
ProSe Authorized	0		9.2.1.99		YES	ignore
SRVCC Operation Possible	0		9.2.1.58		YES	ignore
SRVCC Operation Not Possible	0		9.2.1.119		YES	ignore
V2X Services Authorized	0		9.2.1.120		YES	ignore
UE Sidelink Aggregate Maximum Bit Rate	0		9.2.1.122	This IE applies only if the UE is authorized for V2X services.	YES	ignore
NR UE Security Capabilities	0		9.2.1.127		YES	ignore
Aerial UE subscription information	0		9.2.1.136		YES	ignore
Additional RRM Policy Index	0		9.2.1.39a		YES	ignore
IAB Authorized	0		9.2.1.146		YES	ignore
NR V2X Services Authorized	0		9.2.1.148		YES	ignore
NR UE Sidelink Aggregate Maximum Bit Rate	0		9.2.1.149	This IE applies only if the UE is authorized for NR V2X services.	YES	ignore
PC5 QoS Parameters	0		9.2.1.150	This IE applies only if the UE is authorized for NR V2X services.	YES	ignore
UE Radio Capability ID	0		9.2.1.153		YES	reject

Condition	Explanation
ifCSFBhighpriority	This IE shall be present if the CS Fallback Indicator IE is set to "CS
	Fallback High Priority".

9.1.4.9 UE CONTEXT MODIFICATION RESPONSE

This message is sent by the eNB to confirm the performed UE context updates.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	ignore
eNB UE S1AP ID	M		9.2.3.4		YES	ignore
Criticality Diagnostics	0		9.2.1.21		YES	ignore

9.1.4.10 UE CONTEXT MODIFICATION FAILURE

This message is sent by the eNB in case the performed UE context update is not successful.

Direction: $eNB \rightarrow MME$

IE/Group Name	Presence	Range	IE type and	Semantics	Criticality	Assigned
			reference	description		Criticality
Message Type	M		9.2.1.1		YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	ignore
eNB UE S1AP ID	M		9.2.3.4		YES	ignore
Cause	M		9.2.1.3		YES	ignore
Criticality Diagnostics	0		9.2.1.21		YES	ignore

9.1.4.11 UE RADIO CAPABILITY MATCH REQUEST

This message is sent by the MME to request the compatibility between the UE radio capabilities and network configuration.

Direction: MME \rightarrow eNB

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
UE Radio Capability	0		9.2.1.27		YES	ignore
UE Radio Capability ID	0		9.2.1.153		YES	reject

9.1.4.12 UE RADIO CAPABILITY MATCH RESPONSE

This message is sent by the eNB to report the compatibility between the UE radio capabilities and network configuration.

Direction: eNB → MME

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	ignore
eNB UE S1AP ID	M		9.2.3.4		YES	ignore
Voice Support Match Indicator	M		9.2.1.85		YES	reject
Criticality Diagnostics	0		9.2.1.21		YES	ignore

9.1.4.13 UE CONTEXT MODIFICATION INDICATION

This message is sent by the eNB to request the MME to modify the UE Context information.

IE/Group Name	Presence	Range	IE type and	Semantics	Criticality	Assigned
			reference	description		Criticality
Message Type	M		9.2.1.1		YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
CSG Membership Info		01			YES	reject
>CSG Membership	M		9.2.1.73		-	
Status						
>CSG ld	M		9.2.1.62		-	
>Cell Access Mode	0		9.2.1.74		-	
>PLMN Identity	0		9.2.3.8		-	

9.1.4.14 UE CONTEXT MODIFICATION CONFIRM

This message is sent by the MME to confirm the modification of the UE Context information.

Direction: MME \rightarrow eNB

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	ignore
eNB UE S1AP ID	M		9.2.3.4		YES	ignore
CSG Membership Status	0		9.2.1.73		YES	ignore
Criticality Diagnostics	0		9.2.1.21		YES	ignore

9.1.4.15 UE CONTEXT SUSPEND REQUEST

This message is sent by the eNB to request the MME to suspend the UE context and the related bearer contexts.

Direction: $eNB \rightarrow MME$

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
Information on Recommended Cells and eNBs for Paging	0		9.2.1.105		YES	ignore
Cell Identifier and Coverage Enhancement Level	0		9.2.1.109		YES	ignore
Secondary RAT Usage Report List	0		9.2.1.124		Yes	ignore
User Location Information	0		9.2.1.93		YES	ignore
Time Since Secondary Node Release	0		9.2.1.143		Yes	ignore

9.1.4.16 UE CONTEXT SUSPEND RESPONSE

This message is sent by the MME to indicate to the eNB the UE context and the related bearer contexts have been suspended.

IE/Group Name	Presence	Range	IE type and	Semantics	Criticality	Assigned
			reference	description		Criticality
Message Type	M		9.2.1.1		YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	ignore
eNB UE S1AP ID	M		9.2.3.4		YES	ignore
Criticality Diagnostics	0		9.2.1.21		YES	ignore
Security Context	0		9.2.1.26		YES	reject

9.1.4.17 UE CONTEXT RESUME REQUEST

This message is sent by the eNB to request the MME to indicate that the suspended RRC connection has been resumed, or the UE accesses for early data transmission.

Direction: $eNB \rightarrow MME$

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
E-RAB Failed To Resume List		01			YES	reject
>E-RAB Failed To Resume Item IEs		1 <maxnoofe- RABs></maxnoofe- 			EACH	reject
>>E-RAB ID	M		9.2.1.2		-	
>>Cause	M		9.2.1.3		-	
RRC Resume Cause	0		RRC Establishment Cause 9.2.1.3a		YES	ignore

Range bound	Explanation
maxnoofE-RABs	Maximum no. of E-RAB allowed towards one UE, the maximum
	value is 256.

9.1.4.18 UE CONTEXT RESUME RESPONSE

This message is sent by the MME to indicate to the eNB that the UE context and the related bearer contexts have been resumed in the EPC.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	ignore
eNB UE S1AP ID	М		9.2.3.4		YES	ignore
E-RAB Failed To Resume List		01			YES	reject
>E-RAB Failed To Resume Item IEs		1 <maxnoofe- RABs></maxnoofe- 			EACH	reject
>>E-RAB ID	М		9.2.1.2		-	
>>Cause	М		9.2.1.3		-	
Criticality Diagnostics	0		9.2.1.21		YES	ignore
Security Context	0		9.2.1.26		YES	reject
Pending Data Indication	0		9.2.3.55		YES	ignore

Range bound	Explanation
maxnoofE-RABs	Maximum no. of E-RAB allowed towards one UE, the maximum
	value is 256.

9.1.4.19 UE CONTEXT RESUME FAILURE

This message is sent by the MME to indicate to the eNB that resumption of the UE context and the related bearer contexts has failed in the EPC.

Direction: MME → eNB

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	ignore
eNB UE S1AP ID	M		9.2.3.4		YES	ignore
Cause	M		9.2.1.3		YES	ignore
Criticality Diagnostics	0		9.2.1.21		YES	ignore

9.1.4.20 CONNECTION ESTABLISHMENT INDICATION

This message is sent by the MME to complete the establishment of the UE-associated logical S1-connection.

Direction: $MME \rightarrow eNB$

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	ignore
eNB UE S1AP ID	M		9.2.3.4		YES	ignore
UE Radio Capability	0		9.2.1.27		YES	ignore
Enhanced Coverage Restricted	0		9.2.1.123		YES	ignore
DL CP Security Information	0		9.2.3.49		YES	ignore
CE-Mode-B Restricted	0		9.2.1.129		YES	ignore
End Indication	0		9.2.3.54		YES	ignore
Subscription Based UE Differentiation Information	0		9.2.1.140		YES	ignore
UE Level QoS Parameters	0		E-RAB Level QoS Parameters 9.2.1.15	Includes QoS parameters.	YES	ignore

9.1.4.21 RETRIEVE UE INFORMATION

The message is sent by the eNB to request UE information over the S1 interface.

Direction: $eNB \rightarrow MME$

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
S-TMSI	M		9.2.3.6		YES	reject
			•	<u> </u>		

9.1.4.22 UE INFORMATION TRANSFER

The message is sent by the MME to transfer UE information over the S1 interface.

Direction: MME \rightarrow eNB

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
S-TMSI	M		9.2.3.6		YES	reject
UE Level QoS Parameters	0		E-RAB Level QoS Parameters 9.2.1.15	Includes QoS parameters.	YES	ignore
UE Radio Capability	0		9.2.1.27		YES	ignore
Subscription Based UE Differentiation Information	0		9.2.1.140		YES	ignore
Pending Data Indication	0		9.2.3.55		YES	ignore

9.1.4.23 eNB CP RELOCATION INDICATION

This message is sent by the eNB to initiate the establishment of a UE-associated logical S1-connection, following the reception of re-establishment request as described in TS. 36.300 [14].

Direction: eNB \rightarrow MME.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
S-TMSI	M		9.2.3.6		YES	reject
E-UTRAN CGI	M		9.2.1.38		YES	ignore
TAI	M		9.2.3.16		YES	ignore
UL CP Security Information	M		9.2.3.50		YES	reject

9.1.4.24 MME CP RELOCATION INDICATION

This message is sent by the MME to inform the eNB that the UE is to be relocated as described in TS. 36.300 [14].

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject

9.1.5 Handover Signalling Messages

9.1.5.1 HANDOVER REQUIRED

This message is sent by the source eNB to the MME to request the preparation of resources at the target.

IE/Group Name	Presence	Range	IE type and reference	Semantics	Criticality	Assigned
Massaga Type	M		9.2.1.1	description	YES	Criticality
Message Type						reject
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
Handover Type	M		9.2.1.13		YES	reject
Cause	M		9.2.1.3		YES	ignore
Target ID	M		9.2.1.6		YES	reject
Direct Forwarding Path Availability	0		9.2.3.15		YES	ignore
SRVCC HO Indication	0		9.2.1.59		YES	reject
Source to Target Transparent Container	М		9.2.1.56		YES	reject
Source to Target Transparent Container Secondary	0		Source to Target Transparent Container 9.2.1.56		YES	reject
MS Classmark 2	C- ifSRVCCto GERAN		9.2.1.64		YES	reject
MS Classmark 3	C- ifSRVCCto GERAN		9.2.1.65		YES	ignore
CSG Id	0		9.2.1.62		YES	reject
Cell Access Mode	0	_	9.2.1.74		YES	reject
PS Service Not Available	0		9.2.1.77		YES	ignore

Condition	Explanation
ifSRVCCtoGERAN	This IE shall be present if the <i>Handover Type</i> IE is set to the "Value"
	LTEtoGERAN and the SRVCC HO Indication IE is present.

9.1.5.2 HANDOVER COMMAND

This message is sent by the MME to inform the source eNB that resources for the handover have been prepared at the target side.

IE/Group Name	Presence	Range	IE type and	Semantics	Criticality	Assigned
			reference	description		Criticality
Message Type	M		9.2.1.1		YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
Handover Type	M		9.2.1.13		YES	reject
NAS Security Parameters from E-UTRAN	C- iftoUTRAN		9.2.3.30	The eNB shall use this IE as	YES	reject
HOILE-OTTAIN	GERAN			specified in TS 33.401 [15].		
E-RABs Subject to Forwarding List		01			YES	ignore
>E-RABs Subject to Forwarding Item IEs		1 <maxnoofe- RABs></maxnoofe- 			EACH	ignore
>>E-RAB ID	М		9.2.1.2		-	
>>DL Transport Layer Address	0		9.2.2.1		-	
>>DL GTP-TEID	0		9.2.2.2	To deliver forwarded DL PDCP SDUs.	-	
>>UL Transport Layer Address	0		9.2.2.1		-	
>>UL GTP-TEID	0		9.2.2.2	To deliver forwarded UL PDCP SDUs.	-	
E-RABs to Release List	0		E-RAB List 9.2.1.36		YES	ignore
Target to Source Transparent Container	М		9.2.1.57		YES	reject
Target to Source Transparent Container Secondary	0		Target to Source Transparent Container 9.2.1.57		YES	reject
Criticality Diagnostics	0		9.2.1.21		YES	ignore

Condition Explanation			
iftoUTRANGERAN	This IE shall be present if the Handover Type IE is set to the value		
	"LTEtoUTRAN " or "LTEtoGERAN".		

Range bound	Explanation			
maxnoofE-RABs	Maximum no. of E-RABs for one UE. Value is 256.			

9.1.5.3 HANDOVER PREPARATION FAILURE

This message is sent by the MME to inform the source eNB that the Handover Preparation has failed.

IE/Group Name	Presence	Range	IE type and	Semantics	Criticality	Assigned
			reference	description		Criticality
Message Type	M		9.2.1.1		YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	ignore
eNB UE S1AP ID	M		9.2.3.4		YES	ignore
Cause	M		9.2.1.3		YES	ignore
Criticality Diagnostics	0		9.2.1.21		YES	ignore

9.1.5.4 HANDOVER REQUEST

This message is sent by the MME to the target eNB to request the preparation of resources.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	reject
Handover Type	M		9.2.1.13		YES	reject
Cause	M		9.2.1.3		YES	ignore
UE Aggregate Maximum Bit Rate	M		9.2.1.20		YES	reject
E-RABs To Be Setup List		1			YES	reject
>E-RABs To Be Setup Item IEs		1 <maxnoofe- RABs></maxnoofe- 			EACH	reject
>>E-RAB ID	М		9.2.1.2		-	
>>Transport Layer Address	M		9.2.2.1		-	
>>GTP-TEID	M		9.2.2.2	To deliver UL PDUs.	-	
>>E-RAB Level QoS Parameters	М		9.2.1.15	Includes necessary QoS parameters.	-	
>>Data Forwarding Not Possible	0		9.2.1.76		YES	ignore
>>Bearer Type	0		9.2.1.116		YES	reject
>>Ethernet Type	0		9.2.1.147		YES	ignore
Source to Target Transparent Container	М		9.2.1.56		YES	reject
UE Security Capabilities	M		9.2.1.40		YES	reject
Handover Restriction List	0		9.2.1.22		YES	ignore
Trace Activation	0		9.2.1.4		YES	ignore
Request Type	0		9.2.1.34		YES	ignore
SRVCC Operation Possible	0		9.2.1.58		YES	ignore
Security Context	M		9.2.1.26		YES	reject
NAS Security Parameters to E-UTRAN	C- iffromUTR ANGERA N		9.2.3.31	The eNB shall use this IE as specified in TS 33.401 [15].	YES	reject
CSG Id	0		9.2.1.62		YES	reject
CSG Membership Status	0		9.2.1.73		YES	ignore
GUMMEI	0		9.2.3.9	This IE indicates the MME serving the UE.	YES	ignore
MME UE S1AP ID 2	0		9.2.3.3	This IE indicates the MME UE S1AP ID assigned by the MME.	YES	ignore
Management Based MDT Allowed	0		9.2.1.83		YES	ignore
Management Based MDT PLMN List	0		MDT PLMN List 9.2.1.89		YES	ignore
Masked IMEISV	0		9.2.3.38		YES	ignore
Expected UE Behaviour	0		9.2.1.96		YES	ignore
ProSe Authorized	0		9.2.1.99		YES	ignore
UE User Plane CloT Support Indicator	0		9.2.1.113		YES	ignore
V2X Services Authorized	0		9.2.1.120		YES	ignore
UE Sidelink Aggregate Maximum Bit Rate	0		9.2.1.122	This IE applies only if the UE is authorized for V2X services.	YES	ignore
Enhanced Coverage Restricted	0		9.2.1.123		YES	ignore
NR UE Security Capabilities	0		9.2.1.127		YES	ignore
CE-mode-B Restricted	0		9.2.1.129		YES	ignore
Aerial UE subscription information	0		9.2.1.136		YES	ignore
Pending Data Indication	0		9.2.3.55		YES	ignore
Subscription Based UE	0		9.2.1.140		YES	ignore
Differentiation Information						3

Additional RRM Policy Index	0	9.2.1.39a		YES	ignore
IAB Authorized	0	9.2.1.146		YES	reject
NR V2X Services Authorized	0	9.2.1.148		YES	ignore
NR UE Sidelink Aggregate Maximum Bit Rate	0	9.2.1.149	This IE applies only if the UE is authorized for NR V2X services.	YES	ignore
PC5 QoS Parameters	0	9.2.1.150	This IE applies only if the UE is authorized for NR V2X services.	YES	ignore
UE Radio Capability ID	0	9.2.1.153		YES	reject

Condition	Explanation
C-iffromUTRANGERAN	This IE shall be present if the Handover Type IE is set to the value
	"UTRANtoLTE" or "GERANtoLTE".

Range bound	Explanation			
maxnoofE-RABs	Maximum no. of E-RABs for one UE. Value is 256.			

9.1.5.5 HANDOVER REQUEST ACKNOWLEDGE

This message is sent by the target eNB to inform the MME about the prepared resources at the target.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	М		9.2.1.1	_	YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	ignore
eNB UE S1AP ID	М		9.2.3.4	Allocated at the target eNB.	YES	ignore
E-RABs Admitted List		1		-	YES	ignore
>E-RABs Admitted Item IEs		1 <maxnoofe- RABs></maxnoofe- 			EACH	ignore
>>E-RAB ID	М		9.2.1.2		-	
>>Transport Layer Address	М		9.2.2.1		-	
>>GTP-TEID	М		9.2.2.2	To deliver DL PDUs.	-	
>>DL Transport Layer Address	0		9.2.2.1		-	
>>DL GTP-TEID	0		9.2.2.2	To deliver forwarded DL PDCP SDUs.	-	
>>UL Transport Layer Address	0		9.2.2.1		-	
>>UL GTP-TEID	0		9.2.2.2	To deliver forwarded UL PDCP SDUs.	-	
E-RABs Failed to Setup List	0		E-RAB List 9.2.1.36	A value for E- RAB ID shall only be present once in E-RABs Admitted List IE and E-RABs Failed to Setup List IE.	YES	ignore
Target to Source Transparent Container	М		9.2.1.57		YES	reject
CSG Id	0		9.2.1.62		YES	ignore
Criticality Diagnostics	0		9.2.1.21		YES	ignore
Cell Access Mode	0		9.2.1.74		YES	ignore
CE-mode-B Support Indicator	0		9.2.1.118		YES	ignore

Range bound	Explanation
maxnoofE-RABs	Maximum no. of E-RABs for one UE. Value is 256.

9.1.5.6 HANDOVER FAILURE

This message is sent by the target eNB to inform the MME that the preparation of resources has failed.

Direction: eNB \rightarrow MME.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	ignore
Cause	M		9.2.1.3		YES	ignore
Criticality Diagnostics	0		9.2.1.21		YES	ignore

9.1.5.7 HANDOVER NOTIFY

This message is sent by the target eNB to inform the MME that the UE has been identified in the target cell and the S1 handover has been completed.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	ignore
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
E-UTRAN CGI	M		9.2.1.38		YES	ignore
TAI	M		9.2.3.16		YES	ignore
Tunnel Information for BBF	0		Tunnel Information 9.2.2.3	Indicating HeNB's Local IP Address assigned by the broadband access provider, UDP port Number.	YES	ignore
LHN ID	0		9.2.1.92		YES	ignore
PSCell Information	0		9.2.1.141		YES	ignore
Notify Source eNB	0		ENUMERAT ED (NotifySourc e,)		YES	ignore

9.1.5.8 PATH SWITCH REQUEST

This message is sent by the eNB to request the MME to switch DL GTP tunnel termination point(s) from one end-point to another.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	М		9.2.1.1	•	YES	reject
eNB UE S1AP ID	М		9.2.3.4		YES	reject
E-RAB To Be Switched in Downlink List		1			YES	reject
>E-RABs Switched in Downlink Item IEs		1 <maxnoofe- RABs></maxnoofe- 			EACH	reject
>>E-RAB ID	M		9.2.1.2		-	
>>Transport Layer address	M		9.2.2.1		-	
>>GTP-TEID	М		9.2.2.2	To deliver DL PDUs.	-	
Source MME UE S1AP ID	M		9.2.3.3		YES	reject
E-UTRAN CGI	М		9.2.1.38		YES	ignore
TAI	M		9.2.3.16		YES	ignore
UE Security Capabilities	М		9.2.1.40		YES	ignore
CSG Id	0		9.2.1.62		YES	ignore
Cell Access Mode	0		9.2.1.74		YES	ignore
Source MME GUMMEI	0		9.2.3.9		YES	ignore
CSG Membership Status	0		9.2.1.73		YES	ignore
Tunnel Information for BBF	0		Tunnel Information 9.2.2.3	Indicating HeNB's Local IP Address assigned by the broadband access provider, UDP port Number.	YES	ignore
LHN ID	0		9.2.1.92		YES	ignore
RRC Resume Cause	0		RRC Establishme nt Cause 9.2.1.3a		YES	ignore
NR UE Security Capabilities	0		9.2.1.127		YES	ignore
PSCell Information	0		9.2.1.141		YES	ignore

Range bound	Explanation			
maxnoofE-RABs	Maximum no. of E-RABs for one UE. Value is 256.			

9.1.5.9 PATH SWITCH REQUEST ACKNOWLEDGE

This message is sent by the MME to inform the eNB that the path switch has been successfully completed in the EPC.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
MME UE S1AP ID	М		9.2.3.3		YES	ignore
eNB UE S1AP ID	М		9.2.3.4		YES	ignore
UE Aggregate Maximum Bit Rate	0		9.2.1.20		YES	ignore
E-RAB To Be Switched in Uplink List		01			YES	ignore
>E-RABs Switched in Uplink Item IEs		1 <maxnoofe- RABs></maxnoofe- 			EACH	ignore
>>E-RAB ID	M		9.2.1.2		-	
>>Transport Layer Address	М		9.2.2.1		-	
>>GTP-TEID	M		9.2.2.2		-	
E-RAB To Be Released List	0		E-RAB List 9.2.1.36	A value for E- RAB ID shall only be present once in E-RAB To Be Switched in Uplink List IE and E-RAB to Be Released List IE.	YES	ignore
Security Context	М		9.2.1.26	One pair of {NCC, NH} is provided.	YES	reject
Criticality Diagnostics	0		9.2.1.21	provided.	YES	ignore
MME UE S1AP ID 2	0		9.2.3.3	This IE indicates the MME UE S1AP ID assigned by the MME.	YES	ignore
CSG Membership Status	0		9.2.1.73		YES	ignore
ProSe Authorized	0		9.2.1.99		YES	ignore
UE User Plane CloT Support Indicator	0		9.2.1.113		YES	ignore
V2X Services Authorized	0		9.2.1.120		YES	ignore
UE Sidelink Aggregate Maximum Bit Rate	0		9.2.1.122	This IE applies only if the UE is authorized for V2X services.	YES	ignore
Enhanced Coverage Restricted	0		9.2.1.123		YES	ignore
NR UE Security Capabilities	0		9.2.1.127		YES	ignore
CE-mode-B Restricted	0		9.2.1.129		YES	ignore
Aerial UE subscription information	0		9.2.1.136		YES	ignore
Pending Data Indication	0		9.2.3.55		YES	ignore
Subscription Based UE Differentiation Information	0		9.2.1.140		YES	ignore
Handover Restriction List	0		9.2.1.22		YES	ignore
Additional RRM Policy Index	0		9.2.1.39a		YES	ignore
NR V2X Services Authorized	0		9.2.1.148		YES	ignore
NR UE Sidelink Aggregate Maximum Bit Rate	0		9.2.1.149	This IE applies only if the UE is authorized for NR V2X services.	YES	ignore
PC5 QoS Parameters	0		9.2.1.150	This IE applies only if the UE is authorized for NR V2X services.	YES	ignore
UE Radio Capability ID	0		9.2.1.153		YES	reject

Range bound	Explanation
maxnoofE-RABs	Maximum no. of E-RABs for one UE. Value is 256.

9.1.5.10 PATH SWITCH REQUEST FAILURE

This message is sent by the MME to inform the eNB that a failure has occurred in the EPC during the Path switch request procedure.

Direction: MME \rightarrow eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	ignore
eNB UE S1AP ID	M		9.2.3.4		YES	ignore
Cause	М		9.2.1.3		YES	ignore
Criticality Diagnostics	0		9.2.1.21		YES	ignore

9.1.5.11 HANDOVER CANCEL

This message is sent by the source eNB to the MME to request the cancellation of an ongoing handover.

Direction: eNB \rightarrow MME.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
Cause	M		9.2.1.3		YES	ignore

9.1.5.12 HANDOVER CANCEL ACKNOWLEDGE

This message is sent by the MME to the source eNB to confirm that the ongoing handover was cancelled.

Direction: MME \rightarrow eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	М		9.2.1.1		YES	reject
MME UE S1AP ID	М		9.2.3.3		YES	ignore
eNB UE S1AP ID	M		9.2.3.4		YES	ignore
Criticality Diagnostics	0		9.2.1.21		YES	ignore

9.1.5.13 eNB STATUS TRANSFER

This message is sent by the source eNB to transfer the PDCP SN receiver and transmitter status.

Direction: eNB \rightarrow MME.

IE/Group Name	Presence	Range	IE type and	Semantics	Criticality	Assigned
			reference	description		Criticality
Message Type	M		9.2.1.1		YES	ignore
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
eNB Status Transfer	M		9.2.1.31		YES	reject
Transparent Container						

9.1.5.14 MME STATUS TRANSFER

This message is sent by the MME to transfer the PDCP-SN receiver and transmitter status.

IE/Group Name	Presence	Range	IE type and	Semantics	Criticality	Assigned
			reference	description		Criticality
Message Type	М		9.2.1.1		YES	ignore
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	М		9.2.3.4		YES	reject
eNB Status Transfer	М		9.2.1.31		YES	reject
Transparent Container						

9.1.5.15 HANDOVER SUCCESS

This message is sent by the MME to the source eNB to indicate the successful access of the UE toward the target eNB.

Direction: MME →source eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	ignore
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject

9.1.5.16 eNB EARLY STATUS TRANSFER

This message is sent by the source eNB to transfer the COUNT value(s) of the first forwarded downlink SDU(s) during S1 DAPS Handover.

Direction: $eNB \rightarrow MME$.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
eNB Early Status Transfer Transparent Container	M		9.2.1.157		YES	reject

9.1.5.17 MME EARLY STATUS TRANSFER

This message is sent by the MME to transfer the COUNT value(s) of the first forwarded downlink SDU(s) during S1 DAPS Handover.

Direction: MME \rightarrow eNB

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	ignore
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
eNB Early Status Transfer Transparent Container	М		9.2.1.157		YES	reject

9.1.6 PAGING

This message is sent by the MME and is used to page a UE in one or several tracking areas.

IE/Group Name	Presence	Range	IE type and	Semantics	Criticality	Assigned
			reference	description	\/F0	Criticality
Message Type	M		9.2.1.1		YES	ignore
UE Identity Index value	M		9.2.3.10		YES	ignore
UE Paging Identity	M		9.2.3.13		YES	ignore
Paging DRX	0		9.2.1.16	If the NB-IoT Paging DRX IE is included, the Paging DRX IE is ignored.	YES	ignore
CN Domain	M		9.2.3.22		YES	ignore
List of TAIs		1			YES	ignore
>TAI List Item		1 <maxnooftals></maxnooftals>			EACH	ignore
>>TAI	M		9.2.3.16		-	
CSG Id List		01			GLOBAL	ignore
>CSG ld		1 <maxnoofcsgid ></maxnoofcsgid 	9.2.1.62		-	
Paging Priority	0		9.2.1.78		YES	ignore
UE Radio Capability for Paging	0		9.2.1.98		YES	ignore
Assistance Data for Paging	0		9.2.1.103		YES	ignore
Paging eDRX Information	0		9.2.1.111		YES	ignore
Extended UE Identity Index Value	0		9.2.3.46		YES	ignore
NB-IoT Paging eDRX Information	0		9.2.1.115		YES	ignore
NB-IoT UE Identity Index value	0		9.2.3.47		YES	ignore
Enhanced Coverage Restricted	0		9.2.1.123		YES	ignore
CE-Mode-B Restricted	0		9.2.1.129		YES	ignore
Data size	0		INTEGER (14095,)	The unit is: bit	YES	ignore
WUS Assistance Information	0		9.2.1.158		YES	ignore
NB-IoT Paging DRX	0		9.2.1.159x		YES	ignore

Range bound	Explanation
maxnoofTAIs	Maximum no. of TAIs. Value is 256.
maxnoofCSGlds	Maximum no. of CSG Ids within the CSG Id List. Value is 256.

9.1.7 NAS Transport Messages

9.1.7.1 INITIAL UE MESSAGE

This message is sent by the eNB to transfer the initial layer 3 message to the MME over the S1 interface.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	ignore
eNB UE S1AP ID	M		9.2.3.4		YES	reject
NAS-PDU	M		9.2.3.5		YES	reject
TAI	М		9.2.3.16	Indicating the Tracking Area from which the UE has sent the NAS message.	YES	reject
E-UTRAN CGI	М		9.2.1.38	Indicating the E-UTRAN CGI from which the UE has sent the NAS message.	YES	ignore
RRC Establishment Cause	M		9.2.1.3a		YES	ignore
S-TMSI	0		9.2.3.6		YES	reject
CSG ld	0		9.2.1.62		YES	reject
GUMMEI	0		9.2.3.9		YES	reject
Cell Access Mode	0		9.2.1.74		YES	reject
GW Transport Layer Address	0		Transport Layer Address 9.2.2.1	Indicating GW Transport Layer Address if the GW is collocated with eNB.	YES	ignore
Relay Node Indicator	0		9.2.1.79	Indicating a relay node.	YES	reject
GUMMEI Type	0		ENUMERATE D (native, mapped,, mappedFrom5 G)		YES	ignore
Tunnel Information for BBF	0		Tunnel Information 9.2.2.3	Indicating HeNB's Local IP Address assigned by the broadband access provider, UDP port Number.	YES	ignore
SIPTO L-GW Transport Layer Address	0		Transport Layer Address 9.2.2.1	Indicating SIPTO L-GW Transport Layer Address if the SIPTO L- GW is collocated with eNB.	YES	ignore
LHN ID	0		9.2.1.92		YES	ignore
MME Group ID	0		9.2.3.44		YES	ignore
UE Usage Type	0		INTEGER (0255)		YES	ignore
CE-mode-B Support Indicator	0		9.2.1.118		YES	ignore
DCN ID	0		INTEGER (065535)		YES	ignore
Coverage Level	0		ENUMERATE D (extendedcove rage,)		YES	ignore

UE Application Layer Measurement Capability	0	BIT STRING (SIZE(8))	Each bit in the bitmap indicates an UE Application layer measurement capability, refer to TS 25.331[10]. Bit 0 = QoE Measurement for streaming service Bit 1 = QoE Measurement for MTSI service Value '1' indicates "Capable" and value '0' indicates "not Capable". Unused bits are reserved for future use.	YES	ignore
EDT Session	0	ENUMERATE D (true,)		YES	
IAB Node Indication	0	ENUMERATE D (true,)	Indication of an IAB- node.	YES	reject

9.1.7.2 DOWNLINK NAS TRANSPORT

This message is sent by the MME and is used for carrying NAS information over the S1 interface.

Direction: MME \rightarrow eNB

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	М		9.2.1.1	-	YES	ignore
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
NAS-PDU	M		9.2.3.5		YES	reject
Handover Restriction List	0		9.2.1.22		YES	ignore
Subscriber Profile ID for RAT/Frequency priority	0		9.2.1.39		YES	ignore
SRVCC Operation Possible	0		9.2.1.58		YES	ignore
UE Radio Capability	0		9.2.1.27		YES	ignore
DL NAS PDU Delivery Acknowledgment Request	0		9.2.3.48		YES	ignore
Enhanced Coverage Restricted	0		9.2.1.123		YES	ignore
CE-mode-B Restricted	0		9.2.1.129		YES	ignore
NR UE Security Capabilities	0		9.2.1.127		YES	ignore
UE Capability Info Request	0		9.2.3.51		YES	ignore
End Indication	0		9.2.3.54		YES	ignore
Pending Data Indication	0		9.2.3.55		YES	ignore
Subscription Based UE Differentiation Information	0		9.2.1.140		YES	ignore
Additional RRM Policy Index	0		9.2.1.39a		YES	ignore
UE Radio Capability ID	0		9.2.1.153		YES	reject

9.1.7.3 UPLINK NAS TRANSPORT

This message is sent by the eNB and is used for carrying NAS information over the S1 interface.

Direction: $eNB \rightarrow MME$

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	ignore
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
NAS-PDU	M		9.2.3.5		YES	reject
E-UTRAN CGI	M		9.2.1.38		YES	ignore
TAI	M		9.2.3.16		YES	ignore
GW Transport Layer Address	0		Transport Layer Address 9.2.2.1	Indicating GW Transport Layer Address if the GW is collocated with eNB.	YES	ignore
SIPTO L-GW Transport Layer Address	0		Transport Layer Address 9.2.2.1	Indicating SIPTO L-GW Transport Layer Address if the SIPTO L-GW is collocated with eNB.	YES	ignore
LHN ID	0		9.2.1.92		YES	ignore
PSCell Information	0		9.2.1.141		YES	ignore

9.1.7.4 NAS NON DELIVERY INDICATION

This message is sent by the eNB and is used for reporting the non delivery of a NAS PDU previously received within a DOWNLINK NAS TRANSPORT message over the S1 interface.

Direction: $eNB \rightarrow MME$

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	ignore
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
NAS-PDU	M		9.2.3.5		YES	ignore
Cause	M	•	9.2.1.3		YES	ignore

9.1.7.4a NAS DELIVERY INDICATION

This message is sent by the eNB and is used for reporting the successful delivery of a NAS PDU to the UE that was previously received within a DOWNLINK NAS TRANSPORT message.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	М		9.2.1.1		YES	ignore
MME UE S1AP ID	М		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject

9.1.7.5 REROUTE NAS REQUEST

This message is sent by the MME in order to request for a rerouting of the INITIAL UE MESSAGE to a DCN.

Direction: MME \rightarrow eNB

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
MME UE S1AP ID	0		9.2.3.3		YES	ignore
S1 Message	M		OCTET STRING	Contains the INITIAL UE MESSAGE	YES	reject
MME Group ID	M		9.2.3.44		YES	reject
Additional GUTI	0		9.2.3.45		YES	ignore
UE Usage Type	0		INTEGER (0255)		YES	ignore

9.1.8 Management messages

9.1.8.1 RESET

This message is sent by both the MME and the eNB and is used to request that the S1 interface, or parts of the S1 interface, to be reset.

Direction: MME \rightarrow eNB and eNB \rightarrow MME

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
Cause	M		9.2.1.3		YES	ignore
CHOICE Reset Type	M				YES	reject
>S1 interface						
>>Reset All	M		ENUMERAT ED (Reset all,)		-	
>Part of S1 interface						
>>UE-associated logical S1-connection list		1			-	
>>>UE-associated logical S1-connection Item		1 <maxnoofindividu alS1ConnectionsT oReset></maxnoofindividu 			EACH	reject
>>>>MME UE S1AP ID	0		9.2.3.3		-	
>>>eNB UE S1AP ID	0		9.2.3.4		-	

Range bound	Explanation				
maxnoofIndividualS1ConnectionsToReset	Maximum no. of UE-associated logical S1-connections allowed to				
	reset in one message. Value is 256.				

9.1.8.2 RESET ACKNOWLEDGE

This message is sent by both the MME and the eNB as a response to a RESET message.

Direction: $eNB \rightarrow MME$ and $MME \rightarrow eNB$.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	М		9.2.1.1		YES	reject
UE-associated logical S1-connection list		01			YES	ignore
>UE-associated logical S1-connection Item		1 <maxnoofindividu alS1ConnectionsT oReset></maxnoofindividu 			EACH	ignore
>>MME UE S1AP ID	0		9.2.3.3		-	
>>eNB UE S1AP ID	0		9.2.3.4		-	
Criticality Diagnostics	0		9.2.1.21		YES	ignore

Range bound	Explanation				
maxnoofIndividualS1ConnectionsToReset	Maximum no. of UE-associated logical S1-connections allowed to				
	reset in one message. Value is 256.				

9.1.8.3 ERROR INDICATION

This message is sent by both the MME and the eNB and is used to indicate that some error has been detected in the node.

Direction: MME \rightarrow eNB and eNB \rightarrow MME

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	ignore
MME UE S1AP ID	0		9.2.3.3		YES	ignore
eNB UE S1AP ID	0		9.2.3.4		YES	ignore
Cause	0		9.2.1.3		YES	ignore
Criticality Diagnostics	0		9.2.1.21		YES	ignore
S-TMSI	0		9.2.3.6		YES	ignore

9.1.8.4 S1 SETUP REQUEST

This message is sent by the eNB to transfer information for a TNL association.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
Global eNB ID	M		9.2.1.37		YES	reject
eNB Name	0		PrintableStri ng(SIZE(11 50,))		YES	ignore
Supported TAs		1 <maxnooftacs< td=""><td></td><td>Supported TAs in the eNB.</td><td>GLOBAL</td><td>reject</td></maxnooftacs<>		Supported TAs in the eNB.	GLOBAL	reject
>TAC	M		9.2.3.7	Broadcast TAC.	-	
>Broadcast PLMNs		1 <maxnoofbplm Ns></maxnoofbplm 		Broadcast PLMNs.	-	
>>PLMN Identity	M		9.2.3.8			
>RAT-Type	0		9.2.1.117	RAT-Type associated with the TAC of the indicated PLMN(s).	YES	reject
Default Paging DRX	М		9.2.1.16		YES	ignore
CSG Id List		01			GLOBAL	reject
>CSG Id		1 <maxnoofcsglds< td=""><td>9.2.1.62</td><td></td><td></td><td>-</td></maxnoofcsglds<>	9.2.1.62			-
UE Retention Information	0		9.2.1.112		YES	ignore
NB-IoT Default Paging DRX	0		9.2.1.114		YES	ignore
Connected en-gNB List		<0 maxnoofConnecte den-gNBs>			GLOBAL	ignore
>en-gNB ID	M		BIT STRING (SIZE(2232))	The MME derives the Global engNB ID based on the engNB ID IE and the first PLMN Identity in the Supported TAs list for the en-gNB.		
>Supported TAs		1 <maxnooftacs ></maxnooftacs 		Supported (EPS) TAs in the en-gNB.	•	
>>Configured TAC	M		TAC 9.2.3.7	This information is used as specified in TS 36.300 [14].	-	
>>Broadcast PLMNs		1 <maxnoofbplm Ns></maxnoofbplm 		Broadcast PLMNs.	-	
>>>PLMN Identity	М		9.2.3.8			

Range bound	Explanation
maxnoofTACs	Maximum no. of TACs. Value is 256.
maxnoofBPLMNs	Maximum no. of Broadcast PLMNs. Value is 6.
maxnoofCSGlds	Maximum no. of CSG lds within the CSG ld List. Value is 256.
maxnoofConnecteden-gNBs	Maximum no. of en-gNBs connected to the eNB. Value is 256.

9.1.8.5 S1 SETUP RESPONSE

This message is sent by the MME to transfer information for a TNL association.

Direction: MME \rightarrow eNB

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	М		9.2.1.1	description	YES	reject
MME Name	Ö		PrintableString (SIZE(1150,))		YES	ignore
Served GUMMEIs		1 <maxnoofrats></maxnoofrats>		The LTE related pool configuration is included on the first place in the list.	GLOBAL	reject
>Served PLMNs		1 <maxnoofplmnsp ermme=""></maxnoofplmnsp>			-	
>>PLMN Identity	M		9.2.3.8		-	
>Served GroupIDs		1 <maxnoofgroupid s></maxnoofgroupid 			-	
>>MME Group ID	М		OCTET STRING (SIZE(2))		-	
>Served MMECs		1 <maxnoofmmecs></maxnoofmmecs>			-	
>>MME Code	M		9.2.3.12		-	
>GUMMEI Type	0		ENUMERATE D (native, mapped,, mappedFrom5 G)		-	ignore
Relative MME Capacity	M		9.2.3.17		YES	ignore
MME Relay Support Indicator	0		9.2.1.82		YES	ignore
Criticality Diagnostics	0		9.2.1.21		YES	ignore
UE Retention Information	0		9.2.1.112		YES	ignore
Served DCNs		0 <maxnoofdcns></maxnoofdcns>			GLOBAL	ignore
>Served DCNs Items	M		9.2.1.121		-	
IAB Supported	0		ENUMERATE D (true,)	Indication of support for IAB.	YES	ignore

Range bound	Explanation
maxnoofPLMNsPerMME	Maximum no. of PLMNs per MME. Value is 32.
maxnoofRATs	Maximum no. of RATs. Value is 8.
maxnoofGroupIDs	Maximum no. of GroupIDs per node per RAT. Value is 65535.
maxnoofMMECs	Maximum no. of MMECs per node per RAT. Value is 256.
maxnoofDCNs	Maximum no. of DCNs servered by one MME. Value is 32.

9.1.8.6 S1 SETUP FAILURE

This message is sent by the MME to indicate S1 Setup failure.

Direction: MME \rightarrow eNB

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
Cause	M		9.2.1.3		YES	ignore
Time to wait	0		9.2.1.61		YES	ignore
Criticality Diagnostics	0		9.2.1.21		YES	ignore

9.1.8.7 ENB CONFIGURATION UPDATE

This message is sent by the eNB to transfer updated information for a TNL association.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
eNB Name	0		PrintableStrin g(SIZE(1150 ,))		YES	ignore
Supported TAs		0 <maxnooftacs></maxnooftacs>		Supported TAs in the eNB.	GLOBAL	reject
>TAC	M		9.2.3.7	Broadcast TAC.	-	
>Broadcast PLMNs		1 <maxnoofbplmns></maxnoofbplmns>		Broadcast PLMNs.	-	
>>PLMN Identity	M		9.2.3.8		-	
>RAT-Type	0		9.2.1.117	RAT Type associated with the TAC of the indicated PLMN(s).	YES	reject
CSG Id List		01			GLOBAL	reject
>CSG ld		1 <maxnoofcsgid></maxnoofcsgid>	9.2.1.62		-	
Default Paging DRX	0		9.2.1.16		YES	ignore
NB-IoT Default Paging DRX	0		9.2.1.114		YES	ignore
Connected en-gNB To Be Added List		<0 maxnoofConnecteden- gNBs>			GLOBAL	ignore
>en-gNB ID	M		BIT STRING (SIZE(2232))	The MME derives the Global engns ID based on the en-gNB ID IE and the first PLMN Identity in the Supported TAs list of the added en-gNB.		
>Supported TAs		1 <maxnooftacs></maxnooftacs>		Supported TAs in the en-gNB.	-	
>>Configured TAC	М		TAC 9.2.3.7		-	
>>Broadcast PLMNs		1 <maxnoofbplmns></maxnoofbplmns>		Broadcast PLMNs.	-	
>>>PLMN Identity	М		9.2.3.8			
Connected en-gNB To Be Removed List		<0 maxnoofConnecteden- gNBs>			GLOBAL	ignore
>en-gNB ID	M		BIT STRING (SIZE(2232))	The MME derives the Global engns ID based on the en-gNB ID IE and the first PLMN Identity in the Supported TAs list of the engns to be removed.		
>Supported TAs		1 <maxnooftacs></maxnooftacs>		Supported TAs in the en-gNB.	-	
>>Configured TAC	М		TAC 9.2.3.7		-	
>>Broadcast PLMNs		1 <maxnoofbplmns></maxnoofbplmns>		Broadcast PLMNs.	-	
>>>PLMN Identity	М		9.2.3.8			

Range bound	Explanation
maxnoofTACs	Maximum no. of TACs. Value is 256.
maxnoofBPLMNs	Maximum no. of Broadcast PLMNs. Value is 6.
maxnoofCSGlds	Maximum no. of CSG Ids within the CSG Id List. Value is 256.
maxnoofConnecteden-gNBs	Maximum no. of en-gNBs connected to the eNB. Value is 256.

9.1.8.8 ENB CONFIGURATION UPDATE ACKNOWLEDGE

This message is sent by the MME to acknowledge the eNB transfer updated information for a TNL association.

Direction: MME \rightarrow eNB

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
Criticality Diagnostics	0		9.2.1.21		YES	ignore

9.1.8.9 ENB CONFIGURATION UPDATE FAILURE

This message is sent by the MME to indicate S1 eNB Configuration Update failure.

Direction: MME \rightarrow eNB

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
Cause	M		9.2.1.3		YES	ignore
Time to wait	0		9.2.1.61		YES	ignore
Criticality Diagnostics	0		9.2.1.21		YES	ignore

9.1.8.10 MME CONFIGURATION UPDATE

This message is sent by the MME to transfer updated information for a TNL association.

Direction: MME \rightarrow eNB

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
MME Name	0		PrintableStrin g(SIZE(1150 ,))		YES	ignore
Served GUMMEIs		0 <maxnoofrats></maxnoofrats>		The LTE related pool configuration is included on the first place in the list.	GLOBAL	reject
>Served PLMNs		1 <maxnoofplmnsp erMME></maxnoofplmnsp 			-	
>>PLMN Identity	M		9.2.3.8		-	
>Served GroupIDs		1 <maxnoofgroupid s></maxnoofgroupid 			-	
>>MME GroupID	М		OCTET STRING (SIZE(2))		-	
>Served MMECs		1 <maxnoofmmecs></maxnoofmmecs>			-	
>>MME Code	M		9.2.3.12		-	
>GUMMEI Type	0		ENUMERATE D (native, mapped,, mappedFrom 5G)		-	ignore
Relative MME Capacity	0		9.2.3.17		YES	reject
Served DCNs		0 <maxnoofdcns></maxnoofdcns>			GLOBAL	ignore
>Served DCNs Items	M		9.2.1.121		-	

Range bound	Explanation
maxnoofPLMNsPerMME	Maximum no. of PLMNs per MME. Value is 32.
maxnoofRATs	Maximum no. of RATs. Value is 8.
maxnoofGroupIDs	Maximum no. of GroupIDs per node per RAT. Value is 65535.
maxnoofMMECs	Maximum no. of MMECs per node per RAT. Value is 256.
maxnoofDCNs	Maximum no. of DCNs servered by one MME. Value is 32.

9.1.8.11 MME CONFIGURATION UPDATE ACKNOWLEDGE

This message is sent by the eNB to acknowledge the MME transfer updated information for a TNL association.

Direction: $eNB \rightarrow MME$

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
Criticality Diagnostics	0		9.2.1.21		YES	ignore

9.1.8.12 MME CONFIGURATION UPDATE FAILURE

This message is sent by the eNB to indicate S1 MME Configuration Update failure.

IE/Group Name	Presence	Range	IE type and	Semantics	Criticality	Assigned
			reference	description		Criticality
Message Type	M		9.2.1.1		YES	reject
Cause	M		9.2.1.3		YES	ignore
Time to wait	0		9.2.1.61		YES	ignore
Criticality Diagnostics	0		9.2.1.21		YES	ignore

9.1.8.13 OVERLOAD START

This message is sent by the MME and is used to indicate to the eNB that the MME is overloaded.

Direction: MME \rightarrow eNB

IE/Group Name	Presence	Range	IE type and	Semantics	Criticality	Assigned
			reference	description		Criticality
Message Type	M		9.2.1.1		YES	ignore
Overload Response	M		9.2.3.19		YES	reject
GUMMEI List		01			YES	ignore
>GUMMEI List Item		1 <maxnoofmmecs></maxnoofmmecs>			EACH	ignore
>>GUMMEI	M		9.2.3.9		-	
Traffic Load Reduction	0		9.2.3.36		YES	ignore
Indication						

Range bound	Explanation			
maxnoofMMECs	Maximum no. of MMECs per node per RAT. Value is 256.			

9.1.8.14 OVERLOAD STOP

This message is sent by the MME and is used to indicate that the MME is no longer overloaded.

Direction: MME \rightarrow eNB

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
GUMMEI List		01			YES	ignore
>GUMMEI List Item		1 <maxnoofmmecs></maxnoofmmecs>			EACH	ignore
>>GUMMEI	M		9.2.3.9		-	

Range bound	Explanation
maxnoofMMECs	Maximum no. of MMECs per node per RAT. Value is 256.

9.1.9 S1 CDMA2000 Tunnelling Messages

9.1.9.1 DOWNLINK S1 CDMA2000 TUNNELLING

This message is sent by the MME and is used for carrying CDMA2000 information over the S1 interface.

Direction: MME \rightarrow eNB

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	ignore
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
E-RABs Subject to		01			YES	ignore
Forwarding List						
>E-RABs Subject to		1 <maxnoof e-<="" td=""><td></td><td></td><td>EACH</td><td>ignore</td></maxnoof>			EACH	ignore
Forwarding Item IEs		RABs>				
>>E-RAB ID	M		9.2.1.2		-	
>>DL Transport Layer	0		9.2.2.1		-	
Address						
>>DL GTP-TEID	0		9.2.2.2	This IE indicates the tunnel endpoint for forwarding of DL data.	-	
>>UL Transport Layer Address	0		9.2.2.1		-	
>>UL GTP-TEID	0		9.2.2.2		-	
CDMA2000 HO Status	0		9.2.1.28		YES	ignore
CDMA2000 RAT Type	M		9.2.1.24		YES	reject
CDMA2000-PDU	M		9.2.1.23		YES	reject

Range bound	Explanation				
maxnoofE-RABs	Maximum no. of E-RABs for one UE. Value is 256.				

9.1.9.2 UPLINK S1 CDMA2000 TUNNELLING

This message is sent by the eNB and is used for carrying CDMA2000 information over the S1 interface.

Direction: eNB \rightarrow MME

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	ignore
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
CDMA2000 RAT Type	M		9.2.1.24		YES	reject
CDMA2000 Sector ID	M		9.2.1.25		YES	reject
CDMA2000 HO Required Indication	0		9.2.1.29		YES	ignore
CDMA2000 1xRTT SRVCC Info	0		9.2.1.35		YES	reject
CDMA2000 1xRTT RAND	0		9.2.1.33		YES	reject
CDMA2000-PDU	M		9.2.1.23		YES	reject
E-UTRAN Round Trip Delay Estimation Info	0		9.2.1.69		YES	ignore

9.1.10 UE CAPABILITY INFO INDICATION

This message is sent by the eNB to provide UE Radio Capability information to the MME.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	М		9.2.1.1	•	YES	ignore
MME UE S1AP ID	М		9.2.3.3		YES	reject
eNB UE S1AP ID	М		9.2.3.4		YES	reject
UE Radio Capability	М		9.2.1.27		YES	ignore
UE Radio Capability for Paging	0		9.2.1.98		YES	ignore
UE Application Layer Measurement Capability	0		BIT STRING (SIZE(8))	Each bit in the bitmap indicates an UE Application layer measurement capability, refer to TS 25.331[10]. Bit 0 = QoE Measurement for streaming service Bit 1 = QoE Measurement for MTSI service Value '1' indicates "Capable" and value '0' indicates "not Capable". Unused bits are reserved for future use.	YES	ignore
LTE-M Indication	0		9.2.1.135	400.	YES	ignore
UE Radio Capability – NR Format	0		9.2.1.154		YES	ignore

9.1.11 Trace Messages

9.1.11.1 TRACE START

This message is sent by the MME to initiate trace recording for a UE.

Direction: MME \rightarrow eNB

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	ignore
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
Trace Activation	М		9.2.1.4		YES	ignore

9.1.11.2 TRACE FAILURE INDICATION

This message is sent by the eNB to indicate that a Trace Start procedure or a Deactivate Trace procedure has failed for a UE.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	ignore
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
E-UTRAN Trace ID	М		OCTET STRING (SIZE(8))	As per E-UTRAN Trace ID IE in Trace Activation IE (9.2.1.4).	YES	ignore
Cause	M		9.2.1.3		YES	ignore

9.1.11.3 DEACTIVATE TRACE

This message is sent by the MME to deactivate trace.

Direction: MME \rightarrow eNB

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	ignore
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
E-UTRAN Trace ID	M		OCTET STRING (SIZE(8))	As per E-UTRAN Trace ID IE in Trace Activation IE (9.2.1.4).	YES	ignore

9.1.12 Location Reporting Messages

9.1.12.1 LOCATION REPORTING CONTROL

This message is sent by the MME and is used to request the eNB to report where the UE is currently located.

Direction: MME \rightarrow eNB

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	ignore
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
Request Type	М		9.2.1.34		YES	ignore

9.1.12.2 LOCATION REPORT FAILURE INDICATION

This message is sent by the eNB and is used to indicate the failure of location report.

Direction: $eNB \rightarrow MME$

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	ignore
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
Cause	M		9.2.1.3		YES	ignore

9.1.12.3 LOCATION REPORT

This message is sent by the eNB and is used to provide the UE's location to the MME.

Direction: $eNB \rightarrow MME$

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	М		9.2.1.1		YES	ignore
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
E-UTRAN CGI	M		9.2.1.38		YES	ignore
TAI	M		9.2.3.16		YES	ignore
Request Type	М		9.2.1.34	The Request Type IE is sent as it has been provided.	YES	ignore
PSCell Information	0		9.2.1.141		YES	ignore

9.1.13 Warning Message Transmission Messages

9.1.13.1 WRITE-REPLACE WARNING REQUEST

This message is sent by the MME to request the start or overwrite of the broadcast of a warning message.

Direction: MME \rightarrow eNB

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
Message Identifier	M		9.2.1.44		YES	reject
Serial Number	M		9.2.1.45		YES	reject
Warning Area List	0		9.2.1.46		YES	ignore
Repetition Period	M		9.2.1.48		YES	reject
Extended Repetition Period	0		9.2.1.75		YES	reject
Number of Broadcasts Requested	М		9.2.1.49		YES	reject
Warning Type	0		9.2.1.50		YES	ignore
Warning Security Information	0		9.2.1.51	See TS 23.041 [29].	YES	ignore
Data Coding Scheme	0		9.2.1.52		YES	ignore
Warning Message Contents	0		9.2.1.53		YES	ignore
Concurrent Warning Message Indicator	0		9.2.1.72		YES	reject
Warning Area Coordinates	0		9.2.1.139		YES	ignore

9.1.13.2 WRITE-REPLACE WARNING RESPONSE

This message is sent by the eNB to acknowledge the MME on the start or overwrite request of a warning message.

Direction: eNB → MME

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
Message Identifier	M		9.2.1.44		YES	reject
Serial Number	M		9.2.1.45		YES	reject
Broadcast Completed Area List	0		9.2.1.54		YES	ignore
Criticality Diagnostics	0		9.2.1.21		YES	ignore

9.1.13.3 KILL REQUEST

This message is forwarded by the MME to eNB to cancel an already ongoing broadcast of a warning message

Direction: MME \rightarrow eNB

IE/Group Name	Presence	Range	IE type and	Semantics	Criticality	Assigned
			reference	description		Criticality
Message Type	M		9.2.1.1		YES	reject
Message Identifier	M		9.2.1.44		YES	reject
Serial Number	M		9.2.1.45		YES	reject
Warning Area List	0		9.2.1.46		YES	ignore
Kill-all Warning Messages Indicator	0		9.2.1.91		YES	reject

9.1.13.4 KILL RESPONSE

This message is sent by the eNB to indicate the list of warning areas where cancellation of the broadcast of the identified message was successful and unsuccessful.

Direction: $eNB \rightarrow MME$

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
Message Identifier	M		9.2.1.44		YES	reject
Serial Number	M		9.2.1.45		YES	reject
Broadcast Cancelled Area List	0		9.2.1.70		YES	ignore
Criticality Diagnostics	0		9.2.1.21		YES	ignore

9.1.13.5 PWS RESTART INDICATION

This message is sent by the eNB to inform the MME that PWS information for some or all cells of the eNB are available for reloading from the CBC if needed.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	ignore
E-CGI List for Restart		1 <maxnoofcellsf orRestart></maxnoofcellsf 			EACH	reject
>E-CGI	M		9.2.1.38		-	-
Global eNB ID	M		9.2.1.37		YES	reject
TAI List for Restart		1 <maxnoofrestartt Als></maxnoofrestartt 			EACH	reject
>TAI	M		9.2.3.16		-	-
Emergency Area ID List for Restart		0 <maxnoofrestarte mergencyareaids=""></maxnoofrestarte>			EACH	reject
>Emergency Area ID	М		9.2.1.47		-	-

Range bound	Explanation
maxnoofCellsforRestart	Maximum no. of Cell ID subject for reloading warning messages
	broadcast. Value is 256.
maxnoofRestartTAIs	Maximum no. of TAI subject for reloading warning message
	broadcast. Value is 2048.
maxnoofRestartEmergencyAreaID	Maximum no. of Emergency Area ID subject for reloading warning
	message broadcast. Value is 256.

9.1.13.6 PWS FAILURE INDICATION

This message is sent by the eNB to inform the MME that ongoing PWS operation for one or more cells of the eNB has failed.

Direction: $eNB \rightarrow MME$

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	ignore
PWS failed E-CGI List		1 <maxnoofcellsi neNB></maxnoofcellsi 			EACH	reject
>E-CGI	M		9.2.1.38		-	-
Global eNB ID	M		9.2.1.37		YES	reject

Range bound	Explanation
maxnoofCellsineNB	Maximum no. of cells that can be served by an eNB. Value is 256.

9.1.14 eNB DIRECT INFORMATION TRANSFER

This message is sent by the eNB in order to transfer specific information.

Direction: eNB \rightarrow MME.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	ignore
Inter-system Information Transfer Type	М		9.2.1.55		YES	reject

9.1.15 MME DIRECT INFORMATION TRANSFER

This message is sent by the MME in order to transfer specific information.

Direction: MME \rightarrow eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	ignore
Inter-system Information Transfer Type	М		9.2.1.55		YES	reject

9.1.16 eNB CONFIGURATION TRANSFER

This message is sent by the eNB in order to transfer RAN configuration information.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	ignore
SON Configuration Transfer	0		9.2.3.26		YES	ignore
EN-DC SON Configuration Transfer	0		9.2.3.26a		YES	ignore
Inter-system SON Configuration Transfer	0		OCTET STRING	Contains the Inter- system SON Configuratio n Transfer IE as defined in TS 38.413 [44].	YES	ignore

9.1.17 MME CONFIGURATION TRANSFER

This message is sent by the MME in order to transfer RAN configuration information.

Direction: MME \rightarrow eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	ignore
SON Configuration Transfer	0		9.2.3.26		YES	ignore
EN-DC SON Configuration Transfer	0		9.2.3.26a		YES	ignore
Inter-system SON Configuration Transfer	0		OCTET STRING	Contains the Inter- system SON Configuratio n Transfer IE as defined in TS 38.413 [44].	YES	ignore

9.1.18 CELL TRAFFIC TRACE

This message is sent by eNB to transfer specific information.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	М		9.2.1.1		YES	ignore
MME UE S1AP ID	М		9.2.3.3		YES	reject
eNB UE S1AP ID	М		9.2.3.4		YES	reject
E-UTRAN Trace ID	М		OCTET STRING (SIZE(8))	The E-UTRAN Trace ID IE is composed of the following: Trace Reference defined in TS 32.422 [10] (leftmost 6 octets, with PLMN information coded as in 9.2.3.8), and Trace Recording Session Reference defined in TS 32.422 [10] (last 2 octets).	YES	ignore
E-UTRAN CGI	М		9.2.1.38		YES	ignore
Trace Collection Entity IP Address	М		Transport Layer Address 9.2.2.1	Defined in TS 32.422 [10]	YES	ignore
Privacy Indicator	0		ENUMERATED (Immediate MDT, Logged MDT,)		YES	ignore

9.1.19 LPPa Transport Messages

9.1.19.1 DOWNLINK UE ASSOCIATED LPPA TRANSPORT

This message is sent by the MME and is used for carrying LPPa message over the S1 interface.

Direction: MME \rightarrow eNB

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	ignore
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
Routing ID	M		9.2.3.33		YES	reject
LPPa-PDU	M		9.2.3.32		YES	reject

9.1.19.2 UPLINK UE ASSOCIATED LPPA TRANSPORT

This message is sent by the eNB and is used for carrying LPPa message over the S1 interface.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	ignore
MME UE S1AP ID	M		9.2.3.3		YES	reject
eNB UE S1AP ID	M		9.2.3.4		YES	reject
Routing ID	M		9.2.3.33		YES	reject
LPPa-PDU	M		9.2.3.32		YES	reject

9.1.19.3 DOWNLINK NON UE ASSOCIATED LPPA TRANSPORT

This message is sent by the MME and is used for carrying LPPa message over the S1 interface.

Direction: MME → eNB

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	ignore
Routing ID	M		9.2.3.33		YES	reject
LPPa-PDU	M		9.2.3.32		YES	reject

9.1.19.4 UPLINK NON UE ASSOCIATED LPPA TRANSPORT

This message is sent by the eNB and is used for carrying LPPa message over the S1 interface.

Direction: $eNB \rightarrow MME$

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	ignore
Routing ID	M		9.2.3.33		YES	reject
LPPa-PDU	M		9.2.3.32		YES	reject

9.1.20 Secondary RAT Report Data Usage Messages

9.1.20.1 SECONDARY RAT DATA USAGE REPORT

This message is sent by the eNB to report Secondary RAT data usage.

Direction: eNB \rightarrow MME

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	ignore
MME UE S1AP ID	M		9.2.3.3		YES	ignore
eNB UE S1AP ID	M		9.2.3.4		YES	ignore
Secondary RAT Usage Report list	M		9.2.1.124		YES	ignore
Handover Flag	0		9.2.1.125		YES	ignore
User Location Information	0		9.2.1.93		YES	ignore
Time Since Secondary Node Release	0		9.2.1.143		Yes	ignore

9.1.21 UE Radio Capability ID Mapping Messages

9.1.21.1 UE RADIO CAPABILITY ID MAPPING REQUEST

This message is sent by the eNB and is used to request the UE Radio Capability information that maps to a specific UE Radio Capability ID.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
UE Radio Capability ID	M		9.2.1.153		YES	reject

9.1.21.2 UE RADIO CAPABILITY ID MAPPING RESPONSE

This message is sent by the MME and is used to provide the UE Radio Capability information that maps to a specific UE Radio Capability ID indicated in the UE RADIO CAPABILITY ID MAPPING REQUEST message.

Direction: MME \rightarrow eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
UE Radio Capability ID	M		9.2.1.153		YES	reject
UE Radio Capability	M		9.2.1.27		YES	ignore
Criticality Diagnostics	0		9.2.1.21		YES	ignore

9.2 Information Element Definitions

9.2.0 General

Subclause 9.2 presents the S1AP IE definitions in tabular format. The corresponding ASN.1 definition is presented in subclause 9.3. In case there is contradiction between the tabular format in subclause 9.2 and the ASN.1 definition, the ASN.1 shall take precedence, except for the definition of conditions for the presence of conditional elements, where the tabular format shall take precedence.

The messages have been defined in accordance to the guidelines specified in TR 25.921 [40].

When specifying information elements which are to be represented by bitstrings, if not otherwise specifically stated in the semantics description of the concerned IE or elsewhere, the following principle applies with regards to the ordering of bits:

- The first bit (leftmost bit) contains the most significant bit (MSB);
- The last bit (rightmost bit) contains the least significant bit (LSB);
- When importing bitstrings from other specifications, the first bit of the bitstring contains the first bit of the concerned information:

9.2.1 Radio Network Layer Related IEs

9.2.1.1 Message Type

The Message Type IE uniquely identifies the message being sent. It is mandatory for all messages.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Message Type				
>Procedure Code	М		INTEGER (0255)	
>Type of Message	М		CHOICE (Initiating Message, Successful Outcome, Unsuccessful Outcome,)	

9.2.1.2 E-RAB ID

This element uniquely identifies a radio access bearer for a particular UE, which makes the E-RAB ID unique over one S1 connection. The E-RAB ID shall remain the same for the duration of the E-RAB even if the UE-associated logical S1-connection is released or moved using S1 handover.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
E-RAB ID	М		INTEGER (015,)	

9.2.1.3 Cause

The purpose of the *Cause* IE is to indicate the reason for a particular event for the S1AP protocol.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE Cause	М			200011111111
Group >Radio				
Network Layer				
>>Radio	М		ENUMERATED	
Network			(Unspecified,	
Layer Cause			TX2 _{RELOCOverall} Expiry,	
,			Successful Handover,	
			Release due to E-UTRAN Generated Reason,	
			Handover Cancelled, Partial Handover, Handover	
			Failure In Target EPC/eNB Or Target System,	
			Handover Target not allowed,	
			TS1 _{RELOCoverall} Expiry, TS1 _{RELOCprep} Expiry,	
			Cell not available,	
			Unknown Target ID,	
			No Radio Resources Available in Target Cell,	
			Unknown or already allocated MME UE S1AP ID,	
			Unknown or already allocated eNB UE S1AP ID,	
			Unknown or inconsistent pair of UE S1AP ID,	
			Handover desirable for radio reasons,	
			Time critical handover,	
			Resource optimisation handover,	
			Reduce load in serving cell, User inactivity, Radio Connection With UE Lost, Load Balancing TAU	
			Required, CS Fallback Triggered,	
			UE Not Available For PS Service, Radio resources	
			not available,	
			Failure in the Radio Interface Procedure,	
			Invalid QoS combination, Inter-RAT redirection,	
			Interaction with other procedure, Unknown E-RAB ID,	
			Multiple E-RAB ID instances, Encryption and/or	
			integrity protection algorithms not supported, S1 intra	
			system Handover triggered, S1 inter system	
			Handover triggered, X2 Handover triggered	
			Redirection towards 1xRTT,	
			Not supported QCI value,	
			invalid CSG Id,	
			Release due to Pre-Emption,	
Transport			N26 interface not available)	
>Transport Layer				
>>Transport	М		ENUMERATED	
Layer Cause			(Transport Resource Unavailable,	
			Unspecified,	
>NAS)	
>>NAS	М		ENUMERATED (Normal Release,	
Cause			Authentication failure,	
			Detach,	
			Unspecified,	
			, CSG Subscription Expiry)	
>Protocol				
>>Protocol	М]	ENUMERATED	
Cause			(Transfer Syntax Error,	
			Abstract Syntax Error (Reject),	
			Abstract Syntax Error (Ignore and Notify),	
			Message not Compatible with Receiver State, Semantic Error,	
			Abstract Syntax Error (Falsely Constructed Message),	
			Unspecified,)	
>Misc		1		t

>>Miscellan	M	ENUMERATED	
eous Cause		(Control Processing Overload, Not enough User	
		Plane Processing Resources,	
		Hardware Failure,	
		O&M Intervention,	
		Unspecified, Unknown PLMN,)	

The meaning of the different cause values is described in the following table. In general, "not supported" cause values indicate that the related capability is missing. On the other hand, "not available" cause values indicate that the related capability is present, but insufficient resources were available to perform the requested action.

Radio Network Layer cause	Meaning
Unspecified	Sent for radio network layer cause when none of the specified cause values applies.
TX2RELOCOverall Expiry	The timer guarding the handover that takes place over X2 has abnormally expired.
Successful Handover	Successful handover.
Release due to E-UTRAN	Release is initiated due to E-UTRAN generated reason.
generated reason	·
Handover Cancelled	The reason for the action is cancellation of Handover.
Partial Handover	Provides a reason for the handover cancellation. The HANDOVER COMMAND message from MME contained <i>E-RABs to Release List</i> IE and the source eNB estimated service continuity for the UE would be better by not proceeding with handover towards this particular target eNB.
Handover Failure In Target EPC/eNB Or Target System	The handover failed due to a failure in target EPC/eNB or target system.
Handover Target not allowed	Handover to the indicated target cell is not allowed for the UE in question.
TS1 _{RELOCoverall} Expiry	The reason for the action is expiry of timer TS1 _{RELOCoverall} .
TS1 _{RELOCprep} Expiry	Handover Preparation procedure is cancelled when timer TS1 _{RELOCprep} expires.
Cell not available	The concerned cell is not available.
Unknown Target ID	Handover rejected because the target ID is not known to the EPC.
No radio resources available in target cell	Load on target cell is too high.
Unknown or already allocated MME UE S1AP ID	The action failed because the MME UE S1AP ID is either unknown, or (for a first message received at the eNB) is known and already allocated to an existing context.
Unknown or already allocated eNB UE S1AP ID	The action failed because the eNB UE S1AP ID is either unknown, or (for a first message received at the MME) is known and already allocated to an existing context.
Unknown or inconsistent pair of UE S1AP ID	The action failed because both UE S1AP IDs are unknown, or are known but do not define a single UE context.
Handover Desirable for Radio Reasons	The reason for requesting handover is radio related.
Time Critical Handover	Handover is requested for time critical reason i.e., this cause value is reserved to represent all critical cases where the connection is likely to be dropped if handover is not performed.
Resource Optimisation Handover	The reason for requesting handover is to improve the load distribution with the neighbour cells.
Reduce Load in Serving Cell	Load on serving cell needs to be reduced. When applied to handover preparation, it indicates the handover is triggered due to load balancing.

User Inactivity	The action is requested due to user inactivity on all E-RABs, e.g., S1 is requested to be released in order to optimise the radio resources.
Radio Connection With UE Lost	The action is requested due to losing the radio connection to the UE.
Load Balancing TAU Required	The action is requested for all load balancing and offload cases in the MME.
CS Fallback triggered	The action is due to a CS fallback that has been triggered. When it is included in UE CONTEXT RELEASE REQUEST message, it indicates the PS service suspension is not required in the EPC.
UE Not Available for PS Service	The action is requested due to a CS fallback to GERAN that has been triggered. When it is included in the UE CONTEXT RELEASE REQUEST message, it indicates that the PS service suspension is required in the EPC due to the target GERAN cell or the UE has no DTM capability.
Radio resources not available	No requested radio resources are available.
Invalid QoS combination	The action was failed because of invalid QoS combination.
Inter-RAT Redirection	The release is requested due to inter-RAT redirection or intra- LTE redirection. When it is included in UE CONTEXT RELEASE REQUEST message, the behaviour of the EPC is specified in TS 23.401 [11].
Failure in the Radio Interface Procedure	Radio interface procedure has failed.
Interaction with other procedure	The action is due to an ongoing interaction with another procedure.
Unknown E-RAB ID	The action failed because the E-RAB ID is unknown in the eNB.
Multiple E-RAB ID Instances	The action failed because multiple instance of the same E-RAB had been provided to the eNB.
Encryption and/or integrity protection algorithms not supported	The eNB is unable to support any of the encryption and/or integrity protection algorithms supported by the UE.
S1 Intra system Handover triggered	The action is due to a S1 intra system handover that has been triggered.
S1 Inter system Handover triggered	The action is due to a S1 inter system handover that has been triggered.
X2 Handover triggered	The action is due to an X2 handover that has been triggered.
Redirection towards 1xRTT	The release of the UE-associated logical S1 connection is requested due to redirection towards a 1xRTT system e.g., CS fallback to 1xRTT, or SRVCC to 1xRTT, when the PS service suspension is required in the EPC. During this procedure, the radio interface message might but need not include redirection information.
Not supported QCI Value	The E-RAB setup failed because the requested QCI is not supported.
Invalid CSG Id	The CSG ID provided to the target eNB was found invalid.
Release due to Pre-Emption	Release is initiated due to pre-emption.
N26 interface not available	The action failed due to a temporary failure of the N26 interface.

Transport Layer cause	Meaning
Transport Resource Unavailable	The required transport resources are not available.
Unspecified	Sent when none of the above cause values applies but still
	the cause is Transport Network Layer related.

NAS cause	Meaning
Normal Release	The release is normal.
Authentication Failure	The action is due to authentication failure.
Detach	The action is due to detach.
Unspecified	Sent when none of the above cause values applies but still
	the cause is NAS related.
CSG Subscription Expiry	The action is due to the UE becoming a non-member of the currently used CSG.

Protocol cause	Meaning
Transfer Syntax Error	The received message included a transfer syntax error.
Abstract Syntax Error (Reject)	The received message included an abstract syntax error and the concerning criticality indicated "reject".
Abstract Syntax Error (Ignore And Notify)	The received message included an abstract syntax error and the concerning criticality indicated "ignore and notify".
Message Not Compatible With Receiver State	The received message was not compatible with the receiver state.
Semantic Error	The received message included a semantic error.
Abstract Syntax Error (Falsely Constructed Message)	The received message contained IEs or IE groups in wrong order or with too many occurrences.
Unspecified	Sent when none of the above cause values applies but still the cause is Protocol related.

Miscellaneous cause	Meaning
Control Processing Overload	Control processing overload.
Not Enough User Plane Processing	No enough resources are available related to user plane
Resources Available	processing.
Hardware Failure	Action related to hardware failure.
O&M Intervention	The action is due to O&M intervention.
Unspecified Failure	Sent when none of the above cause values applies and the
	cause is not related to any of the categories Radio Network
	Layer, Transport Network Layer, NAS or Protocol.
Unknown PLMN	The MME does not identify any PLMN provided by the eNB.

9.2.1.3a RRC Establishment Cause

The purpose of the *RRC Establishment Cause* IE is to indicate to the MME the reason for RRC Connection Establishment or RRC Connection Resume as received from the UE in the *EstablishmentCause*, *EstablishmentCause*. *NB* or *ResumeCause* defined in TS 36.331 [16].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
RRC Establishment Cause	М		ENUMERATED(emergency, highPriorityAccess, mt-Access, mo-Signalling, mo-Data,,delayTolerantAccess, mo-VoiceCall, mo-ExceptionData)	

9.2.1.4 Trace Activation

Defines parameters related to a trace activation.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
E-UTRAN Trace ID	M		OCTET STRING (SIZE(8))	The E-UTRAN Trace ID IE is composed of the following: Trace Reference defined in TS 32.422 [10] (leftmost 6 octets, with PLMN information coded as in 9.2.3.8), and Trace Recording Session Reference defined in TS 32.422 [10] (last 2 octets).		
Interfaces To Trace	M		BIT STRING (SIZE(8))	Each position in the bitmap represents an eNB or en-gNB interface: first bit =S1-MME, second bit =X2, third bit =Uu, fourth bit =F1-C, fifth bit =E1: other bits reserved for future use. Value '1' indicates 'should be traced'. Value '0' indicates 'should not be traced'.		
Trace depth	М		ENUMERATED(minimum, medium, maximum, MinimumWithoutVend orSpecificExtension, MediumWithoutVendo rSpecificExtension, MaximumWithoutVen dorSpecificExtension,)	Defined in TS 32.422 [10].		
Trace Collection Entity IP Address	M		Transport Layer Address 9.2.2.1	Defined in TS 32.422 [10].		
MDT Configuration	0		9.2.1.81		YES	ignore
UE Application layer measurement configuration	0		9.2.1.128		YES	Ignore
MDT Configuration NR	0		OCTET STRING	Defined in TS 38.413 [44]. Only the immediate MDT configurations are included in the IE in this version of the specification.	YES	ignore

9.2.1.5 Source ID

Void.

9.2.1.6 Target ID

The *Target ID* IE identifies the target for the handover. The target ID may be, e.g., the target Global eNB-ID (for intra SAE/LTE), the RNC-ID (for SAE/LTE-UMTS handover) or the Cell Global ID of the handover target (in case of SAE/LTE to GERAN A/Gb mode handover).

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
CHOICE Target ID	M				-	-
>Target eNB-ID					-	-

>>Global eNB ID	M	9.2.1.37		-	-
>>Selected TAI	M	TAI 9.2.3.16		-	-
>Target RNC-ID				-	-
>>LAI	М	9.2.3.1		-	-
>>RAC	0	9.2.3.2		-	-
>>RNC-ID	М	INTEGER (04095)	If the Extended RNC- ID IE is included in the Target ID IE, the RNC-ID IE shall be ignored.	-	-
>>Extended RNC- ID	0	9.2.1.14	The Extended RNC- ID IE shall be used if the RNC identity has a value larger than 4095.	-	-
>CGI				-	-
>>PLMN Identity	M	9.2.3.8		-	-
>>LAC	М	OCTET STRING (SIZE(2))	0000 and FFFE not allowed.	-	-
>>CI	М	OCTET STRING (SIZE(2))		-	-
>>RAC	0	9.2.3.2		-	-
>Target NG-RAN Node ID				-	-
>>Global RAN Node ID	M	9.2.1.131		-	-
>>Selected TAI	М	5GS TAI 9.2.3.52		-	-

9.2.1.7 Source eNB to Target eNB Transparent Container

The *Source eNB to target eNB Transparent Container* IE is an information element that is produced by the source eNB and is transmitted to the target eNB. For inter-system handovers to E-UTRAN, the IE is transmitted from the external handover source to the target eNB.

This IE is transparent to the EPC.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
RRC Container	М		OCTET STRING	Includes the RRC Handover Preparation Information message as defined in subclause 10.2.2 of TS 36.331 [16].	-	
E-RABs		01		. ,	-	
Information List						
>E-RABs Information Item		1 <maxnoof E-RABs></maxnoof 			EACH	ignore
>>E-RAB ID	М		9.2.1.2		-	
>>DL Forwarding	0		9.2.3.14		-	
>>DAPS Request Information	0		9.2.1.155		YES	ignore
Target Cell ID	M		E-UTRAN CGI 9.2.1.38		-	
Subscriber Profile ID for RAT/Frequency priority	0		9.2.1.39		-	
UE History Information	М		9.2.1.42		-	
Mobility Information	0		BIT STRING (SIZE (32))	Information related to the handover; the external handover source provides it in order to enable later analysis of the conditions that led to a wrong HO.	YES	ignore
UE History Information from the UE	0		OCTET STRING	VisitedCellInfoList contained in the UEInformationResp onse message (TS 36.331 [16])	YES	ignore
IMS voice EPS fallback from 5G	0		ENUMERAT ED (true,)	2 3/	YES	ignore
Additional RRM Policy Index	0		9.2.1.39a		YES	ignore
UE Context Reference at Source	0		9.2.1.144		YES	ignore
Inter-system measurement Configuration	0		9.2.1.151		YES	ignore
Source Node ID	0		9.2.1.152		YES	ignore

Range bound	Explanation		
maxnoofE-RABs	Maximum no. of E-RABs for one UE. Value is 256.		

9.2.1.8 Target eNB to Source eNB Transparent Container

The *Target eNB to Source eNB Transparent Container* IE is an information element that is produced by the target eNB and is transmitted to the source eNB. For inter-system handovers to E-UTRAN, the IE is transmitted from the target eNB to the external relocation source.

This IE is transparent to EPC.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
RRC Container	M		OCTET STRING	Includes the RRC E-UTRA Handover Command message as defined in subclause 10.2.2 of TS 36.331 [16].	-	
DAPS Response Information List		01			YES	reject
>DAPS Response Information Item		1 <maxnoofe -RABs></maxnoofe 			EACH	ignore
>>E-RAB ID	М		9.2.1.2		-	
>>DAPS Response Information	М		9.2.1.156	Indicates the response to a requested DAPS Handover	-	

Range bound	Explanation		
maxnoofE-RABs	Maximum no. of E-RABs for one UE. Value is 256.		

9.2.1.9 Source RNC to Target RNC Transparent Container

This IE is used to transparently pass radio related information between the handover source and the handover target through the EPC. This container is used for inter 3GPP RAT handovers from SAE/LTE to UTRAN.

This IE defined in TS 25.413 [19].

9.2.1.10 Target RNC to Source RNC Transparent Container

This container is used to transparently pass radio related information between the handover target and the handover source through the EPC. This container is used inter 3GPP RAT handovers from SAE/LTE to UTRAN.

This IE defined in TS 25.413 [19].

9.2.1.11 Source BSS to Target BSS Transparent Container

This container is used to transparently pass radio related information between the handover source and the handover target through the EPC. This container is used for inter 3GPP RAT handovers from SAE/LTE to GERAN A/Gb mode.

This IE is defined in TS 48.018 [18].

9.2.1.12 Target BSS to Source BSS Transparent Container

This container is used to transparently pass radio related information between the handover source and the handover target through the EPC. This container is used for inter 3GPP RAT handovers from SAE/LTE to GERAN A/Gb mode.

This IE is defined in TS 48.018 [18].

9.2.1.13 Handover Type

This IE indicates which kind of handover was triggered in the source side.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Handover Type	M		ENUMERATED	
			(IntraLTE,	
			LTEtoUTRAN,	
			LTEtoGERAN,	
			UTRANtoLTE,	
			GERANtoLTE,	
			EPSto5GS,	
			5GStoEPS	
)	

9.2.1.14 Extended RNC-ID

The Extended RNC-ID is used to identify an RNC.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Extended RNC-ID	M		INTEGER	The Extended RNC-ID IE shall
			(409665535)	be used if the RNC identity
				has a value larger than 4095.

9.2.1.15 E-RAB Level QoS Parameters

This IE defines the QoS to be applied to an E-RAB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
E-RAB Level QoS Parameters				
>QCI	M		INTEGER (0255)	QoS Class Identifier defined in TS 23.401 [11]. Coding specified in TS 23.203 [13].
>Allocation and Retention Priority	М		9.2.1.60	
>GBR QoS Information	0		9.2.1.18	This IE applies to GBR bearers only and shall be ignored otherwise.
>Downlink Maximum Packet Loss Rate	0		Packet Loss Rate 9.2.1.130	This IE applies only to bearers with specific QCI (see TS 23.401 [11]) and indicates the maximum rate for lost packets that can be tolerated in the downlink direction as specified in TS 23.401 [11].
>Uplink Maximum Packet Loss Rate	0		Packet Loss Rate 9.2.1.130	This IE applies only to bearers with specific QCI (see TS 23.401 [11]) and indicates the maximum rate for lost packets that can be tolerated in the uplilnk direction as specified in TS 23.401 [11].

9.2.1.16 Paging DRX

This IE indicates the Paging DRX as defined in TS 36.304 [20].

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Paging DRX	М		ENUMERATED(32, 64, 128, 256,)		-	

9.2.1.17 Paging Cause

Void.

9.2.1.18 GBR QoS Information

This IE indicates the maximum and guaranteed bit rates of a GBR bearer for downlink and uplink.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
E-RAB Maximum Bit Rate Downlink	M		Bit Rate 9.2.1.19	Desc.: This IE indicates the maximum downlink E-RAB Bit Rate as specified in TS 23.401 [11] for this bearer. If the Extended E-RAB Maximum Bit Rate Downlink IE is included, the E-RAB Maximum Bit Rate Downlink IE shall be ignored.
E-RAB Maximum Bit Rate Uplink	М		Bit Rate 9.2.1.19	Desc.: This IE indicates the maximum uplink E-RAB Bit Rate as specified in TS 23.401 [11] for this bearer. If the Extended E-RAB Maximum Bit Rate Uplink IE is included, the E-RAB Maximum Bit Rate Uplink IE shall be ignored.
E-RAB Guaranteed Bit Rate Downlink	M		Bit Rate 9.2.1.19	Desc.: This IE indicates the downlink guaranteed E-RAB Bit Rate as specified in TS 23.401 [11] (provided that there is data to deliver) for this bearer. If the Extended E-RAB Guaranteed Bit Rate Downlink IE is included, the E-RAB Guaranteed Bit Rate Downlink IE shall be ignored.
E-RAB Guaranteed Bit Rate Uplink	М		Bit Rate 9.2.1.19	Desc.: This IE indicates the uplink guaranteed E-RAB Bit Rate as specified in TS 23.401 [11] (provided that there is data to deliver) for this bearer. If the Extended E-RAB Guaranteed Bit Rate Uplink IE is included, the E-RAB Guaranteed Bit Rate Uplink IE shall be ignored.
Extended E-RAB Maximum Bit Rate Downlink	0		Extended Bit Rate 9.2.1.126	Desc.: This IE indicates the maximum downlink E-RAB Bit Rate as specified in TS 23.401 [11] for this bearer.
Extended E-RAB Maximum Bit Rate Uplink	0		Extended Bit Rate 9.2.1.126	Desc.: This IE indicates the maximum uplink E-RAB Bit Rate as specified in TS 23.401 [11] for this bearer.
Extended E-RAB Guaranteed Bit Rate Downlink	0		Extended Bit Rate 9.2.1.126	Desc.: This IE indicates the downlink guaranteed E-RAB Bit Rate as specified in TS 23.401 [11] (provided that there is data to deliver) for this bearer.
Extended E-RAB Guaranteed Bit Rate Uplink	0		Extended Bit Rate 9.2.1.126	Desc.: This IE indicates the uplink guaranteed E-RAB Bit Rate as specified in TS 23.401 [11] (provided that there is data to deliver) for this bearer.

9.2.1.19 Bit Rate

This IE indicates the number of bits delivered by E-UTRAN in UL or to E-UTRAN in DL or by UE in sidelink within a period of time, divided by the duration of the period. It is used, for example, to indicate the maximum or guaranteed bit rate for a GBR bearer, or an aggregated maximum bit rate.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Bit Rate			INTEGER (010,000,000,000)	The unit is: bit/s.

9.2.1.20 UE Aggregate Maximum Bit Rate

The UE Aggregate Maximum Bitrate is applicable for all Non-GBR bearers per UE which is defined for the Downlink and the Uplink direction and provided by the MME to the eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
UE Aggregate Maximum Bit Rate				Applicable for non-GBR E-RABs.
>UE Aggregate Maximum Bit Rate Downlink	M		Bit Rate 9.2.1.19	This IE indicates the UE Aggregate Maximum Bit Rate as specified in TS 23.401 [11] in the downlink direction. If the Extended UE Aggregate Maximum Bit Rate Downlink IE is included, the UE Aggregate Maximum Bit Rate Downlink IE shall be ignored.
>UE Aggregate Maximum Bit Rate Uplink	M		Bit Rate 9.2.1.19	This IE indicates the UE Aggregate Maximum Bit Rate as specified in TS 23.401 [11] in the uplink direction. Receiving both the UE Aggregate Maximum Bit Rate Downlink IE and the UE Aggregate Maximum Bit Rate Uplink IE equal to value zero shall be considered as a logical error by the eNB. If the Extended UE Aggregate Maximum Bit Rate Uplink IE is included, the UE Aggregate Maximum Bit Rate Uplink IE shall be ignored.
>Extended UE Aggregate Maximum Bit Rate Downlink	0		Extended Bit Rate 9.2.1.126	This IE indicates the UE Aggregate Maximum Bit Rate as specified in TS 23.401 [11] in the downlink direction.
>Extended UE Aggregate Maximum Bit Rate Uplink	0		Extended Bit Rate 9.2.1.126	This IE indicates the UE Aggregate Maximum Bit Rate as specified in TS 23.401 [11] in the uplink direction.

9.2.1.21 Criticality Diagnostics

The *Criticality Diagnostics* IE is sent by the eNB or the MME when parts of a received message have not been comprehended or were missing, or if the message contained logical errors. When applicable, it contains information about which IEs were not comprehended or were missing.

For further details on how to use the Criticality Diagnostics IE, (see clause 10).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Procedure Code	0		INTEGER (0255)	Procedure Code is to be used if Criticality Diagnostics is part of Error Indication procedure, and not within the response message of the same procedure that caused the error.
Triggering Message	0		ENUMERATED(initi ating message, successful outcome, unsuccessful outcome)	The Triggering Message is used only if the Criticality Diagnostics is part of Error Indication procedure.
Procedure Criticality	0		ENUMERATED(reje ct, ignore, notify)	This Procedure Criticality is used for reporting the Criticality of the Triggering message (Procedure).
Information Element Criticality Diagnostics		0 <maxnoof Errors></maxnoof 		
>IE Criticality	M		ENUMERATED(reje ct, ignore, notify)	The IE Criticality is used for reporting the criticality of the triggering IE. The value 'ignore' shall not be used.
>IE ID	М		INTEGER (065535)	The IE ID of the not understood or missing IE.
>Type of Error	М		ENUMERATED(not understood, missing,)	-

Range bound	Explanation		
maxnoofErrors	Maximum no. of IE errors allowed to be reported with a single		
	message. The value for maxnoofErrors is 256.		

9.2.1.22 Handover Restriction List

This IE defines roaming or access restrictions for subsequent mobility action for which the eNB provides information about the target of the mobility action towards the UE, e.g., handover and CCO, or for SCG selection during dual connectivity operation. If the eNB receives the *Handover Restriction List* IE, it shall overwrite previously received restriction information.

IE/Group Name	Prese nce	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Serving PLMN	M		9.2.3.8			-
Equivalent PLMNs		0 <maxnoofepl MNs></maxnoofepl 		Allowed PLMNs in addition to Serving PLMN. This list corresponds to the list of "equivalent PLMNs" as defined in TS 24.301 [24]. This list is part of the roaming restriction information. Roaming restrictions apply to PLMNs other than the Serving PLMN and Equivalent PLMNs.		
>PLMN Identity	M		9.2.3.8			
Forbidden TAs		0 <maxnoofepl MNsPlusOne></maxnoofepl 		Intra LTE roaming restrictions.		
>PLMN Identity	М		9.2.3.8	The PLMN of forbidden TACs.		
>Forbidden TACs		1 <maxnoofforb TACs></maxnoofforb 				
>>TAC	М	171002	9.2.3.7	The TAC of the forbidden TAI.		
Forbidden LAs		0 <maxnoofepl MNsPlusOne></maxnoofepl 		Inter-3GPP RAT roaming restrictions.		
>PLMN Identity	М		9.2.3.8			
>Forbidden LACs		1 <maxnoofforb LACs></maxnoofforb 				
>>LAC	М		OCTET STRING (SIZE(2))			
Forbidden inter RATs	0		ENUMERAT ED(ALL, GERAN, UTRAN, CDMA2000,, GERAN and UTRAN, CDMA2000 and UTRAN)	Inter-3GPP and 3GPP2 RAT access restrictions. "ALL" means that all RATs mentioned in the enumeration of this IE are restricted.		
NR Restriction in EPS as Secondary RAT	0		ENUMERAT ED(NRrestri ctedinEPSa sSecondary RAT,)	Restriction to use NR when the NR is used as secondary RAT in ENDC.	YES	ignore
Unlicensed Spectrum Restriction	0		ENUMERAT ED(Unlicens edRestricted ,)	Restriction to use unlicensed spectrum in the form of LAA or LWA/LWIP or NR-U as described in TS 23.401 [11].	YES	ignore
Core Network Type Restrictions		0 <maxnoofepl MNsPlusOne></maxnoofepl 		Includes any of the Serving PLMN or any PLMN of the Equivalent PLMNs listed in the Mobility Restriction List IE for which Core network type restriction applies as specified in TS 23.501 [46].		
>PLMN Identity	M		9.2.3.8			

>Core Network Type	M	ENUMERAT ED(5GCFor bidden, ,EPCForbi dden)	is restricted to connect to 5GC or to EPC for this		
NR Restriction in 5GS	0	ENUMERAT ED(NRrestri ctedin5GS,)	Restriction to use NR when the NR connects to 5GS.	YES	ignore
Last NG-RAN PLMN Identity	0	9.2.3.8	Indicates the NG-RAN PLMN ID from where the UE formerly handed over to EPS and which is preferred in case of subsequent mobility to 5GS.	YES	ignore

Range bound	Explanation
maxnoofEPLMNs	Maximum no. of equivalent PLMN lds. Value is 15.
maxnoofEPLMNsPlusOne	Maximum no. of equivalent PLMN lds plus one. Value is 16.
maxnoofForbTACs	Maximum no. of forbidden Tracking Area Codes. Value is 4096.
maxnoofForbLACs	Maximum no. of forbidden Location Area Codes. Value is 4096.

9.2.1.23 CDMA2000-PDU

This information element contains a CDMA2000 message between the UE and CDMA2000 RAT that is transferred without interpretation in the eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CDMA2000-PDU	М		OCTET STRING	

9.2.1.24 CDMA2000 RAT Type

In the uplink, this information element, along with the *CDMA2000 Sector ID* IE is used for routing the tunnelled CDMA2000 message to the proper destination node in the CDMA2000 RAT and is set by the eNB to the CDMA2000 RAT type received from the UE.

NOTE: In the downlink, this information element is used by the eNB to provide an indication of the RAT Type associated with the tunnelled CDMA2000 message to the UE to help it route the tunnelled downlink CDMA2000 message to the appropriate CDMA upper layer.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CDMA2000 RAT Type	М		ENUMERATED (HRPD, 1xRTT,)	This IE is used to identify which CDMA2000 RAT the tunnelled CDMA2000 signalling is associated with. The source of this information in the uplink is the UE and in the downlink it is the CDMA2000 system.

9.2.1.25 CDMA2000 Sector ID

This information element, along with the *RAT Type* IE is used for routing the tunnelled CDMA2000 message to the proper destination node in the CDMA2000 RAT.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CDMA2000 Sector ID	М		OCTET STRING	This IE is set to CDMA2000 Reference Cell ID corresponding to the HRPD/1xRTT sector under the HRPD AN/1xBS towards which the signalling is performed. The CDMA2000 Reference Cell ID is statically configured in the eNB. If the RAT type is HRPD, this IE contains the HRPD Sector ID as specified in 3GPP2 C.S0024-B [27]. If the RAT type is 1x RTT, this IE is encoded as the Reference Cell ID IE in 3GPP2 A.S0008-C [25].

9.2.1.26 Security Context

The purpose of the *Security Context* IE is to provide security related parameters to the eNB which are used to derive security keys for user plane traffic and RRC signalling messages and for security parameter generation for subsequent X2 or intra eNB Handovers, or for the security parameters for the current S1 Handover. For intra LTE S1 Handover one pair of {NCC, NH} is provided for 1-hop security, see TS 33.401 [15].

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Next Hop Chaining Count	M		INTEGER (07)	Next Hop Chaining Counter (NCC) defined in TS 33.401 [15]. For handover from 5GS to EPS, Next Hop Chaining Count IE = "2" as defined in TS 33.501 [48]. For other inter-RAT Handover into LTE the Next Hop Chaining Count IE takes the value defined for NCC at initial setup, i.e., Next Hop Chaining Count IE = "0".
Next-Hop NH	M		9.2.1.41 Security Key	The NH together with the NCC is used to derive the security configuration as defined in TS 33.401 [15]. For inter RAT Handover the Next-Hop NH IE is the KeNB to be used in the new configuration

9.2.1.27 UE Radio Capability

This IE contains UE Radio Capability information.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
UE Radio Capability	M		OCTET STRING	Includes either the UERadioAccessCapabilityInf ormation message as defined in 10.2.2 of TS 36.331 [16], or the UERadioAccessCapabilityInf ormation-NB message as defined in 10.6.2 of TS 36.331 [16].

9.2.1.28 CDMA2000 HO Status

This IE is used to indicate to the eNB which initiated an inter-RAT HO towards CDMA2000 about the outcome of the handover preparation to CDMA2000.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CDMA2000 HO Status	M		ENUMERATED (HO Success, HO Failure,)	This IE indicates the status of the handover resource allocation in the CDMA2000 RAT.

9.2.1.29 CDMA2000 HO Required Indication

This information element is set by the eNB to provide an indication about whether the UE has initiated the handover preparation with the CDMA2000 RAT.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CDMA2000 HO Required Indication	М		ENUMERATED (true,)	This IE indicates to MME that handover preparation to CDMA2000 has been started. It helps MME to decide when to send certain handover preparation information for HRPD (TS 23.402 [8]) and 1xRTT (TS 23.216 [9]) to the CDMA2000 RAT.

9.2.1.30 1xRTT MEID

Void.

9.2.1.31 eNB Status Transfer Transparent Container

The *eNB Status Transfer Transparent Container* IE is an information element that is produced by the source eNB and is transmitted to the target eNB. This IE is used for the intra SAE/LTE S1 handover case.

This IE is transparent to the EPC.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
E-RABs Subject to Status Transfer List		1			-	-
>E-RABs Subject to Status Transfer Item		1 <maxnoof e-<br="">RABs></maxnoof>			EACH	ignore
>>E-RAB ID	М		9.2.1.2		-	-
>>UL COUNT value	M		COUNT Value 9.2.1.32	PDCP-SN and HFN of first missing UL PDCP SDU in case of 12 bit long PDCP-SN.	-	-
>>DL COUNT value	М		COUNT Value 9.2.1.32	PDCP-SN and HFN that the target eNB should assign for the next DL SDU not having an SN yet in case of 12 bit long PDCP-SN.	-	-
>>Receive Status Of UL PDCP SDUs	0		BIT STRING (SIZE(4096))	PDCP Sequence Number = (First Missing SDU Number + bit position) modulo 4096. 0: PDCP SDU has not been received. 1: PDCP SDU has been received correctly.		
>>UL COUNT Value Extended	0		COUNT Value Extended 9.2.1.90	PDCP-SN and HFN of first missing UL PDCP SDU in case of 15 bit long PDCP-SN.	YES	ignore
>>DL COUNT Value Extended	0		COUNT Value Extended 9.2.1.90	PDCP-SN and HFN that the target eNB should assign for the next DL SDU not having an SN yet in case of 15 bit long PDCP-SN.	YES	ignore
>>Receive Status Of UL PDCP SDUs Extended	O		BIT STRING (SIZE(116384))	PDCP-SN in this release. The first bit indicates the status of the SDU after the First Missing UL PDCP SDU. The N th bit indicates the status of the UL PDCP SDU in position (N + First Missing SDU Number) modulo (1 + the maximum value of the PDCP-SN). 0: PDCP SDU has not been received. 1: PDCP SDU has been received correctly.	YES	ignore
>>UL COUNT Value for PDCP SN Length 18	0		COUNT Value for PDCP SN Length 18 9.2.1.100	PDCP-SN and HFN of first missing UL PDCP SDU in case of 18 bit long PDCP-SN.	YES	ignore

>>DL COUNT Value for PDCP SN Length 18	0	COUNT Value for PDCP SN Length 18 9.2.1.100	PDCP-SN and HFN that the target eNB should assign for the next DL SDU not having an SN yet in case of 18 bit long PDCP-SN.	YES	ignore
>>Receive Status Of UL PDCP SDUs for PDCP SN Length 18	0	BIT STRING (SIZE(113107 2))	The IE is used in case of 18 bit long PDCP-SN. The first bit indicates the status of the SDU after the First Missing UL PDCP SDU. The Nth bit indicates the status of the UL PDCP SDU in position (N + First Missing SDU Number) modulo (1 + the maximum value of the PDCP-SN). 0: PDCP SDU has not been received. 1: PDCP SDU has been received correctly.	YES	ignore

Range bound	Explanation		
maxnoofE-RABs	Maximum no. of E-RABs for one UE. Value is 256.		

9.2.1.32 COUNT Value

This IE contains a PDCP sequence number and a hyper frame number in case of 12 bit long PDCP-SN.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
PDCP-SN	М		INTEGER (04095)		-	-
HFN	М		INTEGER (01048575)		-	-

9.2.1.33 CDMA2000 1xRTT RAND

This information element is a random number generated by the eNB and tunnelled to the 1xCS IWS (TS 23.402 [8]) and is transparent to MME.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CDMA2000 1xRTT RAND	М		OCTET STRING	This IE is a Random Challenge that is used for authentication of UE during 1xCS registration, eCSFB to 1xRTT or handover from E-UTRAN to CDMA2000 1xRTT RAT.
				This IE is coded as the RAND (32bits) of the Authentication Challenge Parameter (RAND) in 3GPP2 A.S0008-C [25].

9.2.1.34 Request Type

The purpose of the *Request Type* IE is to indicate the type of location request to be handled by the eNB.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
Request Type						
>Event Type	М		ENUMERATED(Direct, Change of service cell, Stop Change of service cell,)			
>Report Area	M		ENUMERATED (ECGI,)			
>Additional Location Information	0		ENUMERATED (Include PSCell,)		YES	ignore

9.2.1.35 CDMA2000 1xRTT SRVCC Info

This IE defines SRVCC related information elements that are assembled by the MME to be tunnelled transparently to the 1xCS IWS (TS 23.402 [8]) system.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CDMA2000 1xRTT SRVCC Info				
>CDMA2000 1xRTT MEID	М		OCTET STRING	This information element is the Mobile Equipment Identifier or Hardware ID that is tunnelled from the UE and is transparent to the eNB. This IE is used to derive a MEID-based PLCM that is used for channelization in CDMA2000 1xRTT network.
>CDMA2000 1xRTT Mobile Subscription Information	М		OCTET STRING	This IE provides the list of UE supported 1x RTT Band classes and Band Subclasses. It is provided by the UE to the eNB as part of the UE capability. It is transparent to the eNB.
>CDMA2000 1xRTT Pilot List	M		OCTET STRING	This IE provides the measured pilot information. Encoded as the <i>Pilot List</i> IE from the A21-1x air interface signalling message in 3GPP2 A.S0008-C [25].

9.2.1.36 E-RAB List

This IE contains a list of E-RAB IDs with a cause value. It is used for example to indicate failed bearers or bearers to be released.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
E-RAB List Item		1 <maxnoofe- RABs></maxnoofe- 			EACH	ignore
>E-RAB ID	M		9.2.1.2		-	-
>Cause	M		9.2.1.3		-	-

Range bound	Explanation
maxnoofE-RABs	Maximum no. of E-RAB allowed towards one UE, the maximum
	value is 256.

9.2.1.37 Global eNB ID

This information element is used to globally identify an eNB (see TS 36.401 [2]).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		9.2.3.8	
CHOICE eNB ID	М			
>Macro eNB ID				
>>Macro eNB ID	M		BIT STRING (SIZE(20))	Equal to the 20 leftmost bits of the <i>Cell Identity</i> IE contained in the <i>E-UTRAN CGI</i> IE (see subclause 9.2.1.38) of each cell served by the eNB.
>Home eNB ID				
>>Home eNB ID	M		BIT STRING (SIZE(28))	Equal to the <i>Cell Identity</i> IE contained in the <i>E-UTRAN CGI</i> IE (see subclause 9.2.1.38) of the cell served by the eNB.
>Short Macro eNB ID				
>> Short Macro eNB ID	M		BIT STRING (SIZE(18))	Equal to the 18 leftmost bits of the <i>Cell Identity</i> IE (see subclause 9.2.1.38) of each cell served by the eNB.
>Long Macro eNB ID				
>> Long Macro eNB ID	M		BIT STRING (SIZE(21))	Equal to the 21 leftmost bits of the <i>Cell Identity</i> IE (see subclause 9.2.1.38) of each cell served by the eNB.

9.2.1.37a Global en-gNB ID

This information element is used to globally identify an en-gNB (see TS 36.401 [2]).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		9.2.3.8	
en-gNB ID	M		BIT STRING	
			(SIZE(2232))	

9.2.1.38 E-UTRAN CGI

This information element is used to globally identify a cell (see TS 36.401 [2]).

IE/Group Name	Presence	Range	IE type and	Semantics description
			reference	
PLMN Identity	M		9.2.3.8	
Cell Identity	M		BIT STRING (SIZE(28))	The leftmost bits of the Cell Identity correspond to the eNB ID (defined in subclause 9.2.1.37).

9.2.1.39 Subscriber Profile ID for RAT/Frequency priority

The *Subscriber Profile ID* IE for RAT/Frequency Selection Priority is used to define camp priorities in Idle mode and to control inter-RAT/inter-frequency handover in Active mode TS 36.300 [14].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Subscriber Profile ID for RAT/Frequency Priority	М		INTEGER (1256)	

9.2.1.39a Additional RRM Policy Index

The *Additional RRM Policy Index* IE is used to provide additional information independent from the Subscriber Profile ID for RAT/Frequency priority as specified in TS 36.300 [14].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Additional RRM Policy Index	M		BIT STRING (32)	

9.2.1.40 UE Security Capabilities

The UE Security Capabilities IE defines the supported algorithms for encryption and integrity protection in the UE.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
UE Security Capabilities				
>Encryption Algorithms	M		BIT STRING (SIZE(16,))	Each position in the bitmap represents an encryption algorithm: "all bits equal to 0" – UE supports no other algorithm than EEA0, "first bit" – 128-EEA1, "second bit" – 128-EEA2, "third bit" – 128-EEA3, other bits reserved for future use. Value '1' indicates support and value '0' indicates no support of the algorithm. Algorithms are defined in TS 33.401 [15].
>Integrity Protection Algorithms	M		BIT STRING (SIZE(16,))	Each position in the bitmap represents an integrity protection algorithm: "all bits equal to 0" – UE supports no other algorithm than EIAO, "first bit" – 128-EIA1, "second bit" – 128-EIA2, "third bit" – 128-EIA3, other bits reserved for future use. Value '1' indicates support and value '0' indicates no support of the algorithm. Algorithms are defined in TS 33.401 [15].

9.2.1.41 Security Key

The Security Key IE is used to apply security in the eNB for different scenarios as defined in TS 33.401 [15].

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Security Key	М		BIT STRING (SIZE(256))	Key material for KeNB or Next Hop Key as defined in TS 33.401 [15]

9.2.1.42 UE History Information

The *UE History Information* IE contains information about cells that a UE has been served by in active state prior to the target cell.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Last Visited Cell List		1 <maxnoofcellsin UEHistoryInfo></maxnoofcellsin 		Most recent information is added to the top of this list.	-	-
>Last Visited Cell Information	М		9.2.1.43		-	-

Range bound	Explanation
maxnoOfCellsinUEHistoryInfo	Maximum length of the list. Value is 16.

9.2.1.43 Last Visited Cell Information

The Last Visited Cell Information may contain cell specific information.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
CHOICE Last Visited Cell Information	M				-	-
>E-UTRAN Cell						
>>Last Visited E-UTRAN Cell Information	М		9.2.1.43a		-	-
>UTRAN Cell						
>>Last Visited UTRAN Cell Information	M		OCTET STRING	Defined in TS 25.413 [19].	-	-
>GERAN Cell						
>>Last Visited GERAN Cell Information	М		9.2.1.43b		-	-
>NG-RAN Cell					-	-
>>Last Visited NG-RAN Cell Information	M		OCTET STRING	Defined in TS 38.413 [44] (see subclause 9.3.1.97).		

9.2.1.43a Last Visited E-UTRAN Cell Information

The Last Visited E-UTRAN Cell Information contains information about a cell that is to be used for RRM purposes.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Global Cell ID	M		E-UTRAN CGI 9.2.1.38		-	
Cell Type	M		9.2.1.66		-	
Time UE stayed in Cell	M		INTEGER (04095)	The duration of the time the UE stayed in the cell in seconds. If the UE stays in a cell more than 4095s, this IE is set to 4095.	-	
Time UE stayed in Cell Enhanced Granularity	0		INTEGER (040950)	The duration of the time the UE stayed in the cell in 1/10 seconds. If the UE stays in a cell more than 4095s, this IE is set to 40950.	YES	ignore
HO Cause Value	0		9.2.1.3	The cause for the handover from the E-UTRAN cell.	YES	ignore

9.2.1.43b Last Visited GERAN Cell Information

The Last Visited Cell Information for GERAN is currently undefined.

NOTE: If in later Releases this is defined, the choice type may be extended with the actual GERAN specific information.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
CHOICE Last Visited GERAN Cell Information	М				-	
>Undefined	М		NULL		-	

9.2.1.44 Message Identifier

The purpose of the *Message Identifier* IE is to identify the warning message. Message Identifier IE is set by the EPC and transferred to the UE by the eNB

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Message Identifier	M		BIT STRING (SIZE(16))	This IE is set by the EPC, transferred to the UE by the eNB. The eNB shall treat it
				as an identifier of the message.

9.2.1.45 Serial Number

The *Serial Number* IE identifies a particular message from the source and type indicated by the Message Identifier and is altered every time the message with a given Message Identifier is changed.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Serial Number	M		BIT STRING (SIZE(16))	

9.2.1.46 Warning Area List

The Warning Area List IE indicates the areas where the warning message needs to be broadcast or cancelled.

IE/Group Name	Presence	Range	IE Type and	Semantics
			Reference	Description
CHOICE Warning Area	M			
>Cell ID List		1 <maxnoofceliid></maxnoofceliid>		
>>E-CGI	M		9.2.1.38	
>TAI List for Warning		1 <maxnooftaiforwarning></maxnooftaiforwarning>		
>>TAI	M		9.2.3.16	
>Emergency Area ID List		1		
		<maxnoofemergencyareaid></maxnoofemergencyareaid>		
>>Emergency Area ID	M		9.2.1.47	

Range bound	Explanation
maxnoofCellID	Maximum no. of Cell ID subject for warning message broadcast.
	Value is 65535.
maxnoofTAlforWarning	Maximum no. of TAI subject for warning message broadcast. Value
	is 65535.
maxnoofEmergencyAreaID	Maximum no. of Emergency Area ID subject for warning message
- ,	broadcast. Value is 65535.

9.2.1.47 Emergency Area ID

The Emergency Area ID IE is used to indicate the area which has the emergency impact.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Emergency Area ID	M		OCTET STRING (SIZE(3))	Emergency Area ID may consist of several cells. Emergency Area ID is defined by the operator.

9.2.1.48 Repetition Period

The Repetition Period IE indicates the periodicity of the warning message to be broadcast.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Repetition Period	M		INTEGER (04095)	The unit of value 1 to 4095 is [second].

9.2.1.49 Number of Broadcasts Requested

The Number of Broadcast Requested IE indicates the number of times a message is to be broadcast.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Number of Broadcasts Requested	M		INTEGER (065535)	

9.2.1.50 Warning Type

The *Warning Type* IE indicates types of the disaster. This IE also indicates that a Primary Notification is included. This IE can be used by the UE to differentiate the type of alert according to the type of disaster.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Warning Type	M		OCTET STRING (SIZE(2))	

9.2.1.51 Warning Security Information

The Warning Security Information IE provides the security information needed for securing the Primary Notification.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Warning Security Information	M		OCTET STRING(SIZE(50))	

9.2.1.52 Data Coding Scheme

The *Data Coding Scheme* IE identifies the alphabet or coding employed for the message characters and message handling at the UE (it is passed transparently from the EPC to the UE).

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Data Coding Scheme	M		BIT STRING (SIZE(8))	

9.2.1.53 Warning Message Contents

The Warning Message Content IE contains user information, e.g., the message with warning contents, and will be broadcast over the radio interface.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Warning Message Contents	M		OCTET STRING (SIZE(19600))	The length of this IE varies between 1 to 9600 bytes.

9.2.1.54 Broadcast Completed Area List

The *Broadcast Completed Area List* IE indicates the areas where either resources are available to perform the broadcast or where broadcast is performed successfully.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE Broadcast Completed Area	М			
>Broadcast Completed Area				
>>Cell ID Broadcast		1 <maxnoofcellid></maxnoofcellid>		
>>>E-CGI	M		9.2.1.38	
>TAI Broadcast				
>>TAI Broadcast		1 <maxnooftalforwarning></maxnooftalforwarning>		
>>>TAI	M		9.2.3.16	
>>>Completed Cell in TAI List		1 <maxnoofcellintai></maxnoofcellintai>		
>>>E-CGI	M			
>Emergency Area ID				
>>Emergency Area ID Broadcast		1 <maxnoofemergencyareaid ></maxnoofemergencyareaid 		
>>>Emergency Area ID	M		9.2.1.47	
>>>Completed Cell in Emergency Area ID List		1 <maxnoofcellineai></maxnoofcellineai>		
>>>E-CGI	M			

Range bound	Explanation
maxnoofCellID	Maximum no. of Cell ID subject for warning message broadcast. Value is 65535.
maxnoofTAlforWarning	Maximum no. of TAI subject for warning message broadcast. Value is 65535.
maxnoofEmergencyAreaID	Maximum no. of Emergency Area ID subject for warning message broadcast. Value is 65535.
maxnoofCellinTAI	Maximum no. of Cell ID within a TAI. Value is 65535.
maxnoofCellinEAI	Maximum no. of Cell ID within an Emergency Area. Value is 65535.

9.2.1.55 Inter-system Information Transfer Type

The Inter-system Information Type IE indicates the type of information that the eNB requests to transfer.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE Inter-system Information Transfer Type	М			
>RIM				
>>RIM Transfer	M		9.2.3.23	

9.2.1.56 Source To Target Transparent Container

The *Source to Target Transparent Container* IE is an information element that is used to transparently pass radio related information from the handover source to the handover target through the EPC; it is produced by the source RAN node and is transmitted to the target RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Source to Target Transparent Container	M		OCTET STRING	This IE includes a transparent container from the source RAN node to the target RAN node. The octets of the OCTET STRING are encoded according to the specifications of the target system. Note: in the current version of the specification, this IE may either carry the Source eNB to Target eNB Transparent Container IE or the Source RNC to Target RNC Transparent Container IE as defined in TS 25.413 [19] or the Source BSS to Target BSS Transparent Container Contents of the Source BSS to Target BSS Transparent Container Container IE as defined in TS 48.018 [18] or the Old BSS to New BSS information elements field of the Old BSS to New BSS information IE as defined in TS 48.008 [23], or the Source NG-RAN Node to Target NG-RAN Node Transparent Container IE as defined in TS 38.413 [44].

9.2.1.57 Target To Source Transparent Container

The *Target to Source Transparent Container* IE is an information element that is used to transparently pass radio related information from the handover target to the handover source through the EPC; it is produced by the target RAN node and is transmitted to the source RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Target to Source Transparent Container	M		OCTET STRING	This IE includes a transparent container from the target RAN node to the source RAN node. The octets of the OCTET STRING are coded according to the specifications of the target system. Note: in the current version of the specification, this IE may either carry the Target eNB to Source eNB Transparent Container IE, or the Target RNC to Source RNC Transparent Container IE as defined in TS 25.413 [19] or the Target BSS to Source BSS Transparent Container Contents of the Target BSS to Source BSS Transparent Container IE as defined in TS 48.018 [18] or the Layer 3 Information field of the Layer 3 Information IE as defined in TS 48.008 [23], or the Target NG-RAN Node to Source NG-RAN Node Transparent Container IE as defined in TS 38.413 [44].

9.2.1.58 SRVCC Operation Possible

This element indicates that both UE and MME are SRVCC-capable. E-UTRAN behaviour on receipt of this IE is specified in TS 23.216 [9].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
SRVCC operation possible	М		ENUMERATED	
, ,			(Possible,)	

9.2.1.59 SRVCC HO Indication

This information element is set by the source eNB to provide an indication that E-RAB may be subjected to handover via SRVCC means.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
SRVCC HO Indication	M		ENUMERATED (PS and CS, CS only,)	

9.2.1.60 Allocation and Retention Priority

This IE specifies the relative importance compared to other E-RABs for allocation and retention of the E-UTRAN Radio Access Bearer.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Allocation/Retention Priority				
>Priority Level	М		INTEGER (015)	Desc.: This IE should be understood as "priority of allocation and retention" (see TS 23.401 [11]). Usage: Value 15 means "no priority". Values between 1 and 14 are ordered in decreasing order of priority, i.e., 1 is the highest and 14 the lowest. Value 0 shall be treated as a logical error if received.
>Pre-emption Capability	M		ENUMERATED(shall not trigger pre-emption, may trigger pre- emption)	Desc.: This IE indicates the preemption capability of the request on other E-RABs Usage: The E-RAB shall not pre-empt other E-RABs or, the E-RAB may pre-empt other E-RABs The Pre-emption Capability indicator applies to the allocation of resources for an E-RAB and as such it provides the trigger to the pre-emption procedures/processes of the eNB.
>Pre-emption Vulnerability	M		ENUMERATED(not pre- emptable, pre- emptable)	Desc.: This IE indicates the vulnerability of the E-RAB to preemption of other E-RABs. Usage: The E-RAB shall not be pre-empted by other E-RABs or the E-RAB may be pre-empted by other RABs. Pre-emption Vulnerability indicator applies for the entire duration of the E-RAB, unless modified and as such indicates whether the E-RAB is a target of the pre-emption procedures/processes of the eNB.

9.2.1.61 Time to wait

This IE defines the minimum allowed waiting times.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Time to wait	М		ENUMERATED(1s, 2s, 5s, 10s, 20s, 60s)	

9.2.1.62 CSG ld

This information element indicates the identifier of the Closed Subscriber Group, as defined in TS 23.003 [21].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CSG Id	М		BIT STRING (SIZE (27))	

9.2.1.63 CSG Id List

Void.

9.2.1.64 MS Classmark 2

The coding of this element is described in TS 48.008 [23].

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
MS Classmark 2	М		OCTET STRING	Coded as the value part of the
				Classmark Information Type 2 IE defined in TS 48.008 [23].

9.2.1.65 MS Classmark 3

The coding of this element is described in TS 48.008 [23].

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
MS Classmark 3	M		OCTET STRING	Coded as the value part of the Classmark Information Type 3 IE defined in TS 48.008 [23].

9.2.1.66 Cell Type

The cell type provides the cell coverage area.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Cell Size	M		ENUMERATED		-	
			(verysmall, small,			
			medium, large,)			

9.2.1.67 Old BSS to New BSS Information

This container is used to transparently pass radio related information between the handover source and the handover target through the EPC. This container is used for inter 3GPP RAT handovers from SAE/LTE to GERAN A/Gb mode.

This IE is defined in TS 48.008 [23].

9.2.1.68 Layer 3 Information

This container is used to transparently pass radio related information between the handover target and the handover source through the EPC. This container is used for inter 3GPP RAT handovers from SAE/LTE to GERAN A/Gb mode.

This IE is defined in TS 48.008 [23].

9.2.1.69 E-UTRAN Round Trip Delay Estimation Info

This IE contains the information to assist target HRPD access with the acquisition of the UE.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
E-UTRAN Round Trip Delay Estimation Info	M		INTEGER (02047)	Includes the Round Trip Delay between the eNB and the UE. The unit is $16T_s$ (see subclause 4.2.3 in TS 36.213 [26]).

9.2.1.70 Broadcast Cancelled Area List

The Broadcast Cancelled Area List IE indicates the areas where broadcast was stopped successfully.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE Broadcast Cancelled	М			
Area				
>CID Cancelled				
>>Cell ID Cancelled		1 <maxnoofcellid></maxnoofcellid>		
>>>E-CGI	M		9.2.1.38	
>>>Number of Broadcasts	M		9.2.1.71	
>TAI Cancelled				
>>TAI Cancelled		1 <maxnooftalforwarning></maxnooftalforwarning>		
>>>TAI	M		9.2.3.16	
>>>Cancelled Cell in TAI		1 <maxnoofcellintai></maxnoofcellintai>		
List				
>>>E-CGI	M			
>>>>Number of	M		9.2.1.71	
Broadcasts				
>Emergency Area Cancelled				
>>Emergency Area ID		1		
Cancelled		<maxnoofemergencyareaid></maxnoofemergencyareaid>		
>>>Emergency Area ID	M		9.2.1.47	
>>>Cancelled Cell in		1 <maxnoofcellineai></maxnoofcellineai>		
Emergency Area ID List				
>>>E-CGI	M			
>>>Number of	M		9.2.1.71	
Broadcasts				

Range bound	Explanation
maxnoofCellID	Maximum no. of Cell ID subject for warning message broadcast. Value is 65535.
maxnoofTAlforWarning	Maximum no. of TAI subject for warning message broadcast. Value is 65535.
maxnoofEmergencyAreaID	Maximum no. of Emergency Area ID subject for warning message broadcast. Value is 65535.
maxnoofCellinTAI	Maximum no. of Cell ID within a TAI. Value is 65535.
maxnoofCellinEAI	Maximum no. of Cell ID within an Emergency Area. Value is 65535.

9.2.1.71 Number of Broadcasts

The *Number of Broadcasts* IE indicates the number of times that a particular message has been broadcast in a given warning area.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Number of Broadcasts	М		INTEGER(065535)	This IE is set to '0' if valid
				results are not known or
				not available. It is set to
				65535 if the counter
				results have overflown.

9.2.1.72 Concurrent Warning Message Indicator

The *Concurrent Warning Message Indicator* IE indicates to eNB that the received warning message is a new message to be scheduled for concurrent broadcast with any other ongoing broadcast of warning messages.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Concurrent Warning	М		ENUMERATED(true)	This IE is used to identify a
Message Indicator				PWS type warning system
				which allows the broadcast of
				multiple concurrent warning
				messages over the radio.

9.2.1.73 CSG Membership Status

This element indicates the membership status of the UE to a particular CSG.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CSG Membership Status	М		ENUMERATED (member, not-member)	

9.2.1.74 Cell Access Mode

This element indicates the access mode of the cell accessed by the UE.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Cell Access Mode	M		ENUMERATED (hybrid,)	

9.2.1.75 Extended Repetition Period

The Extended Repetition Period IE indicates the periodicity of the warning message to be broadcast.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Extended Repetition Period	M		INTEGER (40962 ¹⁷ -1)	The Extended Repetition
				Period IE is used if the
				Repetition Period has a
				value larger than 4095.
				Unit [second].

9.2.1.76 Data Forwarding Not Possible

This information element indicates that the MME decided that the corresponding E-RAB bearer will not be subject to data forwarding.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Data Forwarding Not	М		ENUMERATED (Data	
Possible			forwarding not possible,)	

9.2.1.77 PS Service Not Available

This IE indicates that the UE is not available for the PS service in the target cell in case of SRVCC to GERAN.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PS Service Not Available	M		ENUMERATED (PS	
			service not Available,)	

9.2.1.78 Paging Priority

This element indicates the paging priority for paging a UE.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Paging Priority	M		ENUMERATED (PrioLevel1,	Lower value codepoint
			PrioLevel2, PrioLevel3, PrioLevel4,	indicates higher priority.
			PrioLevel5, PrioLevel6, PrioLevel7,	
			PrioLevel8,)	

9.2.1.79 Relay Node Indicator

This element indicates a relay node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Relay Node Indicator	M		ENUMERATED	
-			(true,)	

9.2.1.80 Correlation ID

This information element is the GTP Tunnel Endpoint Identifier or GRE key to be used for the user plane transport between eNB and the L-GW described in TS 23.401 [11].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Correlation ID	M		OCTET STRING	
			(SIZE(4))	

9.2.1.81 MDT Configuration

The IE defines the MDT configuration parameters.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigne Criticalit
MDT Activation	M		ENUMERATED(Imm ediate MDT only, Logged MDT only, Immediate MDT and Trace,, Logged MBSFN MDT)		-	-
CHOICE Area Scope of MDT	М				-	-
>Cell based						-
>>Cell ID List for MDT		1 <maxno ofCellID forMDT ></maxno 				-
>>>E-CGI	M		9.2.1.38		-	-
>TA based						-
>>TA List for MDT		1 <maxno ofTAfor MDT></maxno 				-
>>>TAC	M		9.2.3.7	The TAI is derived using the current serving PLMN.	-	-
>PLMN Wide			NULL		-	-
>TAI based					-	-
>>TAI List for MDT		1 <maxno ofTAfor MDT></maxno 			-	-
>>>TAI	М		9.2.3.16		-	-
CHOICE MDT Mode	M				-	-
>Immediate MDT						-
>>Measurements to Activate	M		BITSTRING (SIZE(8))	Each position in the bitmap indicates a MDT measurement, as defined in TS 37.320 [31]. First Bit = M1, Second Bit= M2, Third Bit = M3, Fourth Bit = M4, Fifth Bit = M5, Sixth Bit = logging of M1 from event triggered measurement reports according to existing RRM configuration, Seventh Bit = M6, Eighth Bit = M7. Value "1" indicates "activate" and value "0" indicates "do not activate".	-	-
>>M1 Reporting Trigger	M		ENUMERATED (periodic, A2event- triggered,, A2event-triggered periodic)	This IE shall be ignored if the <i>Measurements to Activate</i> IE has the first bit set to "0".	-	-
>>M1 Threshold Event A2	C- ifM1A2trig ger			Included in case of event-triggered or event-triggered periodic reporting for measurement M1.	-	-
>>>CHOICE Threshold	M				-	-
>>>RSRP						-

>>>>Threshold RSRP	M	INTEGER (097)	This IE is defined in TS 36.331 [16].	-	-
>>>>RSRQ >>>>>Threshold RSRQ	M	INTEGER (034)	This IE is defined in TS 36.331 [16].	-	-
>>M1 Periodic reporting	C- ifperiodic MDT		Included in case of periodic or event-triggered periodic reporting for measurement M1.	-	-
>>>Report interval	M	ENUMERATED (ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240, min1, min6, min12, min30, min60)	This IE is defined in TS 36.331 [16].	-	-
>>>Report amount	M	ENUMERATED (1, 2, 4, 8, 16, 32, 64, infinity)	Number of reports.	-	-
>>M3 Configuration	C-ifM3	9.2.1.86		YES	ignore
>>M4 Configuration	C-ifM4	9.2.1.87		YES	ignore
>>M5 Configuration	C-ifM5	9.2.1.88		YES	ignore
>>MDT Location Information	0	BITSTRING(SIZE(8))	Each position in the bitmap represents requested location information as defined in TS 37.320 [31]. First Bit = GNSS Second Bit = E-CID information. Other bits are reserved for future use and are ignored if received. Value "1" indicates "activate" and value "0" indicates "do not activate". The eNB shall ignore the first bit unless the Measurements to Activate IE has the first bit or the sixth bit set to "1".	YES	ignore
>>M6 Configuration	C-ifM6	9.2.1.101		YES	ignore
>>M7 Configuration	C-ifM7	9.2.1.102		YES	ignore
>>Bluetooth Measurement Configuration	O	9.2.1.137		YES	Ignore
>>WLAN Measurement Configuration	0	9.2.1.138		YES	Ignore
>Logged MDT >>Logging interval	M	ENUMERATED (1.28, 2.56, 5.12, 10.24, 20.48, 30.72, 40.96 and 61.44)	This IE is defined in TS 36.331 [16]. Unit: [second].	-	-
>>Logging duration	M	ENUMERATED (10, 20, 40, 60, 90 and 120)	This IE is defined in TS 36.331 [16]. Unit: [minute].	-	-
>>Bluetooth Measurement Configuration	0	9.2.1.137		YES	Ignore
>>WLAN Measurement Configuration	0	9.2.1.138		YES	Ignore
>Logged MBSFN MDT				YES	ignore

>>Logging interval	M	ENUMERATED	This IE is defined in TS	-	-
		(1.28, 2.56, 5.12,	36.331 [16]. Unit:		
		10.24, 20.48, 30.72,	[second].		
		40.96 and 61.44)			
>>Logging duration	M	ENUMERATED (10,	This IE is defined in TS	-	-
		20, 40, 60, 90 and	36.331 [16]. Unit:		
		120)	[minute].		
>>MBSFN-ResultToLog	0	MBSFN-ResultToLog		-	-
_		9.2.1.94			
Signalling based MDT	0	MDT PLMN List		YES	ignore
PLMN List		9.2.1.89			

Range bound	Explanation
maxnoofCellIDforMDT	Maximum no. of Cell ID subject for MDT scope. Value is 32.
maxnoofTAforMDT	Maximum no. of TA subject for MDT scope. Value is 8.

Condition	Explanation
ifM1A2trigger	This IE shall be present if the Measurements to Activate IE has the first
	bit set to "1" and the M1 Reporting Trigger IE is set to "A2event-
	triggered" or to "A2event-triggered periodic".
ifperiodicMDT	This IE shall be present if the M1 Reporting Trigger IE is set to
	"periodic", or to "A2event-triggered periodic".
ifM3	This IE shall be present if the Measurements to Activate IE has the third
	bit set to "1".
ifM4	This IE shall be present if the Measurements to Activate IE has the
	fourth bit set to "1".
ifM5	This IE shall be present if the Measurements to Activate IE has the fifth
	bit set to "1".
ifM6	This IE shall be present if the Measurements to Activate IE has the
	seventh bit set to "1".
ifM7	This IE shall be present if the Measurements to Activate IE has the
	eighth bit set to "1".

9.2.1.82 MME Relay Support Indicator

This element is set by the MME to advertise its support of Relay functionalities.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
MME Relay Support	M		ENUMERATED (true,)	
Indicator				

9.2.1.83 Management Based MDT Allowed

This information element is used by the eNB to allow selection of the UE for management based MDT as described in TS 32.422 [10].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Management Based MDT	M		ENUMERATED	
Allowed			(Allowed,)	

9.2.1.84 GW Context Release Indication

This information element is set by the eNB to provide an indication that the MME may release any resources related to the signalled S1 UE context (see TS 36.300 [14]).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
GW Context Release Indication	М		ENUMERATED (true,)	This IE indicates to the MME that the eNB has successfully performed an X2 HO for the UE to a target eNB.

9.2.1.85 Voice Support Match Indicator

This information element is set by the eNB to provide an indication whether the UE radio capabilities are compatible with the network configuration for voice continuity.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Voice Support Match	M		ENUMERATED	
Indicator			(Supported, Not	
			Supported)	

9.2.1.86 M3 Configuration

This IE defines the parameters for M3 measurement collection.

IE/Group Name	Presence	Range	IE type and	Semantics description
			reference	
M3 Collection Period	M		ENUMERATED	
			(ms100, ms1000,	
			ms10000,,	
			ms1024, ms1280,	
			ms2048, ms2560,	
			ms5120, ms10240,	
			min1)	

9.2.1.87 M4 Configuration

This IE defines the parameters for M4 measurement collection.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
M4 Collection Period	М		ENUMERATED (ms1024, ms2048, ms5120, ms10240, min1,)	
M4 Links to log	M		ENUMERATED(uplin k, downlink, both-uplink-and-downlink,)	

9.2.1.88 M5 Configuration

This IE defines the parameters for M5 measurement collection.

IE/Group Name	Presence	Range	IE type and	Semantics description
			reference	
M5 Collection Period	M		ENUMERATED	
			(ms1024, ms2048,	
			ms5120, ms10240,	
			min1,)	
M5 Links to log	M		ENUMERATED(uplin	
			k, downlink, both-	
			uplink-and-downlink,	
)	

9.2.1.89 MDT PLMN List

The purpose of the MDT PLMN List IE is to provide the list of PLMN allowed for MDT.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
MDT PLMN List		1 <maxnoofmd TPLMNs></maxnoofmd 		
>PLMN Identity	М		9.2.3.8	

Range bound	Explanation
maxnoofMDTPLMNs	Maximum no. of PLMNs in the MDT PLMN list. Value is 16.

9.2.1.90 COUNT Value Extended

This IE contains a PDCP sequence number and a hyper frame number in case of 15 bit long PDCP-SN.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
PDCP-SN Extended	M		INTEGER		-	-
			(032767)			
HFN Modified	M		INTEGER		-	-
			(0131071)			

9.2.1.91 Kill-all Warning Messages Indicator

The *Kill-all Warning Messages Indicator* IE indicates to the eNB to stop all already ongoing broadcast of warning messages in the eNB or in an area.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Kill-all Warning Message Indicator	М		ENUMERATED(true)	

9.2.1.92 LHN ID

The LHN ID IE is used to indicate the LHN ID of the eNB, as defined in TS 23.003 [21].

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Local Home Network ID	M		OCTET STRING (SIZE (32256))	Identifies the Local
				Home Network.

9.2.1.93 User Location Information

This IE provides location information of a UE.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
User Location Information					_	_
>E-UTRAN CGI	M		9.2.1.38		_	_
>TAI	M		9.2.3.16		_	_
>PSCell Information	0		9.2.1.141		YES	ignore

9.2.1.94 MBSFN-ResultToLog

This IE provides information on the MBMS area in which the MBSFN MDT result is logged.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
MBSFN-ResultToLog		1 <maxnoof MBSFNArea MDT ></maxnoof 		
>MBSFN-Areald	0		INTEGER (0255)	
>CarrierFreq	M		EARFCN 9.2.1.95	

Range bound	Explanation
maxnoofMBSFNAreaMDT	Maximum number of MBSFN areas configured for logged MBSFN MDT. Value is 8.

9.2.1.95 EARFCN

The E-UTRA Absolute Radio Frequency Channel Number defines the carrier frequency used in a cell for a given direction (UL or DL) in FDD or for both UL and DL directions in TDD.

IE/Group Name	Presence	Range	IE Type and	Semantics Description
			Reference	
EARFCN	M		INTEGER (0 maxEARFCN,)	The relation between EARFCN and carrier frequency (in MHz) are
				defined in TS 36.104 [39].

Range bound	Explanation
maxEARFCN	Maximum value of EARFCNs. Value is 262143.

9.2.1.96 Expected UE Behaviour

This IE defines the behaviour of a UE with predictable activity and/or mobility behaviour, to assist the eNB in determining the optimum RRC connection time.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Expected UE Activity Behaviour	0		9.2.1.97	
Expected HO Interval	0		ENUMERATED (sec15, sec30, sec60, sec90, sec120, sec180, long-time,)	Indicates the expected time interval between inter-eNB handovers. If "long-time" is included, the interval between inter-eNB handovers is expected to be longer than 180 seconds.

9.2.1.97 Expected UE Activity Behaviour

Indicates information about the expected "UE activity behaviour" as defined in TS 23.401 [11].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Expected Activity Period	0		INTEGER (130 40 50 60 80 100 120 150 180 181,)	If this IE is set to "181" the expected activity time is longer than 180 seconds. The remaining values indicate the expected activity time in [seconds].
Expected Idle Period	0		INTEGER (130 40 50 60 80 100 120 150 180 181,)	If this IE is set to "181" the expected idle time is longer than 180 seconds. The remaining values indicate the expected idle time in [seconds].
Source of UE Activity Behaviour Information	0		ENUMERATED (subscription information, statistics,)	If "subscription information" is indicated, the information contained in the Expected Activity Period IE and the Expected Idle Period IE, if present, is derived from subscription information. If "statistics" is indicated, the information contained in the Expected Activity Period IE and the Expected Idle Period IE, if present, is derived from statistical information.

9.2.1.98 UE Radio Capability for Paging

This IE contains paging specific UE Radio Capability information.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
UE Radio Capability for Paging	М		OCTET STRING	Includes either the UERadioPagingInformation message as defined in 10.2.2 of TS 36.331 [16], or the UERadioPagingInformation-NB message as defined in 10.6.2 of TS 36.331 [16].

9.2.1.99 ProSe Authorized

This IE provides information on the authorization status of the UE for ProSe services.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
ProSe Direct Discovery	0		ENUMERATED (authorized, not authorized,)	Indicates whether the UE is authorized for ProSe Direct Discovery	-	-
ProSe Direct Communication	0		ENUMERATED (authorized, not authorized,)	Indicates whether the UE is authorized for ProSe Direct Communication	-	-
ProSe UE-to-Network Relaying	0		ENUMERATED (authorized, not authorized,)	Indicates whether the UE is authorized to act as ProSe UE-to-Network Relay	YES	ignore

9.2.1.100 COUNT Value for PDCP SN Length 18

This IE contains a PDCP sequence number and a hyper frame number in case of 18 bit long PDCP-SN.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
PDCP-SN Length 18	M		INTEGER		-	-
			(0262143)			
HFN for PDCP-SN Length	M		INTEGER		-	-
18			(016383)			

9.2.1.101 M6 Configuration

This IE defines the parameters for M6 measurement collection.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
M6 Report Interval	М		ENUMERATED	
			(ms1024, ms2048,	
			ms5120,	
			ms10240,)	
M6 Delay Threshold	C-ifUL		ENUMERATED	
			(ms30, ms40, ms50,	
			ms60, ms70, ms80,	
			ms90, ms100,	
			ms150, ms300,	
			ms500, ms750,)	
M6 Links to log	M		ENUMERATED(uplin	
			k, downlink, both-	
			uplink-and-downlink,	
)	

Condition	Explanation
ifUL	This IE shall be present if the M6 Links to log IE is set to "uplink" or to
	"both-uplink-and-downlink".

9.2.1.102 M7 Configuration

This IE defines the parameters for M7 measurement collection.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
M7 Collection Period	М		INTEGER (160,)	Unit: minutes
M7 Links to log	М		ENUMERATED(uplin k, downlink, both-uplink-and-downlink,)	

9.2.1.103 Assistance Data for Paging

This IE provides assistance information for paging optimisation.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Assistance Data for	0		9.2.1.104	
Recommended Cells				
Assistance Data for CE capable UEs	0		9.2.1.108	
Paging Attempt Information	0		9.2.1.110	

9.2.1.104 Assistance Data for Recommended Cells

This IE provides assistance information for paging in recommended cells.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Recommended Cells for Paging	М		9.2.1.106	

9.2.1.105 Information on Recommended Cells and eNBs for Paging

This IE provides information on recommended cells and eNBs for paging.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Recommended Cells for Paging	М		9.2.1.106	
Recommended eNBs for Paging	М		9.2.1.107	

9.2.1.106 Recommended Cells for Paging

This IE contains the recommended cells for paging.

This IE is transparent to the EPC.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Recommended Cell List		1		
>Recommended Cell Item IEs		1 <maxnoofre commended Cells></maxnoofre 		Includes visited and non- visited cells, where visited cells are listed in the order the UE visited them with the most recent cell being the first in the list. Non-visited cells are included immediately after the visited cell they are associated with.
>>E-UTRAN CGI	M		9.2.1.38	
>>Time Stayed in Cell	0		INTEGER (04095)	This is included for visited cells and indicates the time a UE stayed in a cell in seconds. If the UE stays in a cell more than 4095 seconds, this IE is set to 4095.

Range bound	Explanation
maxnoofRecommendedCells	Maximum no. of recommended Cells, the maximum value is 16.

9.2.1.107 Recommended eNBs for Paging

This IE contains recommended targets for paging.

IE/Group Name	Presence	Range	IE Type and	Semantics Description
			Reference	
Recommended eNB List				
>Recommended eNB Item IEs		1 <maxnoofre commended eNBs></maxnoofre 		Includes visited and non- visited eNBs, where visited eNBs are listed in the order the UE visited them with the most recent eNB being the first in the list. Non-visited eNBs are included after the visited eNB they are associated with.
>>Choice MME Paging Target				The MME paging target is either an eNB identity or a TAI as specified in TS 36.300 [14].
>>>eNB		_		
>>>Global eNB ID	М		9.2.1.37	
>>>TAI				
>>>TAI	М		9.2.3.16	

Range bound	Explanation
maxnoofRecommendedeNBs	Maximum no. of recommended eNBs, the maximum value is 16.

9.2.1.108 Assistance Data for CE capable UEs

This IE provides information for paging for CE capable UEs.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Cell Identifier and	M		9.2.1.109	
Coverage Enhancement				
Level				

9.2.1.109 Cell Identifier and Coverage Enhancement Level

This IE provides information for paging CE capable UEs.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Global Cell ID	М		E-UTRAN CGI 9.2.1.38	
Coverage Enhancement Level	М		OCTET STRING	Includes either the UEPagingCoverageInformation message as defined in 10.2.2 of TS 36.331 [16], or the UEPagingCoverageInformation- NB message as defined in 10.6.2 of TS 36.331 [16].

9.2.1.110 Paging Attempt Information

This IE includes information related to the paging count over S1.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Paging Attempt Count	М		INTEGER (116,)	Shall be set as specified in TS 36.300 [14].
Intended Number of Paging Attempts	М		INTEGER (116,)	Intended number of paging attempts (see TS 36.300 [14]).
Next Paging Area Scope	0		ENUMERATED (same, changed,)	Indicates whether the paging area scope will change or not at next paging attempt. Usage specified in TS 36.300 [14].

9.2.1.111 Paging eDRX Information

This IE indicates the Paging eDRX parameters as defined in TS 36.304 [20].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Paging eDRX Cycle	M		ENUMERATED (hfhalf, hf1, hf2, hf4, hf6, hf8, hf10, hf12, hf14, hf16, hf32, hf64, hf128, hf256,)	T _{eDRX} defined in TS 36.304 [20]. Unit: [number of hyperframes].
Paging Time Window	0		ENUMERATED (s1, s2, s3, s4, s5, s6, s7, s8, s9, s10, s11, s12, s13, s14, s15, s16,)	Unit: [1.28 second].

9.2.1.112 UE Retention Information

This information element allows the eNB and the MME to indicate whether prior UE related contexts and signalling connections are intended to be retained.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
UE Retention Information	M		ENUMERATED (ues-	
			retained,)	

9.2.1.113 UE User Plane CloT Support Indicator

This IE indicates whether User Plane CIoT EPS Optimisation as specified in TS 23.401 [11] is supported for the UE.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
UE User Plane CloT	M		ENUMERATED	
Support Indicator			(supported,)	

9.2.1.114 NB-IoT Default Paging DRX

This IE indicates the NB-IoT Default Paging DRX as defined in TS 36.304 [20].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
NB-IoT Default Paging DRX	М		ENUMERATED(128, 256, 512, 1024,)	Unit: [number of radioframes]

9.2.1.115 NB-IoT Paging eDRX Information

This IE indicates the NB-IoT Paging eDRX parameters as defined in TS 36.304 [20].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
NB-IoT Paging eDRX	M		ENUMERATED (hf2, hf4,	T _{eDRX} defined in TS 36.304 [20].
Cycle			hf6, hf8, hf10, hf12, hf14,	Unit: [number of hyperframes].
			hf16, hf32, hf64, hf128,	
			hf256, hf512, hf1024,)	
NB-IoT Paging Time	0		ENUMERATED (s1, s2,	Unit: [2.56 seconds]
Window			s3, s4, s5, s6, s7, s8, s9,	
			s10, s11, s12, s13, s14,	
			s15, s16,)	

9.2.1.116 Bearer Type

This IE is used to support Non-IP data as specified in TS 23.401 [11].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Bearer Type	М		ENUMERATED (non IP,)	

9.2.1.117 RAT Type

This element is provided by the eNB to inform about the RAT Type.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
RAT Type	M		ENUMERATED (NB-	
			IOT)	

9.2.1.118 CE-mode-B Support Indicator

This IE indicates whether CE-mode-B as specified in TS 36.306[41] is supported for the UE.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CE-mode-B Support	M		ENUMERATED	
Indicator			(supported,)	

9.2.1.119 SRVCC Operation Not Possible

This element indicates that SRVCC operation is not possible any more.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
SRVCC Operation Not	М		ENUMERATED	
Possible			(notPossible,)	

9.2.1.120 V2X Services Authorized

This IE provides information on the authorization status of the UE to use the sidelink for V2X services.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Vehicle UE	0		ENUMERATED	Indicates whether the	-	-
			(authorized, not	UE is authorized as		
			authorized,)	Vehicle UE		
Pedestrian UE	0		ENUMERATED	Indicates whether the	-	-
			(authorized, not	UE is authorized as		
			authorized,)	Pedestrian UE		

9.2.1.121 Served DCNs Items

The Served DCNs Items indicates the relative processing capacity for a DCN-ID in the MME as defined in TS 23.401 [11].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Served DCNs Items				
>DCN ID	M		INTEGER	
			(065535)	
>Relative DCN Capacity	M		Relative	Relatvie capacity per DCN in
			MME	one MME
			Capacity	
			9.2.3.17	

9.2.1.122 UE Sidelink Aggregate Maximum Bit Rate

This IE provides information on the Aggregate Maximum Bitrate of the UE's sidelink communication for V2X services.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
UE Sidelink Aggregate Maximum Bit Rate	M		Bit Rate 9.2.1.19	Value 0 shall be considered as a logical error by the receiving eNB.

9.2.1.123 Enhanced Coverage Restricted

This IE provides information on the restriction information of using Coverage Enhancement.

IE/Group Name	Presence	Range	IE type and	Semantics description	Criticality	Assigned
			reference			Criticality
Enhanced Coverage	0		ENUMERATED	Indicates whether the	-	-
Restricted			(restricted,)	UE is restricted to use		
				coverage enhancement.		
				Value "restricted"		
				indicates that the UE is		
				not allowed to use		
				coverage enhancement.		

9.2.1.124 Secondary RAT Usage Report List

This IE provides information on the NR resources used with EN-DC.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Secondary RAT usage report Item		1 <maxn oofE- RABs></maxn 			EACH	ignore
>E-RAB ID	М		9.2.1.2		-	-
>Secondary RAT Type	M		ENUMERATED (nR,, unlicensed)		-	-
>E-RAB Usage Report List		1			-	-
>>E-RAB Usage Report Item		1 <maxn oof="" periods="" time=""></maxn>			EACH	ignore
>>>Start timestamp	M		OCTET STRING (SIZE(4))	UTC time encoded in the same format as the first four octets of the 64-bit timestamp format as defined in section 6 of IETF RFC 5905 [42]. It indicates the start time of the collecting period of the included Usage Count UL IE and Usage Count DL IE.	-	-
>>>End timestamp	M		OCTET STRING (SIZE(4))	UTC time encoded in the same format as the first four octets of the 64-bit timestamp format as defined in section 6 of IETF RFC 5905 [42]. It indicates the end time of the collecting period of the included Usage Count UL IE and Usage Count DL IE.	-	-
>>>Usage count UL	М		INTEGER (02 ⁶⁴ -	The unit is: octets	-	-
>>>Usage count DL	М		INTEGER (02 ⁶⁴ - 1)	The unit is: octets	-	-

Range bound	Explanation		
maxnoofE-RABs	Maximum no. of E-RABs for one UE. Value is 256.		
maxnoof time periods	Maximum no. of time reporting periods. Value is 2.		

9.2.1.125 Handover Flag

This IE indicates that the MME should buffer the secondary RAT data usage report since the report is sent due to handover as defined in TS 23.401 [11].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Handover Flag	M		ENUMERATED	
			(handover_preparation,	
)	

9.2.1.126 Extended Bit Rate

This IE indicates the number of bits delivered by E-UTRAN in UL or to E-UTRAN in DL within a period of time, divided by the duration of the period. It is used, for example, to indicate the maximum or guaranteed bit rate for a GBR bearer, or an aggregated maximum bit rate.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Extended Bit Rate			INTEGER (10,000,000,0014,00 0,000,000,000,)	The unit is: bit/s

9.2.1.127 NR UE Security Capabilities

This IE defines the supported algorithms for encryption and integrity protection in NR as defined in TS 33.401 [15].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
NR Encryption Algorithms	M		BIT STRING (SIZE(16,))	Each position in the bitmap represents an encryption algorithm: "all bits equal to 0" – UE supports no other NR algorithm than NEA0, "first bit" – 128-NEA1, "second bit" – 128-NEA2, "third bit" – 128-NEA3, other bits reserved for future use. Value '1' indicates support and value '0' indicates no support of the algorithm. Algorithms are defined in TS 33.401 [15].
NR Integrity Protection Algorithms	M		BIT STRING (SIZE(16,))	Each position in the bitmap represents an integrity protection algorithm: "all bits equal to 0" – UE supports no other NR algorithm than NIA0, "first bit" – 128-NIA1, "second bit" – 128-NIA2, "third bit" – 128-NIA3, other bits reserved for future use. Value '1' indicates support and value '0' indicates no support of the algorithm. Algorithms are defined in TS 33.401 [15].

9.2.1.128 UE Application layer measurement configuration

The IE defines configuration information for the QoE Measurement Collection (QMC) function.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigne Criticalit
Container for application layer measurement	М		Octet string (11000)	Indicates application layer measurement	-	-
configuration				configuration, see Annex L in [43].		
CHOICE Area Scope of QMC	M				-	-
>Cell based						-
>>Cell ID List for QMC		1 <maxno ofCellID forQMC</maxno 				-
>>>E-CGI	М		9.2.1.38		_	_
>TA based	101		0.2.1.00			_
>>TA List for QMC		1 <maxno ofTAfor QMC></maxno 				-
>>>TAC	M		9.2.3.7	The TAI is derived using the current serving PLMN.	-	-
>TAI based					-	-
>>TAI List for QMC		1 <maxno ofTAfor QMC></maxno 			-	-
>>>TAI	M		9.2.3.16		-	-
>PLMN area based						-
>>PLMN List for QMC		1 <maxno ofPLMN forQMC ></maxno 				-
>>>PLMN Identity	M		9.2.3.8		-	-
Service Type	M		ENUMERATED (QMC for streaming service, QMC for MTSI service,)	This IE indicates the service type of UE application layer measurements.	-	-

Range bound	Explanation
maxnoofCellIDforQMC	Maximum no. of Cell ID subject for QMC scope. Value is 32.
maxnoofTAforQMC	Maximum no. of TA subject for QMC scope. Value is 8.
maxnoofPLMNforQMC	Maximum no. of PLMNs in the PLMN list for QMC scope. Value is 16.

9.2.1.129 CE-mode-B Restricted

This IE provides information on the restriction information of using Coverage Enhancement Mode B.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
CE-mode-B Restricted	0		ENUMERATED (restricted, not- restricted)	Indicates whether the UE is restricted to use coverage enhancement. Value "restricted" indicates that the UE is not allowed to use coverage enhancement mode B. Value "notrestricted" indicates that the UE is allowed to use coverage enhancement mode B.	-	-

9.2.1.130 Packet Loss Rate

This IE indicates the packet loss rate.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Packet Loss Rate	M		INTEGER(01000)	Ratio of lost packets per number of packets sent, expressed in tenth of percent.	-	-

9.2.1.131 Global RAN Node ID

This IE is used to globally identify an NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE NG-RAN node	M			
>gNB				
>>Global gNB ID	M		9.2.1.132	
>ng-eNB				
>>Global ng-eNB ID	М		Global eNB ID 9.2.1.37	

9.2.1.132 Global gNB ID

This IE is used to globally identify a gNB (see TS 38.300 [45]).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		9.2.3.8	
CHOICE gNB ID	M			
>gNB ID				
>>gNB ID	M		BIT STRING (SIZE(2232))	Equal to the leftmost bits of the NR Cell Identity IE contained in the NR CGI IE of each cell served by the gNB.

9.2.1.133 Source NG-RAN Node To Target NG-RAN Node Transparent Container

This IE is used to transparently pass radio related information between the handover source and the handover target through the EPC. This container is used for inter 3GPP RAT handovers from EPS to 5GS.

This IE defined in TS 38.413 [44].

9.2.1.134 Target NG-RAN Node To Source NG-RAN Node Transparent Container

This container is used to transparently pass radio related information between the handover target and the handover source through the EPC. This container is used for inter 3GPP RAT handovers from EPS to 5GS.

This IE defined in TS 38.413 [44].

9.2.1.135 LTE-M Indication

This element is provided by the eNB to inform that the UE indicates category M1 or M2 in its UE Radio Capability.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
LTE-M Indication	M		ENUMERATED (LTE-	
			M,)	

9.2.1.136 Aerial UE subscription information

This information element is used by the eNB to know if the UE is allowed to use aerial UE function, refer to TS 23.401 [11].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Aerial UE subscription	M		ENUMERATED	
information			(allowed, not	
			allowed,)	

9.2.1.137 Bluetooth Measurement Configuration

This IE defines the parameters for Bluetooth measurement collection.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Bluetooth Measurement Configuration	М		ENUMERATED (Setup,)	
Bluetooth Measurement Configuration Name List		01		
>Bluetooth Measurement Configuration Name Item IEs		1 <maxnoofblu etoothName ></maxnoofblu 		
>>Bluetooth Measurement Configuration Name	М		OCTET STRING (SIZE (1248))	
BT RSSI	0		ENUMERATED (True,)	In case of Immediate MDT, it corresponds to M8 measurement as defined in 37.320 [31].

Range bound	Explanation
maxnoofBluetoothName	Maximum no. of Bluetooth local name used for Bluetooth
	measurement collection. Value is 4.

9.2.1.138 WLAN Measurement Configuration

This IE defines the parameters for WLAN measurement collection.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
WLAN Measurement Configuration	M		ENUMERATED (Setup,)	
WLAN Measurement Configuration Name List		01		
>WLAN Measurement Configuration Name Item IEs		1 <maxnoofw LANName></maxnoofw 		
>>WLAN Measurement Configuration Name	M		OCTET STRING (SIZE (132))	
WLAN RSSI	0		ENUMERATED (True,)	In case of Immediate MDT, it corresponds to M8 as defined in 37.320 [31].
WLAN RTT	0		ENUMERATED (True,)	In case of Immediate MDT, it corresponds to M9 as defined in 37.320 [31].

Range bound	Explanation
maxnoofWLANName	Maximum no. of WLAN SSID used for WLAN measurement
	collection. Value is 4.

9.2.1.139 Warning Area Coordinates

This IE contains the affected alert area coordinates of a warning message, and will be broadcast over the radio interface.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Warning Area Coordinates	M		OCTET STRING (SIZE(11024))	The length of this
				IE varies between
				1 to 1024 bytes.

9.2.1.140 Subscription Based UE Differentiation Information

This IE is generated by the MME based on the UE subscription information, it provides the Subscription Based UE differentiation Information.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Periodic Communication Indicator	0		ENUMERATED(peri odically, on demand,)	This IE indicates whether the UE communicates periodically or not, e.g. only on demand.
Periodic Time	0		INTEGER (13600,)	This IE indicates the interval time of periodic communication, the unit is: second
Scheduled Communication Time		01		This IE indicates the time zone and day of the week when the UE is available for communication.
>>Day of Week	0		BIT STRING (SIZE(7))	If Day-Of-Week is not provided this shall be interpreted as every day of the week. Each position in the bitmap represents a day of the week: first bit = Mon, second bit =Tue, third bit =Wed, and so on. Value '1' indicates 'scheduled. Value '0' indicates 'not scheduled'.
>>Time of Day Start	0		INTEGER (086399,)	This IE indicates the time to start of the day, each value represent the corresponding second since 00:00 of the day. If Time-Of-Day-Start is not provided, starting time shall be set to start of the day(s) indicated by Day-Of-Week-Mask.
>>Time of Day End	0		INTEGER (086399,)	This IE indicates the time to start of the day, each value represent the corresponding second since 00:00 of the day. The value of this IE should be bigger than the value of <i>Time of Day Start</i> IE. If Time-Of-Day-End is not provided, ending time is end of the day(s) indicated by Day-Of-Week-Mask.
Stationary Indication	0		ENUMERATED(stat ionary, mobile,)	
Traffic Profile	0		ENUMERATED(sin gle packet, dual packets, multiple packets,)	"single packet" indicates single packet transmission (UL or DL), "dual packets" indicates dual packet transmission (UL with subsequent DL, or DL with subsequent UL), "multiple packets" indicates multiple packets transmission.
Battery Indication	0		ENUMERATED(batt ery powered, battery powered not rechargeable or replaceable, not battery powered,)	"battery powered" indicates that the UE is battery powered and the battery is rechargeable/replaceable, "battery powered not rechargeable or replaceable" indicates that the UE is battery powered but the battery is not rechargeable/replaceable,, "not battery powered" indicates that the UE is not battery powered.

9.2.1.141 PSCell Information

This IE includes the information of the UE's PSCell.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
NR Cell Identity	M		9.2.1.142	

9.2.1.142 NR CGI

This IE is used to globally identify an NR cell (see TS 38.300 [45]).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		9.2.3.8	
Cell Identity	M		BIT STRING	
_			(SIZE(36))	

9.2.1.143 Time Since Secondary Node Release

This IE indicates the time elapsed since the completion of the EN-DC release procedure.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Time Since Secondary Node	0		OCTET STRING	Time in seconds. Max
Release			(SIZE(4))	value indicates the
				elapsed time was equal
				or longer than the value.

9.2.1.144 UE Context Reference at Source

This IE uniquely identifies a UE association over an NG interface and the source NG-RAN node.

IE/Group Name	Presence	Range	IE type and	Semantics description	Criticality	Assigned
			reference			Criticality
Source NG-RAN node	M		Global RAN		_	
			Node ID			
			9.2.1.131			
RAN UE NGAP ID	M		9.2.1.145	Allocated at the source	_	
				(Master-)NG-RAN node.		

NOTE: This IE is used in case of inter-system handover to 4G to enable node-internal data forwarding in case of shared en-gNB/gNBs.

9.2.1.145 RAN UE NGAP ID

This IE uniquely identifies the UE association over the NG interface within the NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
RAN UE NGAP ID	M		INTEGER (02 ³² -1)	

9.2.1.146 IAB Authorized

This IE provides information about the authorization status of the IAB-node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
IAB Authorized	M		ENUMERATED	Indicates the IAB-node
			(authorized, not	authorization status.
			authorized,)	

9.2.1.147 Ethernet Type

This IE is used to indicate that Ethernet data is expected.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Ethernet Type	M		ENUMERATED (True,,)	

9.2.1.148 NR V2X Services Authorized

This IE provides information on the authorization status of the UE to use the NR sidelink for V2X services.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Vehicle UE	0		ENUMERATED (authorized, not authorized,)	Indicates whether the UE is authorized as Vehicle UE.
Pedestrian UE	0		ENUMERATED (authorized, not authorized,)	Indicates whether the UE is authorized as Pedestrian UE.

9.2.1.149 NR UE Sidelink Aggregate Maximum Bit Rate

This IE provides information on the Aggregate Maximum Bitrate of the UE's sidelink communication for NR V2X services.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
NR UE Sidelink	M		Bit Rate	Value 0 shall be considered as a
Aggregate Maximum Bit			9.2.1.19	logical error by the receiving
Rate				eNB.

9.2.1.150 PC5 QoS Parameters

This IE provides information on the PC5 QoS parameters of the UE's sidelink communication for NR PC5.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PC5 QoS Flow List		1		
>PC5 QoS Flow Item		1 <maxno ofPC5QoS Flows></maxno 		
>>PQI	M		INTEGER (0255,)	PQI is a special 5QI as specified in TS 23.501 [9].
>>PC5 Flow Bit Rates	0			Only applies for GBR QoS Flows.
>>>Guaranteed Flow Bit Rate	М		Bit Rate 9.2.1.19	Guaranteed Bit Rate for the PC5 QoS flow. Details in TS 23.501 [9].
>>>Maximum Flow Bit Rate	М		Bit Rate 9.2.1.19	Maximum Bit Rate for the PC5 QoS flow. Details in TS 23.501 [9].
>>Range	0		ENUMERAT ED (m50, m80, m180, m200, m350, m400, m500, m700, m1000,)	Only applies for groupcast.
PC5 Link Aggregated Bit Rates	0		Bit Rate 9.2.1.19	Only applies for non-GBR QoS Flows.

Range bound	Explanation
maxnoofPC5QoSFlows	Maximum no. of PC5 QoS flows allowed towards one UE. Value is 2048.

9.2.1.151 Inter System Measurement Configuration

The *Inter-System Measurement Configuration* IE contains information for instructing the incoming UE to continue measuring the cells of the NR RAT after a successful inter-system handover to LTE network.

IE/Group Name	Presen ce	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
RSRP	0		INTEGER (0 127)	Threshold of RSRP.	-	-
RSRQ	0		INTEGER (0 127)	Threshold of RSRQ.	-	-
SINR	0		INTEGER (0127)	Threshold of SINR	-	-
Inter-System Measurement Parameters	М				-	-
>Measurement Duration	M		INTEGER (1100)	The period of time following the successful IRAT handover, during which the target RAT instructs the UE to measure cells of the source RAT. Unit: [second].	-	-
>Inter-System Measurement List		01			EACH	reject
>>Inter-System Measurement Item		1 <maxnooffr equencies ></maxnooffr 		List of inter-system measurements configured	YES	reject
>>>FreqBandIndicato rNR	М		INTEGER (11024)	The frequency band in which the ssbFrequency is located and according to which the UE shall perform the RRC measurements.		
>>>SSB frequencies	M		INTEGER (0maxNARFC N)	Designates the specific SSB frequencies i.e., ARFCN-ValueNR which the target RAT may instruct the UE to measure.	-	-
>>>SubcarrierSpacin gSSB	М		ENUMERATED (kHz15, kHz30, kHz60, kHz120, kHz240,)	Subcarrier spacing of SSB according to TS 36.331 [16].		
>>>maxRS- IndexCellQual	0		INTEGER (1maxRS- IndexCellQual)	Indicates the maximum number of RS indices to be considered/ averaged to derive the cell quality for RRM.Also defined in TS 36.331 [16]		
>>>SMTC	0		OCTET STRING	Contains the MTC- SSB-NR-15 as defined in TS 36.331 [16].		
>>>threshRS-Index- r15	0		OCTET STRING	threshRS-Index- r15as defined in TS 36.331 [16], List of thresholds for consolidation of L1 measurements per RS index		
>>>SSB-ToMeasure	0		OCTET STRING	Contains the IE SSB-ToMeasure as defined in TS 36.331 [16].		

>>>SS-RSSI- Measurements	0	OCTET STRING	Contains the IE SS-RSSI-Measurement as defined in TS 36.331 [16].	
>>>quantityConfigNR -R15	0	OCTET STRING	Indicates the quantityConfigNR-R15 as defined in TS 36.331 [16].	
>>>blackCellsToAdd ModList	0	OCTET STRING	List of cells to add/modify in the black list of cells. It applies only to SSB resources. As defined in TS 36.331 [16].	

Range bound	Explanation
maxnooffrequencies	Maximum no. of frequencies. Value is 64.
maxNARFCN	Maximum value of NR carrier frequency, defined in TS 38.331 [50]. Value is 3279165
maxRS-IndexCellQual	Maximum number of RS indices averaged to derive cell quality for RRM, defined in TS 36.331 [16]. Value is 16

9.2.1.152 Source Node ID

The Source Node ID IE identifies the source for the handover.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE Source Node ID	M			
>Source NG-RAN Node ID				
>>Global RAN Node ID	M		9.2.1.131	
>>Selected TAI	M		5GS TAI 9.2.3.52	

9.2.1.153 UE Radio Capability ID

This IE contains UE Radio Capability ID.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
UE Radio Capability ID	M		OCTET STRING	Defined in TS 23.003 [21].

9.2.1.154 UE Radio Capability – NR Format

This IE contains UE Radio Capability information format encoded as specified in TS 38.331 [50] in order to support Mode of operation A as specified in TS 23.401 [11].

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
UE Radio Capability – NR Format	M		OCTET STRING	Includes UERadioAccessCapabilityInf ormation message as defined in TS 38.331 [50].

9.2.1.155 DAPS Request Information

The DAPS Indicator IE indicates that the source eNB requests a DAPS Handover for the concerned E-RAB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DAPS Indicator	М		ENUMERATED (DAPS HO required,)	Indicates that DAPS
				Handover is requested

9.2.1.156 DAPS Response Information

The DAPS Response Indicator IE indicates the response to a requested DAPS Handover for the concerned E-RAB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DAPS Response	M		ENUMERATED (DAPS HO accepted,	Indicates that DAPS
Indicator			DAPS HO not accepted,)	Handover is accepted or
				not

9.2.1.157 eNB Early Status Transfer Transparent Container

The *eNB Early Status Transfer Transparent Container* IE is an information element that is produced by the source eNB and is transmitted to the target eNB. This IE is used for the intra SAE/LTE S1 DAPS handover case.

This IE is transparent to the EPC.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
E-RABs Subject to Early Status Transfer List		1			-	-
>E-RABs Subject to Early Status Transfer Item		1 <maxnoof e-<br="">RABs></maxnoof>			EACH	ignore
>>E-RAB ID	M		9.2.1.2		-	-
>>CHOICE DL COUNT PDCP-SN length	М				YES	reject
>>>12 bit PDCP-SN >>>> DL COUNT Value for PDCP SN Length 12	M		COUNT Value 9.2.1.32	PDCP-SN and Hyper frame number of the first DL SDU that the source eNB forwards to the target eNB in case of 12 bit long PDCP-SN.		
>>>15 bit PDCP-SN						
>>>>DL COUNT Value for PDCP SN Length 15	M		COUNT Value Extended 9.2.1.90	PDCP-SN and Hyper frame number of the first DL SDU that the source eNB forwards to the target eNB in case of 15 bit long PDCP-SN.		
>>> 18 bit PDCP-SN						
>>>>DL COUNT Value for PDCP SN Length 18	М		COUNT Value for PDCP SN Length 18 9.2.1.100	PDCP-SN and Hyper frame number of the first DL SDU that the source eNB forwards to the target eNB in case of 18 bit long PDCP-SN.		

Range bound	Explanation
maxnoofE-RABs	Maximum no. of E-RABs for one UE. Value is 256.

9.2.1.158 WUS Assistance Information

This IE provides WUS Assistance Information to be used by eNB for determining the WUS group for the UE.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Paging Probability Information	M		ENUMERATED(p00, p05, p10, p15, p20, p25, p30, p35, p40, p45, p50, p55, p60, p65, p70, p75, p80, p85, p90, p95, p100,)	Unit: percentage

9.2.1.159 NB-IoT Paging DRX

This IE indicates the NB-IoT UE specific Paging DRX as defined in TS 36.304 [20].

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
NB-IoT Paging DRX	M		ENUMERATED(32,6	Unit:	-	-
			4, 128, 256, 512,	[number of		
			1024,)	radioframes]		

9.2.2 Transport Network Layer Related IEs

9.2.2.1 Transport Layer Address

This information element is an IP address.

IE/Group Name	Presence	Range	IE type and	Semantics description
			reference	
Transport Layer Address	M		BIT STRING	The Radio Network Layer is not supposed
· ·			(SIZE(1160,	to interpret the address information. It
))	should pass it to the transport layer for
				interpretation.
				For details on the Transport Layer
				Address, see TS 36.414 [12].

9.2.2.2 GTP-TEID

This information element is the GTP Tunnel Endpoint Identifier to be used for the user plane transport between eNB and the serving gateway.

IE/Group Name	Presence	Range	IE type and	Semantics description
			reference	
GTP-TEID	М		OCTET STRING	For details and range, see TS 29.281 [32].
			(SIZE(4))	

9.2.2.3 Tunnel Information

The Tunnel Information IE indicates the transport layer address and UDP port number.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Transport Layer Address	М		9.2.2.1	HeNB's Transport Layer Address.
UDP Port Numbers	0		OCTET STRING (SIZE(2))	UDP Port Numbers if NAT/NAPT is deployed in the BBF access network.

9.2.3 NAS Related IEs

9.2.3.1 LAI

This information element is used to uniquely identify a Location Area.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
LAI				
>PLMN Identity	M		9.2.3.8	
>LAC	M		OCTET	0000 and FFFE not allowed.
			STRING	
			(SIZE(2))	

9.2.3.2 RAC

This information element is used to identify a Routing Area within a Location Area. It is used for PS services.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
RAC	M		OCTET	
			STRING	
			(SIZE(1))	

9.2.3.3 MME UE S1AP ID

The MME UE S1AP ID uniquely identifies the UE association over the S1 interface within the MME.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
MME UE S1AP ID	М		INTEGER (0 2 ³² -1)	

9.2.3.4 eNB UE S1AP ID

The eNB UE S1AP ID uniquely identifies the UE association over the S1 interface within the eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
eNB UE S1AP ID	М		INTEGER (0 2 ²⁴ -1)	

9.2.3.5 NAS-PDU

This information element contains an EPC – UE or UE – EPC message that is transferred without interpretation in the eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
NAS-PDU	М		OCTET STRING	

9.2.3.6 S-TMSI

The Temporary Mobile Subscriber Identity is used for security reasons, to hide the identity of a subscriber.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
MMEC	M		9.2.3.12			
M-TMSI	M		OCTET STRING (SIZE (4))	M-TMSI is unique within MME that allocated it.		

9.2.3.7 TAC

This information element is used to uniquely identify a Tracking Area Code.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
TAC	M		OCTET STRING	
			(SIZE (2))	

9.2.3.8 PLMN Identity

This information element indicates the PLMN Identity.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	М		OCTET STRING (SIZE (3))	- digits 0 to 9, encoded 0000 to 1001, - 1111 used as filler digit, two digits per octet, - bits 4 to 1 of octet n encoding digit 2n-1 - bits 8 to 5 of octet n encoding digit 2n -The PLMN identity consists of 3 digits from MCC followed by either -a filler digit plus 2 digits from MNC (in case of 2 digit MNC) or -3 digits from MNC (in case of a 3 digit MNC).

9.2.3.9 GUMMEI

This information element indicates the globally unique MME identity.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
GUMMEI				
>PLMN Identity	M		9.2.3.8	
>MME Group ID	М		OCTET STRING (SIZE(2))	
>MME code	M		9.2.3.12	

9.2.3.10 UE Identity Index value

The UE Identity Index value IE is used by the eNB to calculate the Paging Frame TS 36.304 [20].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
UE Identity Index Value	М		BIT STRING (SIZE(10))	Coded as specified in TS 36.304 [20].

9.2.3.11 IMSI

This information element contains an International Mobile Subscriber Identity, which is commonly used to identify the UE in the CN.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
IMSI	M		OCTET STRING (SIZE (38))	- digits 0 to 9, encoded 0000 to 1001, - 1111 used as filler digit, two digits per octet, - bit 4 to 1 of octet n encoding digit 2n-1 - bit 8 to 5 of octet n encoding digit 2n -Number of decimal digits shall be from 6 to 15 starting with the digits from the PLMN identity. When the IMSI is made of an odd number of digits, the filler digit shall be added at the end to make an even number of digits of length 2N. The filler digit shall then be consequently encoded as bit 8 to 5 of octet N.

9.2.3.12 MMEC

This information element represents the MME Code to uniquely identify an MME within an MME pool area.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
MMEC	М		OCTET STRING (SIZE (1))	

9.2.3.13 UE Paging Identity

This IE represents the Identity with which the UE is paged.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE UE Paging Identity	M			
>S-TMSI				
>>S-TMSI	М		9.2.3.6	
>IMSI				
>>IMSI	М		9.2.3.11	

9.2.3.14 DL Forwarding

This information element indicates that the E-RAB is proposed for forwarding of downlink packets.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DL Forwarding				
>DL Forwarding	M		ENUMERATED	
_			(DL forwarding	
			proposed,)	

9.2.3.15 Direct Forwarding Path Availability

The availability of a direct forwarding path shall be determined by the source eNB. The EPC behaviour on receipt of this IE is specified in TS 23.401 [11].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Direct Forwarding Path	M		ENUMERATED	
Availability			(Direct Path	
-			Available,)	

9.2.3.16 TAI

This information element is used to uniquely identify a Tracking Area.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
TAI			reference	
>PLMN Identity	M		9.2.3.8	
>TAC	M		9.2.3.7	

9.2.3.17 Relative MME Capacity

This IE indicates the relative processing capacity of an MME with respect to the other MMEs in the pool in order to load-balance MMEs within a pool defined in TS 23.401 [11].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Relative MME Capacity	M		INTEGER	
			(0255)	

9.2.3.18 UE S1AP ID pair

This IE contains a pair of UE S1AP identities.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
MME UE S1AP ID	M		9.2.3.3		-	-
eNB UE S1AP ID	M		9.2.3.4		-	-

9.2.3.19 Overload Response

The Overload Response IE indicates the required behaviour of the eNB in an overload situation.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE Overload Response	M			
>Overload Action				
>>Overload Action	М		9.2.3.20	

9.2.3.20 Overload Action

The *Overload Action* IE indicates which signalling traffic is subject to rejection by the eNB in an MME overload situation as defined in TS 23.401 [11].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Overload Action	М		ENUMERATED (Reject RRC connection establishments for non- emergency MO DT, Reject RRC connection establishments for Signalling, Permit Emergency Sessions and mobile terminated services only,, Permit High Priority Sessions and mobile terminated services only, Reject delay tolerant access, Permit high priority sessions and exception reporting and mobile terminated services only, not accept mo-data or delay tolerant access from CP CIoT)	

9.2.3.21 CS Fallback Indicator

The IE indicates that a fallback to the CS domain is needed.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CS Fallback Indicator	M		ENUMERATED(CS Fallback	
			required,,	
			CS Fallback High Priority)	

9.2.3.22 CN Domain

This IE indicates whether Paging is originated from the CS or PS domain.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CN Domain	M		ENUMERAT ED(PS, CS)	

9.2.3.23 RIM Transfer

This IE contains the RIM Information (e.g. NACC information) and additionally in uplink transfers the RIM routing address of the destination of this RIM information.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
RIM Transfer				
>RIM Information	M		9.2.3.24	
>RIM Routing Address	0		9.2.3.25	

9.2.3.24 RIM Information

This IE contains the RIM Information (e.g., NACC information) i.e., the BSSGP RIM PDU from the RIM application part contained in the eNB, or the BSSGP RIM PDU to be forwarded to the RIM application part in the eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
RIM Information				
>RIM Information	M		OCTET STRING	Contains the BSSGP RIM PDU as defined in TS 48.018 [18].

9.2.3.25 RIM Routing Address

This IE identifies the destination node where the RIM Information needs to be routed by the CN.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
CHOICE RIM Routing Address	М					-
>GERAN-Cell-ID					-	
>>LAI	M		9.2.3.1		-	
>>RAC	M		9.2.3.2		-	
>>Cl	M		OCTET STRING (SIZE(2))		-	
>Target RNC-ID			, , , , ,		-	
>>LAI	M		9.2.3.1		-	
>>RAC	0		9.2.3.2		-	
>>RNC-ID	M		INTEGER (04095)	If the Extended RNC-ID IE is included in the Target ID IE, the RNC- ID IE shall be ignored.		
>>Extended RNC- ID	0		9.2.1.14	The Extended RNC-ID IE shall be used if the RNC identity has a value larger than 4095.	-	
>eHRPD Sector ID					-	
>>eHRPD Sector ID	M		OCTET STRING (SIZE(16))	Contains the eHRPD Sector ID as defined in 3GPP2 C.S0024-B [27] sub-section 13.9.	-	

9.2.3.26 SON Configuration Transfer

This IE contains the configuration information, used by e.g., SON functionality, and additionally includes the eNB identifier of the destination of this configuration information and the eNB identifier of the source of this information.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
SON Configuration Transfer						
>Target eNB-ID	M					
>>Global eNB ID	M		9.2.1.37			
>>Selected TAI	М		TAI 9.2.3.16			
>Source eNB-ID	M		9.2.3.10			
>>Global eNB ID	М		9.2.1.37			
>>Selected TAI	M		TAI			
			9.2.3.16			
>SON Information	M		9.2.3.27			
>X2 TNL Configuration Info	C- ifSONInfor mationReq uest		9.2.3.29	Source eNB X2 TNL Configuration Info.	YES	ignore
>Synchronisation Information	C-if Activate Muting		9.2.3.42	Information on cell selected as source of synchronisation and aggressor cells.	YES	ignore

Condition	Explanation
ifSONInformationRequest	This IE shall be present if the SON Information IE contains the SON
·	Information Request IE set to "X2TNL Configuration Info"
ifActivateMuting	This IE shall be present if the SON Information IE contains the SON
_	Information Request IE set to "Activate Muting"

9.2.3.26a EN-DC SON Configuration Transfer

This IE contains the configuration information, used by SON functionality for EN-DC for communication between a destination (target) en-gNB and a source eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
EN-DC SON				
Configuration Transfer				
>CHOICE Transfer Type	M			
>>Request				NOTE: Used if the SON Information IE indicates a request.
>>>Source eNB-ID		1		
>>>>Global eNB ID	M		9.2.1.37	
>>>Selected TAI	M		TAI 9.2.3.16	
>>>Target en-gNB-ID		1		
>>>>Global en-gNB ID	M		9.2.1.37a	
>>>Selected TAI	M		TAI 9.2.3.16	The MME may ignore this IE if any of the following IEs are present in the ENDC SON Configuration Transfer IE: Target eNB-ID, Associated TAI, Broadcast 5GS TAI. NOTE: The Selected TAI is a 4G TAI and should, if available, correspond to the TAI configured at the en-gNB, however, this TAI is not broadcast by the respective NR cell and may not always be available from UE reporting TAIs of overlapping E-UTRA cells.
>>>Target eNB-ID		01		11 5
>>>>Global eNB ID	M		9.2.1.37	
>>>Selected TAI	M		TAI 9.2.3.16	
>>Associated TAI	0		TAI 9.2.3.16	A 4G TAI associated with the target engNB as specified in TS 36.300 [15].
>>>Broadcast 5GS	0		5GS TAI	A Broadcast 5GS TAI of the en-gNB as
TAI			9.3.2.52	specified in TS 36.300 [15].
>>Reply				NOTE: Used if the SON Information IE indicates a reply.
>>>Source en-gNB- ID		1		
>>>>Global en-gNB ID	M		9.2.1.37a	
>>>Selected TAI	M		TAI 9.2.3.16	NOTE: The Selected TAI contains a configured TAC of the en-gNB.
>>>Target eNB-ID		1		
>>>Global eNB ID	M		9.2.1.37	
>>>Selected TAI	M		TAI 9.2.3.16	
>SON Information	M		9.2.3.27	
>X2 TNL Configuration Info	C- ifSONInformation Request		9.2.3.29	Source eNB X2 TNL Configuration Info.

Condition	Explanation
ifSONInformationRequest	This IE shall be present if the SON Information IE contains the SON
	Information Request IE set to "X2 TNL Configuration Info"

9.2.3.27 SON Information

This IE identifies the nature of the configuration information transferred, i.e., a request, a reply or a report.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
CHOICE SON Information	M					
>SON Information Request						
>>SON Information Request	M		ENUMERAT ED(X2 TNL Configuration Info,, Time synchronisati on Info, Activate Muting, Deactivate Muting)	In the current version of the specification only "X2 NTL Configuration Info" is applicable for EN-DC.	-	
>SON Information Reply			G/			
>>SON Information Reply	M		9.2.3.28		-	
>SON Information Report						
>>SON Information Report	M		9.2.3.39		YES	ignore

9.2.3.28 SON Information Reply

This IE contains the configuration information to be replied to the eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
SON Information Reply						
>X2 TNL Configuration Info	0		9.2.3.29			
>Time Synchronisation Info	0		9.2.3.34		YES	ignore
>Muting Pattern	0		9.2.3.41		YES	ignore
Information						

9.2.3.29 X2 TNL Configuration Info

The X2 TNL Configuration Info IE is used for signalling X2 TNL Configuration information for automatic X2 SCTP association establishment. It contains TNL addresses of either an eNB or, in the context of EN-DC, of an en-gNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
eNB X2 Transport Layer Addresses		1 <maxnoofenb X2TLAs></maxnoofenb 				
>Transport Layer Address	M		9.2.2.1	Transport Layer Addresses for X2 SCTP end-point.		
eNB X2 Extended Transport Layer Addresses		0 <maxnoofenb X2ExtTLAs></maxnoofenb 			YES	ignore
>IP-Sec Transport Layer Address	0		9.2.2.1	Transport Layer Addresses for IP- Sec end-point.	-	-
>eNB GTP Transport Layer Addresses		0 <maxnoofenb X2GTPTLAs></maxnoofenb 			-	-
>>GTP Transport Layer Address	M		9.2.2.1	GTP Transport Layer Addresses for GTP end- points (used for data forwarding over X2 or for transport of X2-U user data for dual connectivity).	-	-
eNB Indirect X2 Transport Layer Addresses		0 <maxnoofenb X2TLAs></maxnoofenb 			YES	ignore
>Transport Layer Address	0		9.2.2.1	Transport Layer Addresses for Indirect X2 SCTP end-point.		

Range bound	Explanation
maxnoofeNBX2TLAs	Maximum no. of eNB X2 Transport Layer Addresses for an SCTP
	end-point. Value is 2.
maxnoofeNBX2ExtTLAs	Maximum no. of eNB X2 Extended Transport Layer Addresses in
	the message. Value is 16.
maxnoofeNBX2GTPTLAs	Maximum no. of eNB X2 GTP Transport Layer Addresses for an
	GTP end-point in the message. Value is 16.

9.2.3.30 NAS Security Parameters from E-UTRAN

The purpose of the *NAS Security Parameters from E-UTRAN* IE is to provide security related parameters for I-RAT handovers from E-UTRAN via the eNB to the UE.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
NAS Security Parameters from E-UTRAN	M		OCTET STRING	Coded as the value part of NAS security parameters from E-UTRA IE defined in TS 24.301 [24].

9.2.3.31 NAS Security Parameters to E-UTRAN

The purpose of the *NAS Security Parameters to E-UTRAN* IE is to provide security related parameters for I-RAT handovers to E-UTRAN via the RNC or BSS to the UE.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
NAS Security Parameters to E-UTRAN	M		OCTET STRING	Coded as the value part of NAS security parameters to E-UTRA
				IE defined in TS 24.301 [24].

9.2.3.32 LPPa-PDU

This information element contains an eNB-E-SMLC or E-SMLC-eNB message that is transferred without interpretation in the MME.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
LPPa-PDU	М		OCTET STRING	

9.2.3.33 Routing ID

This information element is used to identify an E-SMLC within the EPC.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Routing ID	М		INTEGER (0255)	

9.2.3.34 Time Synchronisation Info

The *Time Synchronisation Info* IE is used for signalling stratum level, synchronisation status and muting availability for over-the-air synchronisation using network listening.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Synchronisation Info						
>Stratum Level	М		INTEGER (03,)			
>Synchronisation status	M		ENUMERATED(Synchronous, Asynchronous,)			
>Muting Availability Indication	0		ENUMERATED (Available, Unavailable,)	Indicates availability of muting activation.	YES	ignore

9.2.3.35 Void

9.2.3.36 Traffic Load Reduction Indication

The *Traffic Load Reduction Indication* IE indicates the percentage of the type of traffic relative to the instantaneous incoming rate at the eNB, as indicated in the *Overload Action* IE, to be rejected.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Traffic Load Reduction Indication	М		INTEGER (199)	

9.2.3.37 Additional CS Fallback Indicator

The IE indicates whether the restrictions contained in the *Handover Restriction List* IE apply or not to the CS Fallback High Priority call.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Additional CS Fallback	M		ENUMERATED(no restriction,	
Indicator			restriction,)	

9.2.3.38 Masked IMEISV

This information element contains the IMEISV value with a mask, to identify a terminal model without identifying an individual Mobile Equipment.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Masked IMEISV	M		BIT STRING (SIZE (64))	Coded as the International Mobile station Equipment Identity and Software Version Number (IMEISV) defined in TS 23.003 [21] with the last 4 digits of the SNR masked by setting the corresponding bits to 1. The first to fourth bits correspond to the first digit of the IMEISV, the fifth to eighth bits correspond to the second digit of the IMEISV, and so on.

9.2.3.39 SON Information Report

This IE contains the configuration information to be transferred to the eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE SON Information Report	M			
>RLF Report Information				
>>RLF Report Information	M		9.2.3.40	

9.2.3.40 RLF Report Information

This IE contains the RLF report information to be transferred to the eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
UE RLF Report Container	M		OCTET STRING	rlf-Report-r9 contained in UEInformationResponse message as defined in TS 36.331 [16].
UE RLF Report Container for extended bands	0		OCTET STRING	rlf-Report-v9e0 contained in the UEInformationResponse message (TS 36.331 [16])
NB-IoT RLF Report Container	0		OCTET STRING	rlf-Report-NB-r16 contained in UEInformationResponse- NB message, as defined in TS 36.331 [16].

9.2.3.41 Muting Pattern Information

This information element contains muting pattern information that can be used for over-the-air synchronisation using network listening.

IE/Group Name	Presence	Range	IE type and	Semantics description
			reference	
Muting Pattern Period	M		ENUMERATED (0, 1280, 2560, 5120, 10240,)	Period for repetition of muted subframe in milliseconds. Value '0' indicates that the muting request is not fulfilled.
Muting Pattern Offset	0		INTEGER (010239,)	Offset in number of subframes of the muting pattern starting from subframe 0 in a radio frame where SFN = 0. If this IE is not present, the receiving eNB may consider the requested muting pattern offset in the former request has been accepted.

9.2.3.42 Synchronisation Information

This information element contains information concerning the cell selected as source of synchronisation signal by the sending eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Source Stratum Level	0		INTEGER (03,)	Stratum Level of cell selected as synchronisation source. The range of this IE is limited to 02.
Listening Subframe Pattern	0		9.2.3.43	Subframe pattern where the Reference Signals can be detected for synchronisation.
Aggressor Cell List		01		List of cells for which the muting pattern need to be activated.
>Aggressor E- CGI List		1 <max noofCell sineNB ></max 		
>>E-CGI	M		9.2.1.38	

Range bound	Explanation		
maxnoofCellsineNB	Maximum no. cells that can be served by an eNB. Value is 256.		

9.2.3.43 Listening Subframe Pattern

This information element contains information concerning the pattern of subframes where the reference signals can be detected for the purpose of over the air synchronisation via network listening.

IE/Group Name	Presence	Range	IE type and	Semantics description
			reference	
Pattern Period	M		ENUMERATED	Period in milliseconds for repetition of the
			(1280, 2560,	subframe where reference signals are
			5120, 10240,)	available.
Pattern Offset	M		INTEGER	Offset in number of subframes of the reference
			(010239,)	signals starting from subframe 0 in a radio
			·	frame where SFN = 0.

9.2.3.44 MME Group ID

This information element contains information concerning the MME Group ID that identifies a group of MME's.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
MME Group ID	М		OCTET STRING (SIZE(2))	The MME Group ID is defined in TS 23.003 [21]

9.2.3.45 Additional GUTI

This information element contains DCN related information to for identification of a CN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
GUMMEI	M		9.2.3.9	
M-TMSI	M		OCTET STRING	
			(SIZE (4))	

9.2.3.46 Extended UE Identity Index Value

The *Extended UE Identity Index Value* IE is used by the eNB to calculate the paging resources to be used for the UE, as defined in TS 36.304 [20].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Extended UE Identity Index Value	М		BIT STRING (SIZE(14))	Corresponds to the UE_ID used to determine the Paging Narrowband and the NB-IoT paging carrier as specified in TS 36.304 [20].

9.2.3.47 NB-IoT UE Identity Index Value

The *NB-IoT UE Identity Index Value* IE is used by the eNB to calculate the paging resources to be used for the UE, as defined in TS 36.304 [20].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
NB-IoT UE Identity Index Value	М		BIT STRING (SIZE(12))	Coded as specified in TS 36.304 [20].

9.2.3.48 DL NAS PDU Delivey Request

This IE indicates the request to acknowledge the successful delivery of a downlink NAS PDU as specified in TS 23.401 [11].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DL NAS PDU Delivery	М		ENUMERATED	
Request			(requested,)	

9.2.3.49 DL CP Security Information

The *DL CP Security Information* IE contains NAS level security information to be forwarded to the UE as described in TS 33.401 [15].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
DL NAS MAC	М		BIT STRING (SIZE(16))	Defined in TS 33.401 [15].

9.2.3.50 UL CP Security Information

The *UL CP Security Information* IE contains NAS level security information to enable UE authentication by the MME as described in TS 33.401 [15].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
UL NAS MAC	M		BIT STRING (SIZE(16))	Defined in TS 33.401 [15].
UL NAS Count	M		BIT STRING (SIZE(5))	Defined in TS 33.401 [15].

9.2.3.51 UE Capability Info Request

This IE indicates the request to provide to the MME the UE capability related information when retrieved from the UE.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
UE Capability Info Request	M		ENUMERATED	
			(requested,)	

9.2.3.52 5GS TAI

This information element is used to uniquely identify a 5GS Tracking Area.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
TAI				
>PLMN Identity	М		9.2.3.8	
>5GS TAC	М		9.2.3.53	

9.2.3.53 5GS TAC

This information element is used to uniquely identify a 5GS Tracking Area Code.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
5GS TAC	М		OCTET STRING (SIZE (3))	

9.2.3.54 End Indication

The End Indication IE indicates that there are no further NAS PDUs to be transmitted for this UE.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
End Indication	M		ENUMERAT	
			ED (no	
			further data,	
			further data	
			exists,)	

9.2.3.55 Pending Data Indication

This IE indicates that the MME is aware of pending signalling or data in the network for the UE, or that the MME expects a response from the UE.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Pending Data Indication	M		ENUMERATED (true,)	

9.3 Message and Information Element Abstract Syntax (with ASN.1)

9.3.0 General

S1AP ASN.1 definition conforms to ITU-T Rec. X.691 [4], ITU-T Rec. X.680 [5] and ITU-T Rec. X.681 [6].

The ASN.1 definition specifies the structure and content of S1AP messages. S1AP messages can contain any IEs specified in the object set definitions for that message without the order or number of occurrence being restricted by ASN.1. However, for this version of the standard, a sending entity shall construct a S1AP message according to the PDU definitions module and with the following additional rules:

- IEs shall be ordered (in an IE container) in the order they appear in object set definitions.
- Object set definitions specify how many times IEs may appear. An IE shall appear exactly once if the presence field in an object has value "mandatory". An IE may appear at most once if the presence field in an object has value "optional" or "conditional". If in a tabular format there is multiplicity specified for an IE (i.e., an IE list) then in the corresponding ASN.1 definition the list definition is separated into two parts. The first part defines an IE container list where the list elements reside. The second part defines list elements. The IE container list appears as an IE of its own. For this version of the standard an IE container list may contain only one kind of list elements.

NOTE: In the above "IE" means an IE in the object set with an explicit ID. If one IE needs to appear more than once in one object set, then the different occurrences will have different IE IDs.

If a S1AP message that is not constructed as defined above is received, this shall be considered as Abstract Syntax Error, and the message shall be handled as defined for Abstract Syntax Error in subclause 10.3.6.

Subclause 9.3 presents the Abstract Syntax of S1AP protocol with ASN.1. In case there is contradiction between the ASN.1 definition in this subclause and the tabular format in subclause 9.1 and 9.2, the ASN.1 shall take precedence, except for the definition of conditions for the presence of conditional elements, where the tabular format shall take precedence.

9.3.1 Usage of private message mechanism for non-standard use

The private message mechanism for non-standard use may be used:

- for special operator- (and/or vendor) specific features considered not to be part of the basic functionality, i.e., the functionality required for a complete and high-quality specification in order to guarantee multivendor interoperability;
- by vendors for research purposes, e.g., to implement and evaluate new algorithms/features before such features are proposed for standardisation.

The private message mechanism shall not be used for basic functionality. Such functionality shall be standardised.

9.3.2 Elementary Procedure Definitions

```
-- Elementary Procedure definitions
__ ********************
S1AP-PDU-Descriptions {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
eps-Access (21) modules (3) slap (1) version1 (1) slap-PDU-Descriptions (0)}
DEFINITIONS AUTOMATIC TAGS ::=
BEGIN
       -- IE parameter types from other modules.
__ *********************
IMPORTS
   Criticality,
   ProcedureCode
FROM S1AP-CommonDataTypes
   CellTrafficTrace,
   DeactivateTrace,
   DownlinkUEAssociatedLPPaTransport,
   DownlinkNASTransport,
   DownlinkNonUEAssociatedLPPaTransport,
   DownlinkS1cdma2000tunnelling,
   ENBDirectInformationTransfer,
   ENBStatusTransfer,
   ENBConfigurationUpdate,
   ENBConfigurationUpdateAcknowledge,
   ENBConfigurationUpdateFailure,
   ErrorIndication,
   HandoverCancel,
   HandoverCancelAcknowledge,
   HandoverCommand,
   HandoverFailure,
   HandoverNotify,
   HandoverPreparationFailure,
   HandoverRequest,
   HandoverRequestAcknowledge,
   HandoverRequired,
   InitialContextSetupFailure,
   InitialContextSetupRequest,
   InitialContextSetupResponse,
   InitialUEMessage,
   KillRequest,
```

KillResponse, LocationReportingControl, LocationReportingFailureIndication, LocationReport, MMEConfigurationUpdate, MMEConfigurationUpdateAcknowledge, MMEConfigurationUpdateFailure, MMEDirectInformationTransfer. MMEStatusTransfer, NASNonDeliveryIndication, OverloadStart, OverloadStop, Paging, PathSwitchRequest, PathSwitchRequestAcknowledge, PathSwitchRequestFailure, PrivateMessage, Reset, ResetAcknowledge, S1SetupFailure, S1SetupRequest, S1SetupResponse, E-RABModifyRequest, E-RABModifyResponse, E-RABModificationIndication, E-RABModificationConfirm, E-RABReleaseCommand, E-RABReleaseResponse, E-RABReleaseIndication, E-RABSetupRequest, E-RABSetupResponse, TraceFailureIndication, TraceStart, UECapabilityInfoIndication, UEContextModificationFailure, UEContextModificationRequest, UEContextModificationResponse, UEContextReleaseCommand, UEContextReleaseComplete, UEContextReleaseRequest, UERadioCapabilityMatchRequest, UERadioCapabilityMatchResponse, UplinkUEAssociatedLPPaTransport, UplinkNASTransport, UplinkNonUEAssociatedLPPaTransport, UplinkS1cdma2000tunnelling, WriteReplaceWarningRequest, WriteReplaceWarningResponse, ENBConfigurationTransfer, MMEConfigurationTransfer, PWSRestartIndication, UEContextModificationIndication, UEContextModificationConfirm, RerouteNASRequest,

```
PWSFailureIndication,
    UEContextSuspendRequest,
    UEContextSuspendResponse,
    UEContextResumeRequest,
    UEContextResumeResponse,
   UEContextResumeFailure,
    ConnectionEstablishmentIndication.
    NASDeliveryIndication.
    RetrieveUEInformation,
    UEInformationTransfer,
    ENBCPRelocationIndication,
   MMECPRelocationIndication,
    SecondaryRATDataUsageReport,
    UERadioCapabilityIDMappingRequest,
    UERadioCapabilityIDMappingResponse,
    HandoverSuccess,
    ENBEarlyStatusTransfer,
    MMEEarlyStatusTransfer
FROM S1AP-PDII-Contents
    id-CellTrafficTrace,
    id-DeactivateTrace,
    id-downlinkUEAssociatedLPPaTransport,
    id-downlinkNASTransport,
    id-downlinkNonUEAssociatedLPPaTransport,
    id-DownlinkS1cdma2000tunnelling,
    id-eNBStatusTransfer,
    id-ErrorIndication,
    id-HandoverCancel,
    id-HandoverNotification,
    id-HandoverPreparation,
    id-HandoverResourceAllocation,
    id-InitialContextSetup,
    id-initialUEMessage,
    id-ENBConfigurationUpdate,
    id-Kill,
    id-LocationReportingControl,
    id-LocationReportingFailureIndication,
    id-LocationReport,
    id-eNBDirectInformationTransfer,
    id-MMEConfigurationUpdate,
    id-MMEDirectInformationTransfer,
    id-MMEStatusTransfer,
    id-NASNonDeliveryIndication,
    id-OverloadStart,
    id-OverloadStop,
    id-Paging,
    id-PathSwitchRequest,
    id-PrivateMessage,
    id-Reset,
    id-S1Setup,
   id-E-RABModify,
```

```
id-E-RABModificationIndication,
   id-E-RABRelease,
   id-E-RABReleaseIndication.
   id-E-RABSetup,
   id-TraceFailureIndication,
   id-TraceStart,
   id-UECapabilityInfoIndication,
   id-UEContextModification,
   id-UEContextRelease,
   id-UEContextReleaseRequest,
   id-UERadioCapabilityMatch,
   id-uplinkUEAssociatedLPPaTransport,
   id-uplinkNASTransport,
   id-uplinkNonUEAssociatedLPPaTransport,
   id-UplinkS1cdma2000tunnelling,
   id-WriteReplaceWarning,
   id-eNBConfigurationTransfer,
   id-MMEConfigurationTransfer,
   id-PWSRestartIndication,
   id-UEContextModificationIndication,
   id-RerouteNASRequest,
   id-PWSFailureIndication,
   id-UEContextSuspend,
   id-UEContextResume,
   id-ConnectionEstablishmentIndication,
   id-NASDeliveryIndication,
   id-RetrieveUEInformation,
   id-UEInformationTransfer,
   id-eNBCPRelocationIndication,
   id-MMECPRelocationIndication,
   id-SecondaryRATDataUsageReport,
   id-UERadioCapabilityIDMapping,
   id-HandoverSuccess.
   id-eNBEarlyStatusTransfer,
   id-MMEEarlyStatusTransfer
FROM S1AP-Constants;
-- Interface Elementary Procedure Class
__ *******************
S1AP-ELEMENTARY-PROCEDURE ::= CLASS {
   &InitiatingMessage
   &SuccessfulOutcome
                                               OPTIONAL,
   &UnsuccessfulOutcome
                                               OPTIONAL,
                                              UNIQUE,
   &procedureCode
                               ProcedureCode
   &criticality
                               Criticality
                                               DEFAULT ignore
WITH SYNTAX {
```

```
&InitiatingMessage
   INITIATING MESSAGE
   [SUCCESSFUL OUTCOME
                              &SuccessfulOutcomel
   [UNSUCCESSFUL OUTCOME
                              &UnsuccessfulOutcomel
   PROCEDURE CODE
                              &procedureCode
   [CRITICALITY
                              &criticality]
    ****************
  Interface PDU Definition
  ****************
S1AP-PDU ::= CHOICE {
   initiatingMessage
                      InitiatingMessage,
   successfulOutcome
                      SuccessfulOutcome,
   unsuccessfulOutcome UnsuccessfulOutcome,
InitiatingMessage ::= SEQUENCE
                                                                ({S1AP-ELEMENTARY-PROCEDURES}),
   procedureCode S1AP-ELEMENTARY-PROCEDURE.&procedureCode
                                                                ({S1AP-ELEMENTARY-PROCEDURES}{@procedureCode}),
   criticality
                  S1AP-ELEMENTARY-PROCEDURE.&criticality
                                                                ({S1AP-ELEMENTARY-PROCEDURES}{@procedureCode})
   value
                  S1AP-ELEMENTARY-PROCEDURE.&InitiatingMessage
SuccessfulOutcome ::= SEOUENCE {
   procedureCode
                  S1AP-ELEMENTARY-PROCEDURE.&procedureCode
                                                                ({S1AP-ELEMENTARY-PROCEDURES}),
                                                                (\(\frac{1}{51AP-ELEMENTARY-PROCEDURES\)\(\frac{1}{6}\)\(\text{procedureCode}\)\),
   criticality
                  S1AP-ELEMENTARY-PROCEDURE.&criticality
                                                                ({S1AP-ELEMENTARY-PROCEDURES}{@procedureCode})
   value
                  S1AP-ELEMENTARY-PROCEDURE.&SuccessfulOutcome
UnsuccessfulOutcome ::= SEQUENCE {
   procedureCode S1AP-ELEMENTARY-PROCEDURE.&procedureCode
                                                                ({S1AP-ELEMENTARY-PROCEDURES}),
                                                                ({S1AP-ELEMENTARY-PROCEDURES}{@procedureCode}).
   criticality
                  S1AP-ELEMENTARY-PROCEDURE.&criticality
                                                               ({S1AP-ELEMENTARY-PROCEDURES}{@procedureCode})
   value
                  S1AP-ELEMENTARY-PROCEDURE. & UnsuccessfulOutcome
      -- Interface Elementary Procedure List
S1AP-ELEMENTARY-PROCEDURES S1AP-ELEMENTARY-PROCEDURE ::= {
   S1AP-ELEMENTARY-PROCEDURES-CLASS-1
   S1AP-ELEMENTARY-PROCEDURES-CLASS-2,
S1AP-ELEMENTARY-PROCEDURES-CLASS-1 S1AP-ELEMENTARY-PROCEDURE ::= {
   handoverPreparation
   handoverResourceAllocation
```

```
pathSwitchRequest
    e-RABSetup
    e-RABModify
    e-RABRelease
    initialContextSetup
    handoverCancel
    kill
    reset
    s1Setup
    uEContextModification
    uEContextRelease
    eNBConfigurationUpdate
    mMEConfigurationUpdate
    writeReplaceWarning
    uERadioCapabilityMatch
    e-RABModificationIndication
    uEContextModificationIndication
    uEContextSuspend
    uEContextResume
    uERadioCapabilityIDMapping
S1AP-ELEMENTARY-PROCEDURES-CLASS-2 S1AP-ELEMENTARY-PROCEDURE ::= {
    handoverNotification
    e-RABReleaseIndication
    paging
    downlinkNASTransport
    initialUEMessage
    uplinkNASTransport
    errorIndication
    nASNonDeliveryIndication
    uEContextReleaseRequest
    downlinkS1cdma2000tunnelling
    uplinkS1cdma2000tunnelling
    uECapabilityInfoIndication
    eNBStatusTransfer
    mMEStatusTransfer
    deactivateTrace
    traceStart
    traceFailureIndication
    cellTrafficTrace
    locationReportingControl
    {\tt location} {\tt ReportingFailureIndication}
    locationReport
    overloadStart
    overloadStop
    eNBDirectInformationTransfer
    mMEDirectInformationTransfer
    eNBConfigurationTransfer
    mMEConfigurationTransfer
    privateMessage
    downlinkUEAssociatedLPPaTransport
```

```
uplinkUEAssociatedLPPaTransport
   downlinkNonUEAssociatedLPPaTransport
   uplinkNonUEAssociatedLPPaTransport
   pWSRestartIndication
   rerouteNASRequest
   pWSFailureIndication
    connectionEstablishmentIndication
   nASDelivervIndication
   retrieveUEInformation
   uEInformationTransfer
   eNBCPRelocationIndication
   mMECPRelocationIndication
   secondaryRATDataUsageReport
   handoverSuccess
   eNBEarlyStatusTransfer
   mMEEarlyStatusTransfer
-- Interface Elementary Procedures
        handoverPreparation S1AP-ELEMENTARY-PROCEDURE ::= {
   INITIATING MESSAGE
                           HandoverRequired
                           HandoverCommand
   SUCCESSFUL OUTCOME
   UNSUCCESSFUL OUTCOME
                           HandoverPreparationFailure
                           id-HandoverPreparation
   PROCEDURE CODE
   CRITICALITY
                           reject
handoverResourceAllocation S1AP-ELEMENTARY-PROCEDURE ::= {
                           HandoverRequest
   INITIATING MESSAGE
                           HandoverRequestAcknowledge
   SUCCESSFUL OUTCOME
                           HandoverFailure
   UNSUCCESSFUL OUTCOME
   PROCEDURE CODE
                           id-HandoverResourceAllocation
   CRITICALITY
                           reject
handoverNotification S1AP-ELEMENTARY-PROCEDURE ::= {
   INITIATING MESSAGE
                           HandoverNotify
   PROCEDURE CODE
                           id-HandoverNotification
   CRITICALITY
                           ignore
pathSwitchRequest S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                           PathSwitchRequest
                           PathSwitchRequestAcknowledge
   SUCCESSFUL OUTCOME
                           PathSwitchRequestFailure
   UNSUCCESSFUL OUTCOME
                           id-PathSwitchRequest
    PROCEDURE CODE
   CRITICALITY
                           reject
```

```
e-RABSetup S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            E-RABSetupRequest
    SUCCESSFUL OUTCOME
                            E-RABSetupResponse
    PROCEDURE CODE
                            id-E-RABSetup
    CRITICALITY
                            reject
e-RABModify S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            E-RABModifyRequest
                            E-RABModifyResponse
    SUCCESSFUL OUTCOME
    PROCEDURE CODE
                            id-E-RABModify
    CRITICALITY
                            reject
e-RABRelease S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            E-RABReleaseCommand
                            E-RABReleaseResponse
    SUCCESSFUL OUTCOME
                            id-E-RABRelease
    PROCEDURE CODE
    CRITICALITY
                            reject
e-RABReleaseIndication S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            E-RABReleaseIndication
    PROCEDURE CODE
                            id-E-RABReleaseIndication
    CRITICALITY
                            ignore
initialContextSetup S1AP-ELEMENTARY-PROCEDURE ::= {
                            InitialContextSetupRequest
    INITIATING MESSAGE
                            InitialContextSetupResponse
    SUCCESSFUL OUTCOME
    UNSUCCESSFUL OUTCOME
                            InitialContextSetupFailure
    PROCEDURE CODE
                            id-InitialContextSetup
    CRITICALITY
                            reject
uEContextReleaseRequest S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            UEContextReleaseRequest
    PROCEDURE CODE
                            id-UEContextReleaseRequest
    CRITICALITY
                            ignore
paging S1AP-ELEMENTARY-PROCEDURE ::= {
                            Paging
    INITIATING MESSAGE
    PROCEDURE CODE
                            id-Paging
                            ignore
    CRITICALITY
downlinkNASTransport S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            DownlinkNASTransport
                            id-downlinkNASTransport
    PROCEDURE CODE
    CRITICALITY
                            ignore
initialUEMessage S1AP-ELEMENTARY-PROCEDURE ::= {
```

```
InitialUEMessage
    INITIATING MESSAGE
    PROCEDURE CODE
                            id-initialUEMessage
    CRITICALITY
                            ignore
uplinkNASTransport S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            UplinkNASTransport
                            id-uplinkNASTransport
    PROCEDURE CODE
    CRITICALITY
                            ignore
nASNonDeliveryIndication S1AP-ELEMENTARY-PROCEDURE ::= {
                            NASNonDeliveryIndication
    INITIATING MESSAGE
    PROCEDURE CODE
                            id-NASNonDeliveryIndication
    CRITICALITY
                            ignore
handoverCancel S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            HandoverCancel
                            HandoverCancelAcknowledge
    SUCCESSFUL OUTCOME
    PROCEDURE CODE
                            id-HandoverCancel
    CRITICALITY
                            reject
reset S1AP-ELEMENTARY-PROCEDURE ::= {
                            Reset
    INITIATING MESSAGE
    SUCCESSFUL OUTCOME
                            ResetAcknowledge
                            id-Reset
    PROCEDURE CODE
    CRITICALITY
                            reject
errorIndication S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            ErrorIndication
    PROCEDURE CODE
                            id-ErrorIndication
    CRITICALITY
                            ignore
s1Setup S1AP-ELEMENTARY-PROCEDURE ::= {
                            S1SetupRequest
    INITIATING MESSAGE
                            S1SetupResponse
    SUCCESSFUL OUTCOME
    UNSUCCESSFUL OUTCOME
                            S1SetupFailure
                            id-S1Setup
    PROCEDURE CODE
    CRITICALITY
                            reject
eNBConfigurationUpdate S1AP-ELEMENTARY-PROCEDURE ::= {
                            ENBConfigurationUpdate
    INITIATING MESSAGE
                            ENBConfigurationUpdateAcknowledge
    SUCCESSFUL OUTCOME
                            ENBConfigurationUpdateFailure
    UNSUCCESSFUL OUTCOME
    PROCEDURE CODE
                            id-ENBConfigurationUpdate
                            reject
    CRITICALITY
mMEConfigurationUpdate S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            MMEConfigurationUpdate
```

```
MMEConfigurationUpdateAcknowledge
    SUCCESSFUL OUTCOME
    UNSUCCESSFUL OUTCOME
                            MMEConfigurationUpdateFailure
    PROCEDURE CODE
                            id-MMEConfigurationUpdate
    CRITICALITY
                            reject
downlinkS1cdma2000tunnelling S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            DownlinkS1cdma2000tunnelling
    PROCEDURE CODE
                            id-DownlinkS1cdma2000tunnelling
    CRITICALITY
                            ignore
uplinkSlcdma2000tunnelling SlAP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            UplinkS1cdma2000tunnelling
    PROCEDURE CODE
                            id-UplinkS1cdma2000tunnelling
    CRITICALITY
                            ignore
uEContextModification S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            UEContextModificationRequest
    SUCCESSFUL OUTCOME
                            UEContextModificationResponse
                            UEContextModificationFailure
    UNSUCCESSFUL OUTCOME
    PROCEDURE CODE
                            id-UEContextModification
    CRITICALITY
                            reject
uECapabilityInfoIndication S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            UECapabilityInfoIndication
                            id-UECapabilityInfoIndication
    PROCEDURE CODE
    CRITICALITY
                            ignore
uEContextRelease S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            UEContextReleaseCommand
    SUCCESSFUL OUTCOME
                            UEContextReleaseComplete
                            id-UEContextRelease
    PROCEDURE CODE
    CRITICALITY
                            reject
eNBStatusTransfer S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            ENBStatusTransfer
    PROCEDURE CODE
                            id-eNBStatusTransfer
    CRITICALITY
                            ignore
mMEStatusTransfer S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            MMEStatusTransfer
    PROCEDURE CODE
                            id-MMEStatusTransfer
    CRITICALITY
                            ignore
deactivateTrace S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            DeactivateTrace
    PROCEDURE CODE
                            id-DeactivateTrace
```

```
CRITICALITY
                            ignore
traceStart S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            TraceStart.
    PROCEDURE CODE
                            id-TraceStart
    CRITICALITY
                            ignore
traceFailureIndication S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            TraceFailureIndication
    PROCEDURE CODE
                            id-TraceFailureIndication
    CRITICALITY
                            ignore
cellTrafficTrace S1AP-ELEMENTARY-PROCEDURE ::={
    INITIATING MESSAGE
                            CellTrafficTrace
                            id-CellTrafficTrace
    PROCEDURE CODE
    CRITICALITY
                            ignore
locationReportingControl S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            LocationReportingControl
    PROCEDURE CODE
                            id-LocationReportingControl
    CRITICALITY
                            ignore
locationReportingFailureIndication S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            LocationReportingFailureIndication
    PROCEDURE CODE
                            id-LocationReportingFailureIndication
    CRITICALITY
                            ignore
locationReport S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            LocationReport
                            id-LocationReport
    PROCEDURE CODE
    CRITICALITY
                            ignore
overloadStart S1AP-ELEMENTARY-PROCEDURE ::=
    INITIATING MESSAGE
                            OverloadStart
    PROCEDURE CODE
                            id-OverloadStart
    CRITICALITY
                            ignore
overloadStop S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            OverloadStop
    PROCEDURE CODE
                            id-OverloadStop
    CRITICALITY
                            reject
writeReplaceWarning S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            WriteReplaceWarningRequest
    SUCCESSFUL OUTCOME
                            WriteReplaceWarningResponse
    PROCEDURE CODE
                            id-WriteReplaceWarning
```

```
CRITICALITY
                            reject
eNBDirectInformationTransfer S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            ENBDirectInformationTransfer
    PROCEDURE CODE
                            id-eNBDirectInformationTransfer
    CRITICALITY
                            ignore
mMEDirectInformationTransfer S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            MMEDirectInformationTransfer
    PROCEDURE CODE
                            id-MMEDirectInformationTransfer
    CRITICALITY
                            ignore
eNBConfigurationTransfer S1AP-ELEMENTARY-PROCEDURE ::= {
                            ENBConfigurationTransfer
    INITIATING MESSAGE
                            id-eNBConfigurationTransfer
    PROCEDURE CODE
    CRITICALITY
                            ignore
mMEConfigurationTransfer S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            MMEConfigurationTransfer
                            id-MMEConfigurationTransfer
    PROCEDURE CODE
    CRITICALITY
                            ignore
privateMessage S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            PrivateMessage
    PROCEDURE CODE
                            id-PrivateMessage
    CRITICALITY
                            ignore
pWSRestartIndication S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            PWSRestartIndication
    PROCEDURE CODE
                            id-PWSRestartIndication
    CRITICALITY
                            ignore
kill S1AP-ELEMENTARY-PROCEDURE ::= {
                            KillRequest
    INITIATING MESSAGE
                            KillResponse
    SUCCESSFUL OUTCOME
    PROCEDURE CODE
                            id-Kill
    CRITICALITY
                            reject
downlinkUEAssociatedLPPaTransport S1AP-ELEMENTARY-PROCEDURE ::= {
                            DownlinkUEAssociatedLPPaTransport
    INITIATING MESSAGE
                            id-downlinkUEAssociatedLPPaTransport
    PROCEDURE CODE
    CRITICALITY
                            ignore
uplinkUEAssociatedLPPaTransport S1AP-ELEMENTARY-PROCEDURE ::= {
```

```
UplinkUEAssociatedLPPaTransport
    INITIATING MESSAGE
    PROCEDURE CODE
                            id-uplinkUEAssociatedLPPaTransport
    CRITICALITY
                            ignore
downlinkNonUEAssociatedLPPaTransport S1AP-ELEMENTARY-PROCEDURE ::= {
                            DownlinkNonUEAssociatedLPPaTransport
    INITIATING MESSAGE
    PROCEDURE CODE
                            id-downlinkNonUEAssociatedLPPaTransport
    CRITICALITY
                            ignore
uplinkNonUEAssociatedLPPaTransport S1AP-ELEMENTARY-PROCEDURE ::= {
                            UplinkNonUEAssociatedLPPaTransport
    INITIATING MESSAGE
    PROCEDURE CODE
                            id-uplinkNonUEAssociatedLPPaTransport
    CRITICALITY
                            ignore
uERadioCapabilityMatch S1AP-ELEMENTARY-PROCEDURE ::= {
                            UERadioCapabilityMatchRequest
    INITIATING MESSAGE
                            UERadioCapabilityMatchResponse
    SUCCESSFUL OUTCOME
    PROCEDURE CODE
                            id-UERadioCapabilityMatch
    CRITICALITY
                            reject
e-RABModificationIndication S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            E-RABModificationIndication
    SUCCESSFUL OUTCOME
                            E-RABModificationConfirm
                            id-E-RABModificationIndication
    PROCEDURE CODE
    CRITICALITY
                            reject
uEContextModificationIndication S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            UEContextModificationIndication
    SUCCESSFUL OUTCOME
                            UEContextModificationConfirm
    PROCEDURE CODE
                            id-UEContextModificationIndication
    CRITICALITY
                            reject
rerouteNASRequest S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            RerouteNASRequest
    PROCEDURE CODE
                            id-RerouteNASRequest
    CRITICALITY
                            reject
pWSFailureIndication S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            PWSFailureIndication
                            id-PWSFailureIndication
    PROCEDURE CODE
    CRITICALITY
                            ignore
uEContextSuspend S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            UEContextSuspendRequest
    SUCCESSFUL OUTCOME
                            UEContextSuspendResponse
    PROCEDURE CODE
                            id-UEContextSuspend
    CRITICALITY
                            reject
```

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```
uEContextResume S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            UEContextResumeRequest
    SUCCESSFUL OUTCOME
                            UEContextResumeResponse
                            UEContextResumeFailure
    UNSUCCESSFUL OUTCOME
                            id-UEContextResume
    PROCEDURE CODE
    CRITICALITY
                            reject
connectionEstablishmentIndication S1AP-ELEMENTARY-PROCEDURE ::= {
                            ConnectionEstablishmentIndication
    INITIATING MESSAGE
    PROCEDURE CODE
                            id-ConnectionEstablishmentIndication
    CRITICALITY
                            reject
nASDeliveryIndication S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            NASDeliveryIndication
                            id-NASDeliveryIndication
    PROCEDURE CODE
    CRITICALITY
                            ignore
retrieveUEInformation S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            RetrieveUEInformation
    PROCEDURE CODE
                            id-RetrieveUEInformation
    CRITICALITY
                            reject
uEInformationTransfer S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            UEInformationTransfer
    PROCEDURE CODE
                            id-UEInformationTransfer
    CRITICALITY
                            reject
eNBCPRelocationIndication S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            ENBCPRelocationIndication
    PROCEDURE CODE
                            id-eNBCPRelocationIndication
    CRITICALITY
                            reject
mMECPRelocationIndication S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            MMECPRelocationIndication
    PROCEDURE CODE
                            id-MMECPRelocationIndication
    CRITICALITY
                            reject
secondaryRATDataUsageReport S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            SecondaryRATDataUsageReport
    PROCEDURE CODE
                            id-SecondaryRATDataUsageReport
    CRITICALITY
                        ignore
uERadioCapabilityIDMapping S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            UERadioCapabilityIDMappingRequest
```

```
UERadioCapabilityIDMappingResponse
    SUCCESSFUL OUTCOME
    PROCEDURE CODE
                            id-UERadioCapabilityIDMapping
    CRITICALITY
                            reject
handoverSuccess S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            HandoverSuccess
    PROCEDURE CODE
                            id-HandoverSuccess
    CRITICALITY
                            ignore
eNBEarlyStatusTransfer S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            ENBEarlyStatusTransfer
    PROCEDURE CODE
                            id-eNBEarlyStatusTransfer
    CRITICALITY
                            reject
mMEEarlyStatusTransfer S1AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE
                            {\tt MMEEarlyStatusTransfer}
    PROCEDURE CODE
                            id-MMEEarlyStatusTransfer
    CRITICALITY
                            ignore
END
```

9.3.3 PDU Definitions

```
__ ***********************
-- PDU definitions for S1AP.
__ ********************
S1AP-PDU-Contents {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
eps-Access (21) modules (3) slap (1) version1 (1) slap-PDU-Contents (1) }
DEFINITIONS AUTOMATIC TAGS ::=
BEGIN
       *****************
-- IE parameter types from other modules.
__ *********************
IMPORTS
   UEAggregateMaximumBitrate,
   BearerType,
   Cause,
   CellAccessMode,
   Cdma2000HORequiredIndication,
   Cdma2000HOStatus,
   Cdma20000neXSRVCCInfo,
   Cdma20000neXRAND,
   Cdma2000PDU,
   Cdma2000RATType,
   Cdma2000SectorID,
   EUTRANRoundTripDelayEstimationInfo,
   CNDomain,
   ConcurrentWarningMessageIndicator,
   CriticalityDiagnostics,
   CSFallbackIndicator,
   CSG-Id,
   CSG-IdList,
   CSGMembershipStatus,
   Data-Forwarding-Not-Possible,
   Direct-Forwarding-Path-Availability,
   Global-ENB-ID,
   EUTRAN-CGI,
   ENBname,
   ENB-StatusTransfer-TransparentContainer,
   ENB-UE-S1AP-ID,
   ExtendedRepetitionPeriod,
   GTP-TEID,
   GUMMEI,
```

```
GUMMEIType,
HandoverRestrictionList,
HandoverType,
Masked-IMEISV,
LAI.
LPPa-PDU,
ManagementBasedMDTAllowed,
MDTPLMNList,
MMEname,
MMERelaySupportIndicator,
MME-UE-S1AP-ID,
MSClassmark2,
MSClassmark3,
NAS-PDU.
NASSecurityParametersfromE-UTRAN,
NASSecurityParameterstoE-UTRAN,
OverloadResponse,
PagingDRX,
PagingPriority,
PLMNidentity,
ProSeAuthorized,
RIMTransfer,
RelativeMMECapacity,
RequestType,
E-RAB-ID,
E-RABLevelQoSParameters,
E-RABList,
RelayNode-Indicator,
Routing-ID,
SecurityKey,
SecurityContext,
ServedGUMMEIs,
SONConfigurationTransfer,
Source-ToTarget-TransparentContainer,
SourceBSS-ToTargetBSS-TransparentContainer,
SourceeNB-ToTargeteNB-TransparentContainer,
SourceRNC-ToTargetRNC-TransparentContainer,
SubscriberProfileIDforRFP,
SRVCCOperationNotPossible,
SRVCCOperationPossible,
SRVCCHOIndication,
SupportedTAs,
TAI,
Target-ToSource-TransparentContainer,
TargetBSS-ToSourceBSS-TransparentContainer,
TargeteNB-ToSourceeNB-TransparentContainer,
TargetID,
TargetRNC-ToSourceRNC-TransparentContainer,
TimeToWait,
TraceActivation,
TrafficLoadReductionIndication,
E-UTRAN-Trace-ID,
TransportLayerAddress,
UEIdentityIndexValue,
```

```
UEPagingID,
UERadioCapability,
UERadioCapabilityForPaging,
UE-RetentionInformation,
UE-S1AP-IDs.
UE-associatedLogicalS1-ConnectionItem,
UESecurityCapabilities,
S-TMSI,
MessageIdentifier,
SerialNumber,
WarningAreaList,
RepetitionPeriod,
NumberofBroadcastRequest,
WarningType,
WarningSecurityInfo,
DataCodingScheme,
WarningMessageContents,
BroadcastCompletedAreaList,
RRC-Establishment-Cause,
BroadcastCancelledAreaList,
PS-ServiceNotAvailable,
GUMMEIList.
Correlation-ID,
GWContextReleaseIndication,
PrivacyIndicator,
VoiceSupportMatchIndicator,
TunnelInformation,
KillAllWarningMessages,
TransportInformation,
LHN-ID,
UserLocationInformation,
AdditionalCSFallbackIndicator,
ECGIListForRestart,
TAIListForRestart,
EmergencyAreaIDListForRestart,
ExpectedUEBehaviour,
Paging-eDRXInformation,
Extended-UEIdentityIndexValue,
MME-Group-ID,
Additional-GUTI,
PWSfailedECGIList,
CellIdentifierAndCELevelForCECapableUEs,
AssistanceDataForPaging,
InformationOnRecommendedCellsAndENBsForPaging,
UE-Usage-Type,
UEUserPlaneCIoTSupportIndicator,
NB-IoT-DefaultPagingDRX,
NB-IoT-Paging-eDRXInformation,
CE-mode-B-SupportIndicator,
NB-IoT-UEIdentityIndexValue,
V2XServicesAuthorized,
DCN-ID,
ServedDCNs,
UESidelinkAggregateMaximumBitrate,
```

```
DLNASPDUDeliveryAckRequest,
    Coverage-Level,
    EnhancedCoverageRestricted,
    DL-CP-SecurityInformation,
    UL-CP-SecurityInformation,
    SecondaryRATDataUsageRequest,
    SecondaryRATDataUsageReportList,
    HandoverFlag,
    NRUESecurityCapabilities,
    UE-Application-Layer-Measurement-Capability,
    CE-ModeBRestricted,
    Packet-LossRate,
    UECapabilityInfoRequest,
    SourceNgRanNode-ToTargetNgRanNode-TransparentContainer,
    TargetNgRanNode-ToSourceNgRanNode-TransparentContainer,
    EndIndication,
    EDT-Session,
    LTE-M-Indication,
    AerialUEsubscriptionInformation,
    PendingDataIndication,
    WarningAreaCoordinates,
    Subscription-Based-UE-DifferentiationInfo,
    PSCellInformation,
    NR-CGI,
    ConnectedengNBList,
    EN-DCSONConfigurationTransfer,
    TimeSinceSecondaryNodeRelease,
    Additional RRMPriority Index,
    IAB-Authorized,
    IAB-Node-Indication,
    IAB-Supported,
    DataSize,
    Ethernet-Type,
    NRV2XServicesAuthorized,
   NRUESidelinkAggregateMaximumBitrate,
    PC5QoSParameters,
    IntersystemSONConfigurationTransfer,
    UERadioCapabilityID,
    NotifySourceeNB,
    ENB-EarlyStatusTransfer-TransparentContainer,
    WUS-Assistance-Information,
    NB-IoT-PagingDRX
FROM S1AP-IEs
    PrivateIE-Container{},
    ProtocolExtensionContainer{},
    ProtocolIE-Container{},
    ProtocolIE-ContainerList{},
    ProtocolIE-ContainerPair{},
    ProtocolIE-ContainerPairList{},
```

```
ProtocolIE-SingleContainer{},
    S1AP-PRIVATE-IES,
    S1AP-PROTOCOL-EXTENSION,
    S1AP-PROTOCOL-IES,
    S1AP-PROTOCOL-IES-PAIR
FROM S1AP-Containers
    id-AssistanceDataForPaging,
    id-AerialUEsubscriptionInformation,
    id-uEaggregateMaximumBitrate,
    id-BearerType,
    id-Cause,
    id-CellAccessMode.
    id-CellIdentifierAndCELevelForCECapableUEs,
    id-cdma2000HORequiredIndication,
    id-cdma2000HOStatus,
    id-cdma20000neXSRVCCInfo,
    id-cdma20000neXRAND,
    id-cdma2000PDU,
    id-cdma2000RATType,
    id-cdma2000SectorID,
    id-EUTRANRoundTripDelayEstimationInfo,
    id-CNDomain,
    id-ConcurrentWarningMessageIndicator,
    id-CriticalityDiagnostics,
    id-CSFallbackIndicator,
    id-CSG-Id,
    id-CSG-IdList,
    id-CSGMembershipStatus,
    id-Data-Forwarding-Not-Possible,
    id-DefaultPagingDRX,
    id-Direct-Forwarding-Path-Availability,
    id-Global-ENB-ID,
    id-EUTRAN-CGI,
    id-eNBname,
    id-eNB-StatusTransfer-TransparentContainer,
    id-eNB-UE-S1AP-ID,
    id-GERANtoLTEHOInformationRes,
    id-GUMMEI-ID,
    id-GUMMEIType,
    id-HandoverRestrictionList,
    id-HandoverType,
    id-Masked-IMEISV,
    id-InformationOnRecommendedCellsAndENBsForPaging,
    id-InitialContextSetup,
    id-Inter-SystemInformationTransferTypeEDT,
    id-Inter-SystemInformationTransferTypeMDT,
    id-LPPa-PDU,
    id-NAS-DownlinkCount,
    id-ManagementBasedMDTAllowed,
    id-ManagementBasedMDTPLMNList,
    id-MMEname,
    id-MME-UE-S1AP-ID,
```

```
id-MSClassmark2,
id-MSClassmark3.
id-NAS-PDU.
id-NASSecurityParametersfromE-UTRAN,
id-NASSecurityParameterstoE-UTRAN,
id-OverloadResponse,
id-pagingDRX,
id-PagingPriority,
id-RelativeMMECapacity,
id-RequestType,
id-Routing-ID,
id-E-RABAdmittedItem,
id-E-RABAdmittedList,
id-E-RABDataForwardingItem,
id-E-RABFailedToModifyList,
id-E-RABFailedToReleaseList,
id-E-RABFailedtoSetupItemHORegAck,
id-E-RABFailedToSetupListBearerSURes,
id-E-RABFailedToSetupListCtxtSURes,
id-E-RABFailedToSetupListHOReqAck,
id-E-RABFailedToBeReleasedList,
id-E-RABFailedToResumeListResumeReq,
id-E-RABFailedToResumeItemResumeReq,
id-E-RABFailedToResumeListResumeRes,
id-E-RABFailedToResumeItemResumeRes,
id-E-RABModify,
id-E-RABModifyItemBearerModRes,
id-E-RABModifyListBearerModRes,
id-E-RABRelease,
id-E-RABReleaseItemBearerRelComp,
id-E-RABReleaseItemHOCmd,
id-E-RABReleaseListBearerRelComp,
id-E-RABReleaseIndication,
id-E-RABSetup,
id-E-RABSetupItemBearerSURes,
id-E-RABSetupItemCtxtSURes,
id-E-RABSetupListBearerSURes,
id-E-RABSetupListCtxtSURes,
id-E-RABSubjecttoDataForwardingList,
id-E-RABToBeModifiedItemBearerModReg,
id-E-RABToBeModifiedListBearerModReg,
id-E-RABToBeModifiedListBearerModInd,
id-E-RABToBeModifiedItemBearerModInd,
id-E-RABNotToBeModifiedListBearerModInd,
id-E-RABNotToBeModifiedItemBearerModInd.
id-E-RABModifyListBearerModConf,
id-E-RABModifyItemBearerModConf,
id-E-RABFailedToModifyListBearerModConf,
id-E-RABToBeReleasedListBearerModConf.
id-E-RABToBeReleasedList,
id-E-RABReleasedList,
id-E-RABToBeSetupItemBearerSUReg,
id-E-RABToBeSetupItemCtxtSUReq,
id-E-RABToBeSetupItemHOReq,
```

```
id-E-RABToBeSetupListBearerSUReg,
id-E-RABToBeSetupListCtxtSUReq,
id-E-RABToBeSetupListHOReg.
id-E-RABToBeSwitchedDLItem,
id-E-RABToBeSwitchedDLList.
id-E-RABToBeSwitchedULList,
id-E-RABToBeSwitchedULItem,
id-E-RABtoReleaseListHOCmd,
id-ProSeAuthorized.
id-SecurityKey,
id-SecurityContext,
id-ServedGUMMEIs,
id-SONConfigurationTransferECT,
id-SONConfigurationTransferMCT,
id-Source-ToTarget-TransparentContainer,
id-Source-ToTarget-TransparentContainer-Secondary,
id-SourceMME-UE-S1AP-ID,
id-SRVCCOperationNotPossible,
id-SRVCCOperationPossible,
id-SRVCCHOIndication,
id-SubscriberProfileIDforRFP.
id-SupportedTAs,
id-S-TMSI,
id-TAI,
id-TAIItem,
id-TAIList.
id-Target-ToSource-TransparentContainer,
id-Target-ToSource-TransparentContainer-Secondary,
id-TargetID,
id-TimeToWait,
id-TraceActivation.
id-TrafficLoadReductionIndication,
id-E-UTRAN-Trace-ID,
id-UEIdentityIndexValue,
id-UEPagingID,
id-UERadioCapability,
id-UERadioCapabilityForPaging,
id-UTRANtoLTEHOInformationRes,
id-UE-associatedLogicalS1-ConnectionListResAck,
id-UE-associatedLogicalS1-ConnectionItem,
id-UE-RetentionInformation,
id-UESecurityCapabilities,
id-UE-S1AP-IDs,
id-V2XServicesAuthorized,
id-ResetType,
id-MessageIdentifier,
id-SerialNumber,
id-WarningAreaList,
id-RepetitionPeriod,
id-NumberofBroadcastRequest,
id-WarningType,
id-WarningSecurityInfo,
id-DataCodingScheme,
id-WarningMessageContents,
```

```
id-BroadcastCompletedAreaList,
id-BroadcastCancelledAreaList.
id-RRC-Establishment-Cause.
id-TraceCollectionEntityIPAddress,
id-AdditionalRRMPriorityIndex,
id-MDTConfigurationNR,
maxnoofTAIs,
maxnoofErrors,
maxnoofE-RABs.
maxnoofIndividualS1ConnectionsToReset,
maxnoofEmergencyAreaID,
maxnoofCellID,
maxnoofTAIforWarning,
maxnoofCellinTAI,
maxnoofCellinEAI,
id-ExtendedRepetitionPeriod,
id-PS-ServiceNotAvailable,
id-RegisteredLAI,
id-GUMMEIList,
id-SourceMME-GUMMEI,
id-MME-UE-S1AP-ID-2,
id-GW-TransportLayerAddress,
id-RelayNode-Indicator,
id-Correlation-ID,
id-MMERelaySupportIndicator,
id-GWContextReleaseIndication,
id-PrivacyIndicator,
id-VoiceSupportMatchIndicator,
id-Tunnel-Information-for-BBF,
id-SIPTO-Correlation-ID,
id-SIPTO-L-GW-TransportLayerAddress,
id-KillAllWarningMessages,
id-TransportInformation,
id-LHN-ID,
id-UserLocationInformation,
id-AdditionalCSFallbackIndicator,
id-ECGIListForRestart,
id-TAIListForRestart,
id-EmergencyAreaIDListForRestart,
id-ExpectedUEBehaviour,
id-Paging-eDRXInformation,
id-extended-UEIdentityIndexValue,
id-CSGMembershipInfo,
id-MME-Group-ID,
id-Additional-GUTI,
id-S1-Message,
id-PWSfailedECGIList,
id-PWSFailureIndication,
id-UE-Usage-Type,
id-UEUserPlaneCIoTSupportIndicator,
id-NB-IoT-DefaultPagingDRX,
id-NB-IoT-Paging-eDRXInformation,
id-CE-mode-B-SupportIndicator,
id-NB-IoT-UEIdentityIndexValue,
```

```
id-RRC-Resume-Cause,
    id-DCN-ID.
    id-ServedDCNs.
    id-UESidelinkAggregateMaximumBitrate,
    id-DLNASPDUDeliveryAckRequest,
    id-Coverage-Level,
    id-EnhancedCoverageRestricted,
    id-UE-Level-QoS-Parameters,
    id-DL-CP-SecurityInformation,
    id-UL-CP-SecurityInformation,
    id-SecondaryRATDataUsageRequest,
    id-SecondaryRATDataUsageReportList,
    id-HandoverFlag,
    id-NRUESecurityCapabilities,
    id-UE-Application-Layer-Measurement-Capability,
    id-CE-ModeBRestricted,
    id-DownlinkPacketLossRate,
    id-UplinkPacketLossRate,
    id-UECapabilityInfoRequest,
    id-EndIndication,
    id-EDT-Session.
    id-LTE-M-Indication,
    id-PendingDataIndication,
    id-WarningAreaCoordinates,
    id-Subscription-Based-UE-DifferentiationInfo,
    id-PSCellInformation,
    id-ConnectedengNBList,
    id-ConnectedengNBToAddList,
    id-ConnectedengNBToRemoveList,
    id-EN-DCSONConfigurationTransfer-ECT,
    id-EN-DCSONConfigurationTransfer-MCT,
    id-TimeSinceSecondaryNodeRelease,
    id-IAB-Authorized,
    id-IAB-Node-Indication,
    id-IAB-Supported,
    id-DataSize,
    id-Ethernet-Type,
    id-NRV2XServicesAuthorized,
    id-NRUESidelinkAggregateMaximumBitrate,
    id-PC50oSParameters.
    id-IntersystemSONConfigurationTransferMCT,
    id-IntersystemSONConfigurationTransferECT,
    id-UERadioCapabilityID,
    id-UERadioCapability-NR-Format,
    id-NotifySourceeNB,
    id-eNB-EarlyStatusTransfer-TransparentContainer,
    id-WUS-Assistance-Information,
    id-NB-IoT-PagingDRX
FROM S1AP-Constants;
```

__ *******************

```
-- Common Container Lists
  **********
                                                                        ::= ProtocolIE-ContainerList
E-RAB-IE-ContainerList
                                                                                                         { 1, maxnoofE-RABs,
                                                                                                                              {IEsSetParam}
                                S1AP-PROTOCOL-IES
                                                      : TEsSet Daram
E-RAB-IE-ContainerPairList
                                                                         ::= ProtocolIE-ContainerPairList { 1, maxnoofE-RABs,
                                                                                                                              {IEsSetParam}
                                S1AP-PROTOCOL-IES-PAIR : IEsSetParam
ProtocolError-IE-ContainerList { S1AP-PROTOCOL-IES
                                                    : IEsSetParam }
                                                                        ::= ProtocolIE-ContainerList
                                                                                                         { 1, maxnoofE-RABs,
                                                                                                                             {IEsSetParam}
-- HANDOVER PREPARATION ELEMENTARY PROCEDURE
-- Handover Required
*****************
HandoverRequired ::= SEQUENCE {
                                                  { { HandoverRequiredIEs} },
   protocolIEs
                      ProtocolIE-Container
    . . .
HandoverRequiredIEs S1AP-PROTOCOL-IES ::= {
     ID id-MME-UE-S1AP-ID
                                                  CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                                                      PRESENCE mandatory}
     ID id-eNB-UE-S1AP-ID
                                                  CRITICALITY reject TYPE ENB-UE-S1AP-ID
                                                                                                      PRESENCE mandatory
     ID id-HandoverType
                                                  CRITICALITY reject TYPE HandoverType
                                                                                                      PRESENCE mandatory
     ID id-Cause
                                                  CRITICALITY ignore TYPE Cause
                                                                                                      PRESENCE mandatory
     ID id-TargetID
                                                 CRITICALITY reject TYPE TargetID
                                                                                                      PRESENCE mandatory }
     ID id-Direct-Forwarding-Path-Availability
                                                 CRITICALITY ignore TYPE Direct-Forwarding-Path-Availability PRESENCE optional |
     ID id-SRVCCHOIndication
                                                  CRITICALITY reject TYPE SRVCCHOIndication
                                                                                                      PRESENCE optional } |
     ID id-Source-ToTarget-TransparentContainer
                                                 CRITICALITY reject TYPE Source-ToTarget-TransparentContainer PRESENCE mandatory}
     ID id-Source-ToTarget-TransparentContainer-Secondary CRITICALITY reject TYPE Source-ToTarget-TransparentContainer PRESENCE optional |
                                                                                                      PRESENCE conditional}
     ID id-MSClassmark2
                                                  CRITICALITY reject TYPE MSClassmark2
     ID id-MSClassmark3
                                                                                                      PRESENCE conditional }
                                                  CRITICALITY ignore TYPE MSClassmark3
     ID id-CSG-Id
                                                                                                      PRESENCE optional }
                                                 CRITICALITY reject TYPE CSG-Id
     ID id-CellAccessMode
                                                  CRITICALITY reject TYPE CellAccessMode
                                                                                                      PRESENCE optional }
     ID id-PS-ServiceNotAvailable
                                                 CRITICALITY ignore TYPE PS-ServiceNotAvailable
                                                                                                      PRESENCE optional }
-- Handover Command
HandoverCommand ::= SEQUENCE {
   protocolIEs
                      ProtocolIE-Container
                                                  { { HandoverCommandIEs} },
   . . .
```

```
HandoverCommandIEs S1AP-PROTOCOL-IES ::= {
     ID id-MME-UE-S1AP-ID
                                                  CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                                                         PRESENCE mandatory }
     ID id-eNB-UE-S1AP-ID
                                                  CRITICALITY reject TYPE ENB-UE-S1AP-ID
                                                                                                         PRESENCE mandatory }
     ID id-HandoverType
                                                  CRITICALITY reject TYPE HandoverType
                                                                                                         PRESENCE mandatory}
     ID id-NASSecurityParametersfromE-UTRAN
                                                  CRITICALITY reject TYPE NASSecurityParametersfromE-UTRAN
                                                                                                               PRESENCE conditional
    -- This IE shall be present if HandoverType IE is set to value "LTEtoUTRAN" or "LTEtoGERAN" --}
     ID id-E-RABSubjecttoDataForwardingList
                                                  CRITICALITY ignore TYPE E-RABSubjecttoDataForwardingList
                                                                                                               PRESENCE optional } |
     ID id-E-RABtoReleaseListHOCmd
                                                  CRITICALITY ignore TYPE E-RABList
                                                                                                         PRESENCE optional } |
     ID id-Target-ToSource-TransparentContainer
                                                  CRITICALITY reject TYPE Target-ToSource-TransparentContainer
                                                                                                                 PRESENCE mandatory}
     ID id-Target-ToSource-TransparentContainer-Secondary CRITICALITY reject TYPE Target-ToSource-TransparentContainer PRESENCE optional |
                                                  CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                                         PRESENCE optional }.
    { ID id-CriticalityDiagnostics
E-RABSubjecttoDataForwardingList ::= E-RAB-IE-ContainerList { {E-RABDataForwardingItemIEs} }
E-RABDataForwardingItemIEs S1AP-PROTOCOL-IES ::= {
    { ID id-E-RABDataForwardingItem
                                                  CRITICALITY ignore TYPE E-RABDataForwardingItem
                                                                                                      PRESENCE mandatory },
    . . .
E-RABDataForwardingItem ::= SEQUENCE {
    e-RAB-ID
                                      E-RAB-ID,
   dL-transportLayerAddress
                                      TransportLayerAddress
                                                                                                      OPTIONAL.
   dL-qTP-TEID
                                      GTP-TEID
                                                                                                      OPTIONAL,
   uL-TransportLayerAddress
                                      TransportLayerAddress
                                                                                                      OPTIONAL,
   uL-GTP-TEID
                                      GTP-TEID
                                                                                                      OPTIONAL,
                                      ProtocolExtensionContainer { { E-RABDataForwardingItem-ExtIEs} }
   iE-Extensions
                                                                                                            OPTIONAL,
E-RABDataForwardingItem-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
     -- Handover Preparation Failure
   ******************
HandoverPreparationFailure ::= SEQUENCE
   protocolIEs
                       ProtocolIE-Container
                                                  { { HandoverPreparationFailureIEs} },
HandoverPreparationFailureIEs S1AP-PROTOCOL-IES ::= {
     ID id-MME-UE-S1AP-ID
                                          CRITICALITY ignore TYPE MME-UE-S1AP-ID
                                                                                              PRESENCE mandatory
     ID id-eNB-UE-S1AP-ID
                                          CRITICALITY ignore TYPE ENB-UE-S1AP-ID
                                                                                              PRESENCE mandatory
     ID id-Cause
                                          CRITICALITY ignore TYPE Cause
                                                                                              PRESENCE mandatory
```

```
{ ID id-CriticalityDiagnostics
                                           CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                                PRESENCE optional },
-- HANDOVER RESOURCE ALLOCATION ELEMENTARY PROCEDURE
       -- Handover Request
  ****************
HandoverRequest ::= SEQUENCE {
                                                   { {HandoverRequestIEs} },
   protocolIEs
                       ProtocolIE-Container
    . . .
HandoverRequestIEs S1AP-PROTOCOL-IES ::= {
     ID id-MME-UE-S1AP-ID
                                                                                                        PRESENCE mandatory}
                                                   CRITICALITY reject TYPE MME-UE-S1AP-ID
     ID id-HandoverType
                                                   CRITICALITY reject TYPE HandoverType
                                                                                                        PRESENCE mandatory}
     ID id-Cause
                                                   CRITICALITY ignore TYPE Cause
                                                                                                        PRESENCE mandatory } |
     ID id-uEaggregateMaximumBitrate
                                                   CRITICALITY reject TYPE UEAggregateMaximumBitrate
                                                                                                           PRESENCE mandatory } |
     ID id-E-RABToBeSetupListHOReq
                                                                                                        PRESENCE mandatory} |
                                                   CRITICALITY reject TYPE E-RABToBeSetupListHOReg
     ID id-Source-ToTarget-TransparentContainer
                                                   CRITICALITY reject TYPE Source-ToTarget-TransparentContainer PRESENCE mandatory |
     ID id-UESecurityCapabilities
                                                   CRITICALITY reject TYPE UESecurityCapabilities
                                                                                                        PRESENCE mandatory } |
     ID id-HandoverRestrictionList
                                                   CRITICALITY ignore TYPE HandoverRestrictionList
                                                                                                        PRESENCE optional }
     ID id-TraceActivation
                                                   CRITICALITY ignore TYPE TraceActivation
                                                                                                        PRESENCE optional }
     ID id-RequestType
                                                   CRITICALITY ignore TYPE RequestType
                                                                                                        PRESENCE optional }
     ID id-SRVCCOperationPossible
                                                   CRITICALITY ignore TYPE SRVCCOperationPossible
                                                                                                        PRESENCE optional }
     ID id-SecurityContext
                                                   CRITICALITY reject TYPE SecurityContext
                                                                                                        PRESENCE mandatory }
                                                                                                              PRESENCE conditional
     ID id-NASSecurityParameterstoE-UTRAN
                                                   CRITICALITY reject TYPE NASSecurityParameterstoE-UTRAN
    -- This IE shall be present if the Handover Type IE is set to the value "UTRANtoLTE" or "GERANtoLTE" --
     ID id-CSG-Id
                                                   CRITICALITY reject TYPE CSG-Id
                                                                                                        PRESENCE optional }
     ID id-CSGMembershipStatus
                                                   CRITICALITY ignore TYPE CSGMembershipStatus
                                                                                                        PRESENCE optional }
     ID id-GUMMEI-ID
                                                   CRITICALITY ignore TYPE GUMMEI
                                                                                                        PRESENCE optional }
     ID id-MME-UE-S1AP-ID-2
                                                   CRITICALITY ignore TYPE MME-UE-S1AP-ID
                                                                                                        PRESENCE optional }
                                                                                                           PRESENCE optional |
     ID id-ManagementBasedMDTAllowed
                                                   CRITICALITY ignore TYPE ManagementBasedMDTAllowed
     ID id-ManagementBasedMDTPLMNList
                                                   CRITICALITY ignore TYPE MDTPLMNList
                                                                                                        PRESENCE optional }
     ID id-Masked-IMEISV
                                                   CRITICALITY ignore TYPE Masked-IMEISV
                                                                                                        PRESENCE optional}
     ID id-ExpectedUEBehaviour
                                                                                                        PRESENCE optional }
                                                   CRITICALITY ignore TYPE ExpectedUEBehaviour
     ID id-ProSeAuthorized
                                                   CRITICALITY ignore TYPE ProSeAuthorized
                                                                                                        PRESENCE optional }
                                                                                                              PRESENCE optional } |
     ID id-UEUserPlaneCIoTSupportIndicator
                                                   CRITICALITY ignore TYPE UEUserPlaneCIoTSupportIndicator
     ID id-V2XServicesAuthorized
                                                   CRITICALITY ignore TYPE V2XServicesAuthorized
                                                                                                        PRESENCE optional } |
     ID id-UESidelinkAggregateMaximumBitrate
                                                   CRITICALITY ignore TYPE UESidelinkAggregateMaximumBitrate
                                                                                                                 PRESENCE optional } |
     ID id-EnhancedCoverageRestricted
                                                   CRITICALITY ignore TYPE EnhancedCoverageRestricted
                                                                                                           PRESENCE optional } |
     ID id-NRUESecurityCapabilities
                                                   CRITICALITY ignore TYPE NRUESecurityCapabilities
                                                                                                           PRESENCE optional } |
     ID id-CE-ModeBRestricted
                                                   CRITICALITY ignore TYPE CE-ModeBRestricted
                                                                                                        PRESENCE optional } |
     ID id-AerialUEsubscriptionInformation
                                                   CRITICALITY ignore TYPE AerialUEsubscriptionInformation
                                                                                                                    PRESENCE optional |
     ID id-PendingDataIndication
                                                   CRITICALITY ignore TYPE PendingDataIndication
                                                                                                        PRESENCE optional } |
```

```
{ ID id-Subscription-Based-UE-DifferentiationInfo
                                                           CRITICALITY ignore TYPE Subscription-Based-UE-DifferentiationInfo
optional}|
     ID id-AdditionalRRMPriorityIndex
                                               CRITICALITY ignore TYPE Additional RRMPriorityIndex
                                                                                                      PRESENCE optional } |
     ID id-IAB-Authorized
                                               CRITICALITY reject TYPE IAB-Authorized
                                                                                                      PRESENCE optional } |
     ID id-NRV2XServicesAuthorized
                                                       CRITICALITY ignore TYPE NRV2XServicesAuthorized
                                                                                                                           PRESENCE optional }
     ID id-NRUESidelinkAggregateMaximumBitrate
                                                       CRITICALITY ignore TYPE NRUESidelinkAggregateMaximumBitrate
                                                                                                                          PRESENCE optional }
     ID id-PC50oSParameters
                                                       CRITICALITY ignore TYPE PC50oSParameters
                                                                                                                       PRESENCE optional } |
                                                       CRITICALITY reject TYPE UERadioCapabilityID
     ID id-UERadioCapabilityID
                                                                                                                       PRESENCE optional } . . . .
                                           ::= E-RAB-IE-ContainerList { {E-RABToBeSetupItemHORegIEs} }
E-RABToBeSetupListHOReq
E-RABToBeSetupItemHORegIEs S1AP-PROTOCOL-IES ::= {
    { ID id-E-RABToBeSetupItemHOReq
                                               CRITICALITY reject TYPE E-RABToBeSetupItemHOReg
                                                                                                      PRESENCE mandatory
    . . .
E-RABToBeSetupItemHOReg ::= SEQUENCE
    e-RAB-ID
                                       E-RAB-ID,
    transportLayerAddress
                                       TransportLayerAddress,
    gTP-TEID
                                       GTP-TEID,
    e-RABlevelQosParameters
                                       E-RABLevelQoSParameters,
    iE-Extensions
                                       ProtocolExtensionContainer { {E-RABTOBeSetupItemHOReq-ExtIEs} } 
                                                                                                         OPTIONAL,
    . . .
E-RABTOBeSetupItemHOReq-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
     ID id-Data-Forwarding-Not-Possible
                                               CRITICALITY ignore EXTENSION Data-Forwarding-Not-Possible PRESENCE optional } |
                                                                                                      PRESENCE optional } |
     ID id-BearerType
                                               CRITICALITY reject EXTENSION BearerType
                                                                                                      PRESENCE optional },
     ID id-Ethernet-Type
                                               CRITICALITY ignore EXTENSION Ethernet-Type
    -- Handover Request Acknowledge
HandoverRequestAcknowledge ::= SEQUENCE
    protocolIEs
                       ProtocolIE-Container
                                                  { {HandoverRequestAcknowledgeIEs} },
    . . .
HandoverRequestAcknowledgeIEs S1AP-PROTOCOL-IES ::=
     ID id-MME-UE-S1AP-ID
                                                   CRITICALITY ignore TYPE MME-UE-S1AP-ID
                                                                                                         PRESENCE mandatory }
     ID id-eNB-UE-S1AP-ID
                                                   CRITICALITY ignore TYPE ENB-UE-S1AP-ID
                                                                                                         PRESENCE mandatory}
     ID id-E-RABAdmittedList
                                                   CRITICALITY ignore TYPE E-RABAdmittedList
                                                                                                         PRESENCE mandatory }
     ID id-E-RABFailedToSetupListHORegAck
                                                   CRITICALITY ignore TYPE E-RABFailedtoSetupListHOReqAck
                                                                                                               PRESENCE optional }
     ID id-Target-ToSource-TransparentContainer
                                                   CRITICALITY reject TYPE Target-ToSource-TransparentContainer PRESENCE mandatory |
     ID id-CSG-Id
                                                   CRITICALITY ignore TYPE CSG-Id
                                                                                                         PRESENCE optional }
     ID id-CriticalityDiagnostics
                                                   CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                                         PRESENCE optional}
     ID id-CellAccessMode
                                                   CRITICALITY ignore TYPE CellAccessMode
                                                                                                         PRESENCE optional }
     ID id-CE-mode-B-SupportIndicator
                                                   CRITICALITY ignore TYPE CE-mode-B-SupportIndicator
                                                                                                            PRESENCE optional },
```

```
E-RABAdmittedList
                                  ::= E-RAB-IE-ContainerList { {E-RABAdmittedItemIEs} }
E-RABAdmittedItemIEs S1AP-PROTOCOL-IES ::= {
   { ID id-E-RABAdmittedItem
                                     CRITICALITY ignore TYPE E-RABAdmittedItem
                                                                                       PRESENCE mandatory },
   . . .
E-RABAdmittedItem ::= SEQUENCE {
   e-RAB-ID
                                  E-RAB-ID,
   transportLayerAddress
                                  TransportLayerAddress,
   qTP-TEID
                                  GTP-TEID,
   dL-transportLayerAddress
                                  TransportLayerAddress
                                                        OPTIONAL,
   dL-qTP-TEID
                                  GTP-TEID
                                                         OPTIONAL,
   uL-TransportLayerAddress
                                  TransportLayerAddress
                                                        OPTIONAL,
   uL-GTP-TEID
                                  GTP-TEID
                                                        OPTIONAL,
                                  ProtocolExtensionContainer { {E-RABAdmittedItem-ExtIEs} } 
   iE-Extensions
E-RABAdmittedItem-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    . . .
                                             ::= E-RAB-IE-ContainerList { {E-RABFailedtoSetupItemHOReqAckIEs} }
E-RABFailedtoSetupListHORegAck
E-RABFailedtoSetupItemHORegAckIEs S1AP-PROTOCOL-IES ::= {
    { ID id-E-RABFailedtoSetupItemHOReqAck
                                                 CRITICALITY ignore TYPE E-RABFailedToSetupItemHOReqAck
                                                                                                             PRESENCE mandatory },
   . . .
E-RABFailedToSetupItemHORegAck ::= SEQUENCE {
   e-RAB-ID
                                  E-RAB-ID,
   cause
                      Cause,
   iE-Extensions
                                  ProtocolExtensionContainer { { E-RABFailedToSetupItemHOReqAckExtIEs} }
                                                                                                          OPTIONAL,
E-RABFailedToSetupItemHOReqAckExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  -- Handover Failure
__ ********************************
HandoverFailure ::= SEQUENCE {
   protocolIEs
                      ProtocolIE-Container
                                                { { HandoverFailureIEs} },
   . . .
```

```
HandoverFailureIEs S1AP-PROTOCOL-IES ::= {
     ID id-MME-UE-S1AP-ID
                                   CRITICALITY ignore TYPE MME-UE-S1AP-ID
                                                                                     PRESENCE mandatory }
     ID id-Cause
                                   CRITICALITY ignore TYPE Cause
                                                                                     PRESENCE mandatory }
   ID id-CriticalityDiagnostics
                                   CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                     PRESENCE optional },
  *****************
-- HANDOVER NOTIFICATION ELEMENTARY PROCEDURE
-- Handover Notify
*****************
HandoverNotify ::= SEQUENCE {
                                             { { HandoverNotifyIEs} },
   protocolIEs
                    ProtocolIE-Container
   . . .
HandoverNotifyIEs S1AP-PROTOCOL-IES ::= {
     ID id-MME-UE-S1AP-ID
                                       CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                                  PRESENCE mandatory}
     ID id-eNB-UE-S1AP-ID
                                                                                  PRESENCE mandatory}
                                       CRITICALITY reject TYPE ENB-UE-S1AP-ID
     ID id-EUTRAN-CGI
                                                                                  PRESENCE mandatory }
                                       CRITICALITY ignore TYPE EUTRAN-CGI
   { ID id-TAI
                                       CRITICALITY ignore TYPE TAI
                                                                                  PRESENCE mandatory
-- Extension for Release 11 to support BBAI --
     ID id-Tunnel-Information-for-BBF
                                       CRITICALITY ignore TYPE TunnelInformation
                                                                                  PRESENCE optional }
     ID id-LHN-ID
                                       CRITICALITY ignore TYPE LHN-ID
                                                                                  PRESENCE optional }
                                      CRITICALITY ignore TYPE PSCellInformation
     ID id-PSCellInformation
                                                                                  PRESENCE optional }
                                       CRITICALITY ignore TYPE NotifySourceeNB
   { ID id-NotifySourceeNB
                                                                                  PRESENCE optional },
    ******************
-- PATH SWITCH REQUEST ELEMENTARY PROCEDURE
-- Path Switch Request
PathSwitchRequest ::= SEQUENCE {
   protocolIEs ProtocolIE-Container
                                             { { PathSwitchRequestIEs} },
   . . .
```

```
PathSwitchRequestIEs S1AP-PROTOCOL-IES ::= {
     ID id-eNB-UE-S1AP-ID
                                          CRITICALITY reject TYPE ENB-UE-S1AP-ID
                                                                                             PRESENCE mandatory }
     ID id-E-RABToBeSwitchedDLList
                                          CRITICALITY reject TYPE E-RABToBeSwitchedDLList
                                                                                             PRESENCE mandatory
     ID id-SourceMME-UE-S1AP-ID
                                                                                             PRESENCE mandatory
                                          CRITICALITY reject TYPE MME-UE-S1AP-ID
     ID id-EUTRAN-CGI
                                                                                             PRESENCE mandatory }
                                          CRITICALITY ignore TYPE EUTRAN-CGI
     ID id-TAI
                                          CRITICALITY ignore TYPE TAI
                                                                                             PRESENCE mandatory
     ID id-UESecurityCapabilities
                                          CRITICALITY ignore TYPE UESecurityCapabilities
                                                                                             PRESENCE mandatory }
     ID id-CSG-Id
                                          CRITICALITY ignore TYPE CSG-Id
                                                                                             PRESENCE optional }
                                          CRITICALITY ignore TYPE CellAccessMode
                                                                                             PRESENCE optional }
     ID id-CellAccessMode
     ID id-SourceMME-GUMMEI
                                          CRITICALITY ignore TYPE GUMMEI
                                                                                             PRESENCE optional }
     ID id-CSGMembershipStatus
                                          CRITICALITY ignore TYPE CSGMembershipStatus
                                                                                             PRESENCE optional }
-- Extension for Release 11 to support BBAI --
     ID id-Tunnel-Information-for-BBF
                                                                                             PRESENCE optional }
                                          CRITICALITY ignore TYPE TunnelInformation
     ID id-LHN-ID
                                          CRITICALITY ignore TYPE LHN-ID
                                                                                             PRESENCE optional }
     ID id-RRC-Resume-Cause
                                          CRITICALITY ignore TYPE RRC-Establishment-Cause
                                                                                             PRESENCE optional }
     ID id-NRUESecurityCapabilities
                                                  CRITICALITY ignore TYPE NRUESecurityCapabilities
                                                                                                          PRESENCE optional |
    { ID id-PSCellInformation
                                          CRITICALITY ignore TYPE PSCellInformation
                                                                                             PRESENCE optional },
                                       ::= E-RAB-IE-ContainerList { {E-RABToBeSwitchedDLItemIEs} }
E-RABToBeSwitchedDLList
E-RABToBeSwitchedDLItemIEs S1AP-PROTOCOL-IES ::= {
                                                                                                  PRESENCE mandatory
    { ID id-E-RABToBeSwitchedDLItem
                                          CRITICALITY reject TYPE E-RABToBeSwitchedDLItem
    . . .
E-RABToBeSwitchedDLItem ::= SEQUENCE {
                                   E-RAB-ID,
    e-RAB-ID
                                   TransportLayerAddress,
   transportLayerAddress
   gTP-TEID
                                   GTP-TEID,
                                   ProtocolExtensionContainer { { E-RABToBeSwitchedDLItem-ExtIEs} }
   iE-Extensions
                                                                                                       OPTIONAL,
E-RABTOBeSwitchedDLItem-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
     ***********************
-- Path Switch Request Acknowledge
__ *********************
PathSwitchRequestAcknowledge ::= SEQUENCE {
   protocolIEs
                       ProtocolIE-Container
                                                 { { PathSwitchRequestAcknowledgeIEs} },
    . . .
PathSwitchRequestAcknowledgeIEs S1AP-PROTOCOL-IES ::= {
    { ID id-MME-UE-S1AP-ID
                                          CRITICALITY ignore TYPE MME-UE-S1AP-ID
                                                                                                  PRESENCE mandatory }
```

```
PRESENCE mandatory } |
      ID id-eNB-UE-S1AP-ID
                                           CRITICALITY ignore TYPE ENB-UE-S1AP-ID
     ID id-uEaggregateMaximumBitrate
                                           CRITICALITY ignore TYPE UEAggregateMaximumBitrate
                                                                                                   PRESENCE optional}
     ID id-E-RABToBeSwitchedULList
                                           CRITICALITY ignore TYPE E-RABToBeSwitchedULList
                                                                                                   PRESENCE optional
     ID id-E-RABToBeReleasedList
                                           CRITICALITY ignore TYPE E-RABList
                                                                                                   PRESENCE optional }
     ID id-SecurityContext
                                           CRITICALITY reject TYPE SecurityContext
                                                                                                   PRESENCE mandatory
                                                                                                   PRESENCE optional }
     ID id-CriticalityDiagnostics
                                           CRITICALITY ignore TYPE CriticalityDiagnostics
     ID id-MME-UE-S1AP-ID-2
                                           CRITICALITY ignore TYPE MME-UE-S1AP-ID
                                                                                                   PRESENCE optional}
     ID id-CSGMembershipStatus
                                           CRITICALITY ignore TYPE CSGMembershipStatus
                                                                                                   PRESENCE optional}
     ID id-ProSeAuthorized
                                           CRITICALITY ignore TYPE ProSeAuthorized
                                                                                                   PRESENCE optional }
     ID id-UEUserPlaneCIoTSupportIndicator CRITICALITY ignore TYPE UEUserPlaneCIoTSupportIndicator PRESENCE optional
                                           CRITICALITY ignore TYPE V2XServicesAuthorized
                                                                                                   PRESENCE optional }
     ID id-V2XServicesAuthorized
     ID id-UESidelinkAggregateMaximumBitrate
                                                   CRITICALITY ignore TYPE UESidelinkAggregateMaximumBitrate PRESENCE optional | |
                                                                                                   PRESENCE optional | |
     ID id-EnhancedCoverageRestricted
                                           CRITICALITY ignore TYPE EnhancedCoverageRestricted
     ID id-NRUESecurityCapabilities
                                                   CRITICALITY ignore TYPE NRUESecurityCapabilities
                                                                                                            PRESENCE optional |
     ID id-CE-ModeBRestricted
                                           CRITICALITY ignore TYPE CE-ModeBRestricted
                                                                                               PRESENCE optional |
     ID id-AerialUEsubscriptionInformation
                                                   CRITICALITY ignore TYPE AerialUEsubscriptionInformation
                                                                                                                     PRESENCE optional } |
     ID id-PendingDataIndication
                                           CRITICALITY ignore TYPE PendingDataIndication
                                                                                                   PRESENCE optional } |
     ID id-Subscription-Based-UE-DifferentiationInfo
                                                           CRITICALITY ignore TYPE Subscription-Based-UE-DifferentiationInfo
                                                                                                                                 PRESENCE
optional}
     ID id-HandoverRestrictionList
                                           CRITICALITY ignore TYPE HandoverRestrictionList
                                                                                                   PRESENCE optional } |
     ID id-AdditionalRRMPriorityIndex
                                           CRITICALITY ignore TYPE Additional RRMPriorityIndex
                                                                                                   PRESENCE optional } |
                                                       CRITICALITY ignore TYPE NRV2XServicesAuthorized
     ID id-NRV2XServicesAuthorized
                                                                                                                           PRESENCE optional }
                                                                                                                           PRESENCE optional }
     ID id-NRUESidelinkAggregateMaximumBitrate
                                                       CRITICALITY ignore TYPE NRUESidelinkAggregateMaximumBitrate
     ID id-PC50oSParameters
                                                       CRITICALITY ignore TYPE PC5QoSParameters
                                                                                                                        PRESENCE optional } |
     ID id-UERadioCapabilityID
                                                       CRITICALITY reject TYPE UERadioCapabilityID
                                                                                                                        PRESENCE optional },
E-RABTOBeSwitchedULList ::= E-RAB-IE-ContainerList { {E-RABTOBeSwitchedULItemIEs} }
E-RABToBeSwitchedULItemIEs S1AP-PROTOCOL-IES ::= {
    { ID id-E-RABToBeSwitchedULItem
                                       CRITICALITY ignore TYPE E-RABToBeSwitchedULItem
                                                                                               PRESENCE mandatory },
   . . .
E-RABToBeSwitchedULItem ::= SEOUENCE {
    e-RAB-ID
                                       E-RAB-ID,
    transportLayerAddress
                                       TransportLayerAddress,
    qTP-TEID
                                       GTP-TEID,
    iE-Extensions
                                       ProtocolExtensionContainer { { E-RABToBeSwitchedULItem-ExtIEs} } OPTIONAL,
E-RABToBeSwitchedULItem-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
-- Path Switch Request Failure
  *************************
```

```
PathSwitchRequestFailure ::= SEOUENCE {
   protocolIEs
                   ProtocolIE-Container
                                           { { PathSwitchRequestFailureIEs} },
   . . .
PathSwitchRequestFailureIEs S1AP-PROTOCOL-IES ::= {
    ID id-MME-UE-S1AP-ID
                                     CRITICALITY ignore TYPE MME-UE-S1AP-ID
                                                                                   PRESENCE mandatory
    ID id-eNB-UE-S1AP-ID
                                     CRITICALITY ignore TYPE ENB-UE-S1AP-ID
                                                                                   PRESENCE mandatory
    ID id-Cause
                                     CRITICALITY ignore TYPE Cause
                                                                                   PRESENCE mandatory
   ID id-CriticalityDiagnostics
                                                                                   PRESENCE optional },
                                     CRITICALITY ignore TYPE CriticalityDiagnostics
  ********************
-- HANDOVER CANCEL ELEMENTARY PROCEDURE
  *******************
-- Handover Cancel
__ *********************
HandoverCancel ::= SEQUENCE {
                                           { { HandoverCancelIEs} },
   protocolIEs
               ProtocolIE-Container
HandoverCancelIEs S1AP-PROTOCOL-IES ::= {
    ID id-MME-UE-S1AP-ID
                                     CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                                   PRESENCE mandatory
    ID id-eNB-UE-S1AP-ID
                                     CRITICALITY reject TYPE ENB-UE-S1AP-ID
                                                                                   PRESENCE mandatory
                                     CRITICALITY ignore TYPE Cause
   { ID id-Cause
                                                                                   PRESENCE mandatory
   -- Handover Cancel Request Acknowledge
  ********************
HandoverCancelAcknowledge ::= SEQUENCE {
              ProtocolIE-Container
                                           { { HandoverCancelAcknowledgeIEs} },
   protocolIEs
HandoverCancelAcknowledgeIEs S1AP-PROTOCOL-IES ::= {
    ID id-MME-UE-S1AP-ID
                                     CRITICALITY ignore TYPE MME-UE-S1AP-ID
                                                                                   PRESENCE mandatory
                                                                                   PRESENCE mandatory
    ID id-eNB-UE-S1AP-ID
                                     CRITICALITY ignore TYPE ENB-UE-S1AP-ID
   { ID id-CriticalityDiagnostics
                                     CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                   PRESENCE optional },
```

```
-- HANDOVER SUCCESS ELEMENTARY PROCEDURE
__ ********************************
__ *********************
-- Handover Success
__ *******************
HandoverSuccess ::= SEQUENCE {
                                  { { HandoverSuccessIEs} },
  protocolIEs
           ProtocolIE-Container
HandoverSuccessIEs S1AP-PROTOCOL-IES ::= {
   { ID id-MME-UE-S1AP-ID
                             CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                              PRESENCE mandatory |
  { ID id-eNB-UE-S1AP-ID
                             CRITICALITY reject TYPE ENB-UE-S1AP-ID
                                                              PRESENCE mandatory },
  . . .
  ******************
-- enb early status transfer elementary procedure
  *****************
-- eNB Early Status Transfer
  ENBEarlyStatusTransfer ::= SEQUENCE {
                                  { {ENBEarlyStatusTransferIEs} },
  protocolIEs
           ProtocolIE-Container
ENBEarlyStatusTransferIEs S1AP-PROTOCOL-IES ::= {
    ID id-MME-UE-S1AP-ID
                                                                      PRESENCE mandatory}
                                      CRITICALITY reject TYPE MME-UE-S1AP-ID
   ID id-eNB-UE-S1AP-ID
                                                                          PRESENCE mandatory |
                                        CRITICALITY reject TYPE ENB-UE-S1AP-ID
   mandatory},
  . . .
  *****************
-- MME EARLY STATUS TRANSFER ELEMENTARY PROCEDURE
__ ********************************
```

```
-- MME Early Status Transfer
__ **********************
MMEEarlyStatusTransfer ::= SEQUENCE {
   protocolIEs
             ProtocolIE-Container
                                       { {MMEEarlyStatusTransferIEs} },
   . . .
MMEEarlyStatusTransferIEs S1AP-PROTOCOL-IES ::= {
    ID id-MME-UE-S1AP-ID
                                          CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                               PRESENCE mandatory }
    ID id-eNB-UE-S1AP-ID
                                                                               PRESENCE mandatory
                                          CRITICALITY reject TYPE ENB-UE-S1AP-ID
   { ID id-eNB-EarlyStatusTransfer-TransparentContainer CRITICALITY reject TYPE ENB-EarlyStatusTransfer-TransparentContainer PRESENCE mandatory},
-- E-RAB SETUP ELEMENTARY PROCEDURE
__ *********************
  ****************
-- E-RAB Setup Request
  *****************
E-RABSetupRequest ::= SEQUENCE {
                  ProtocolIE-Container
                                       { {E-RABSetupRequestIEs} },
   protocolIEs
   . . .
E-RABSetupRequestIEs S1AP-PROTOCOL-IES ::= {
    ID id-MME-UE-S1AP-ID
                                 CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                             PRESENCE mandatory
                                                                             PRESENCE mandatory
    ID id-eNB-UE-S1AP-ID
                                 CRITICALITY reject TYPE ENB-UE-S1AP-ID
    ID id-uEaggregateMaximumBitrate CRITICALITY reject TYPE UEAggregateMaximumBitrate
                                                                             PRESENCE optional }
   E-RABTOBESetupListBearerSUReq ::= SEQUENCE (SIZE(1.. maxnoofE-RABs)) OF ProtocolIE-SingleContainer { {E-RABTOBESetupItemBearerSUReqIEs} }
E-RABToBeSetupItemBearerSURegIEs
                           S1AP-PROTOCOL-IES ::= {
   TYPE E-RABTOBeSetupItemBearerSUReq PRESENCE mandatory },
E-RABToBeSetupItemBearerSUReq ::= SEQUENCE {
   e-RAB-ID
                           E-RAB-ID,
   e-RABlevelOoSParameters
                           E-RABLevelOoSParameters,
```

```
TransportLayerAddress,
   transportLayerAddress
   aTP-TEID
                                GTP-TEID.
   nAS-PDU
                                NAS-PDU.
   iE-Extensions
                                ProtocolExtensionContainer { {E-RABToBeSetupItemBearerSUReqExtIEs} } OPTIONAL,
E-RABTOBeSetupItemBearerSUReqExtIEs S1AP-PROTOCOL-EXTENSION ::= {
     ID id-Correlation-ID CRITICALITY ignore EXTENSION Correlation-ID
                                                                                PRESENCE optional }
     PRESENCE optional
                                                                                PRESENCE optional }
     ID id-BearerType
                                CRITICALITY reject EXTENSION BearerType
                                CRITICALITY ignore EXTENSION Ethernet-Type
                                                                               PRESENCE optional },
    { ID id-Ethernet-Type
     ******************
-- E-RAB Setup Response
__ ********************
E-RABSetupResponse ::= SEOUENCE {
   protocolIEs
                     ProtocolIE-Container
                                              { {E-RABSetupResponseIEs} },
   . . .
E-RABSetupResponseIEs S1AP-PROTOCOL-IES ::= {
     ID id-MME-UE-S1AP-ID
                                               CRITICALITY ignore TYPE MME-UE-S1AP-ID
                                                                                           PRESENCE mandatory
     ID id-eNB-UE-S1AP-ID
                                               CRITICALITY ignore TYPE ENB-UE-S1AP-ID
                                                                                           PRESENCE mandatory
     ID id-E-RABSetupListBearerSURes
                                               CRITICALITY ignore TYPE E-RABSetupListBearerSURes PRESENCE optional }
     ID id-E-RABFailedToSetupListBearerSURes
                                               CRITICALITY ignore TYPE E-RABList
                                                                                           PRESENCE optional }
    ID id-CriticalityDiagnostics
                                               CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },
   . . .
E-RABSetupListBearerSURes ::= SEQUENCE (SIZE(1.. maxnoofE-RABs)) OF ProtocolIE-SingleContainer { {E-RABSetupItemBearerSUResIEs} }
E-RABSetupItemBearerSUResIEs
                             S1AP-PROTOCOL-IES ::= {
   { ID id-E-RABSetupItemBearerSURes
                                    CRITICALITY ignore
                                                          TYPE E-RABSetupItemBearerSURes PRESENCE mandatory },
   . . .
E-RABSetupItemBearerSURes ::= SEQUENCE {
   e-RAB-ID
                             E-RAB-ID
   transportLayerAddress
                            TransportLayerAddress,
   aTP-TEID
                             GTP-TEID,
                             ProtocolExtensionContainer { {E-RABSetupItemBearerSUResExtIEs} } OPTIONAL,
   iE-Extensions
```

```
E-RABSetupItemBearerSUResExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ********************
-- E-RAB MODIFY ELEMENTARY PROCEDURE
__ ********************
    *****************
-- E-RAB Modify Request
__ *********************
E-RABModifyRequest ::= SEQUENCE {
                                        { {E-RABModifyRequestIEs} },
   protocolIEs
                  ProtocolIE-Container
   . . .
E-RABModifyRequestIEs S1AP-PROTOCOL-IES ::= {
    ID id-MME-UE-S1AP-ID
                                                                                     PRESENCE mandatory
                                      CRITICALITY reject TYPE MME-UE-S1AP-ID
    ID id-eNB-UE-S1AP-ID
                                                                                     PRESENCE mandatory
                                      CRITICALITY reject TYPE ENB-UE-S1AP-ID
                                                                                     PRESENCE optional }
    ID id-uEaggregateMaximumBitrate
                                      CRITICALITY reject TYPE UEAggregateMaximumBitrate
    PRESENCE mandatory } |
                                                                                     PRESENCE optional },
   { ID id-SecondaryRATDataUsageRequest
                                      CRITICALITY ignore TYPE SecondaryRATDataUsageRequest
E-RABTOBEMOdifiedListBearerModReq ::= SEQUENCE (SIZE(1.. maxnoofE-RABs)) OF ProtocolIE-SingleContainer { {E-RABTOBEModifiedItemBearerModReqIEs} }
E-RABToBeModifiedItemBearerModRegIEs
                               S1AP-PROTOCOL-IES ::= {
   { ID id-E-RABToBeModifiedItemBearerModReg
                                      CRITICALITY reject
                                                         TYPE E-RABToBeModifiedItemBearerModReq PRESENCE mandatory },
E-RABToBeModifiedItemBearerModReg ::= SEQUENCE {
   e-RAB-ID
                            E-RAB-ID,
                            E-RABLevelQoSParameters,
   e-RABLevelQoSParameters
   nAS-PDU
                            NAS-PDU,
                            ProtocolExtensionContainer { {E-RABToBeModifyItemBearerModReqExtIEs} } OPTIONAL,
   iE-Extensions
E-RABTOBEModifyItemBearerModReqExtIEs S1AP-PROTOCOL-EXTENSION ::= {
   PRESENCE optional },
```

```
-- E-RAB Modify Response
__ *********************
E-RABModifyResponse ::= SEOUENCE {
   protocolIEs
                    ProtocolIE-Container
                                           { {E-RABModifyResponseIEs} },
   . . .
E-RABModifyResponseIEs S1AP-PROTOCOL-IES ::= {
     ID id-MME-UE-S1AP-ID
                                     CRITICALITY ignore TYPE MME-UE-S1AP-ID
                                                                                     PRESENCE mandatory
     ID id-eNB-UE-S1AP-ID
                                     CRITICALITY ignore TYPE ENB-UE-S1AP-ID
                                                                                     PRESENCE mandatory
    ID id-E-RABModifyListBearerModRes
                                     CRITICALITY ignore TYPE E-RABModifyListBearerModRes
                                                                                     PRESENCE optional }
                                                                                     PRESENCE optional
     ID id-E-RABFailedToModifyList
                                     CRITICALITY ignore TYPE E-RABList
    ID id-CriticalityDiagnostics
                                     CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                     PRESENCE optional }
   PRESENCE optional },
   . . .
E-RABModifyListBearerModRes ::= SEQUENCE (SIZE(1.. maxnoofE-RABs)) OF ProtocolIE-SingleContainer { {E-RABModifyItemBearerModResIEs} }
E-RABModifyItemBearerModResIEs S1AP-PROTOCOL-IES ::= {
   { ID id-E-RABModifyItemBearerModRes
                                     CRITICALITY ignore TYPE E-RABModifyItemBearerModRes
                                                                                     PRESENCE mandatory },
   . . .
E-RABModifyItemBearerModRes ::= SEQUENCE {
   e-RAB-ID
   iE-Extensions
                          ProtocolExtensionContainer { {E-RABModifyItemBearerModResExtIEs} } OPTIONAL,
E-RABModifyItemBearerModResExtIEs S1AP-PROTOCOL-EXTENSION ::= {
   *****************
-- E-RAB RELEASE ELEMENTARY PROCEDURE
    ******************
-- E-RAB Release Command
```

```
E-RABReleaseCommand ::= SEOUENCE {
   protocolIEs
                   ProtocolIE-Container
                                          { {E-RABReleaseCommandIEs} },
E-RABReleaseCommandIEs S1AP-PROTOCOL-IES ::= {
    ID id-MME-UE-S1AP-ID
                                   CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                              PRESENCE mandatory
    ID id-eNB-UE-S1AP-ID
                                                                              PRESENCE mandatory
                                   CRITICALITY reject TYPE ENB-UE-S1AP-ID
    ID id-uEaggregateMaximumBitrate
                                   CRITICALITY reject TYPE UEAggregateMaximumBitrate PRESENCE optional }
                                                                              PRESENCE mandatory } |
    ID id-E-RABToBeReleasedList
                                   CRITICALITY ignore TYPE E-RABList
    ID id-NAS-PDU
                                   CRITICALITY ignore TYPE NAS-PDU
                                                                              PRESENCE optional },
-- E-RAB Release Response
  *****************
E-RABReleaseResponse ::= SEQUENCE {
                   ProtocolIE-Container
                                         { { E-RABReleaseResponseIEs } },
   protocolIEs
E-RABReleaseResponseIEs S1AP-PROTOCOL-IES ::= {
    ID id-MME-UE-S1AP-ID
                                   CRITICALITY ignore TYPE MME-UE-S1AP-ID
                                                                                 PRESENCE mandatory
    ID id-eNB-UE-S1AP-ID
                                   CRITICALITY ignore TYPE ENB-UE-S1AP-ID
                                                                                 PRESENCE mandatory
    PRESENCE optional
    ID id-E-RABFailedToReleaseList
                                   CRITICALITY ignore TYPE E-RABList
    ID id-CriticalityDiagnostics
                                   CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                 PRESENCE optional }
-- Extension for Release 12 to support User Location Information --
    ID id-UserLocationInformation
                                   CRITICALITY ignore TYPE UserLocationInformation
                                                                                 PRESENCE optional }
    PRESENCE optional },
E-RABReleaseListBearerRelComp ::= SEQUENCE (SIZE(1.. maxnoofE-RABs)) OF ProtocolIE-SingleContainer { {E-RABReleaseItemBearerRelCompIEs} }
E-RABReleaseItemBearerRelCompIEs S1AP-PROTOCOL-IES ::= {
   . . .
E-RABReleaseItemBearerRelComp ::= SEOUENCE {
   e-RAB-ID
   iE-Extensions
                             ProtocolExtensionContainer { {E-RABReleaseItemBearerRelCompExtIEs} } OPTIONAL,
```

```
E-RABReleaseItemBearerRelCompExtIEs S1AP-PROTOCOL-EXTENSION ::= {
-- E-RAB RELEASE INDICATION ELEMENTARY PROCEDURE
-- E-RAB Release Indication
  ******************
E-RABReleaseIndication ::= SEQUENCE {
                                      { {E-RABReleaseIndicationIEs} },
             ProtocolIE-Container
  protocolIEs
E-RABReleaseIndicationIEs S1AP-PROTOCOL-IES ::= {
    ID id-MME-UE-S1AP-ID
                                 CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                          PRESENCE mandatory
    ID id-eNB-UE-S1AP-ID
                         CRITICALITY reject .... CRITICALITY ignore TYPE E-RABList
                                CRITICALITY reject TYPE ENB-UE-S1AP-ID
                                                                          PRESENCE mandatory
   { ID id-E-RABReleasedList
                                                                          PRESENCE mandatory
-- Extension for Release 12 to support User Location Information --
    PRESENCE optional }
   PRESENCE optional },
  -- INITIAL CONTEXT SETUP ELEMENTARY PROCEDURE
  ********************
-- Initial Context Setup Request
InitialContextSetupRequest ::= SEQUENCE
             ProtocolIE-Container
   protocolIEs
                                      { {InitialContextSetupRequestIEs} },
InitialContextSetupRequestIEs S1AP-PROTOCOL-IES ::= {
    ID id-MME-UE-S1AP-ID
                        CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                            PRESENCE mandatory }
   { ID id-eNB-UE-S1AP-ID
                                 CRITICALITY reject TYPE ENB-UE-S1AP-ID
                                                                            PRESENCE mandatory }
```

```
ID id-uEaggregateMaximumBitrate
                                           CRITICALITY reject TYPE UEAggregateMaximumBitrate
                                                                                                    PRESENCE mandatory } |
     ID id-E-RABToBeSetupListCtxtSUReg
                                           CRITICALITY reject TYPE E-RABToBeSetupListCtxtSUReg
                                                                                                    PRESENCE mandatory}
     ID id-UESecurityCapabilities
                                           CRITICALITY reject TYPE UESecurityCapabilities
                                                                                                    PRESENCE mandatory
     ID id-SecurityKey
                                           CRITICALITY reject TYPE SecurityKey
                                                                                                    PRESENCE mandatory }
     ID id-TraceActivation
                                           CRITICALITY ignore TYPE TraceActivation
                                                                                                    PRESENCE optional }
     ID id-HandoverRestrictionList
                                           CRITICALITY ignore TYPE HandoverRestrictionList
                                                                                                    PRESENCE optional
     ID id-UERadioCapability
                                           CRITICALITY ignore TYPE UERadioCapability
                                                                                                    PRESENCE optional}
                                           CRITICALITY ignore TYPE SubscriberProfileIDforRFP
                                                                                                    PRESENCE optional}
     ID id-SubscriberProfileIDforRFP
                                           CRITICALITY reject TYPE CSFallbackIndicator
                                                                                                    PRESENCE optional
     ID id-CSFallbackIndicator
     ID id-SRVCCOperationPossible
                                           CRITICALITY ignore TYPE SRVCCOperationPossible
                                                                                                    PRESENCE optional }
     ID id-CSGMembershipStatus
                                           CRITICALITY ignore TYPE CSGMembershipStatus
                                                                                                    PRESENCE optional}
     ID id-RegisteredLAI
                                                                                                    PRESENCE optional }
                                           CRITICALITY ignore TYPE LAI
     ID id-GUMMEI-ID
                                                                                                    PRESENCE optional)
                                           CRITICALITY ignore TYPE GUMMEI
     ID id-MME-UE-S1AP-ID-2
                                           CRITICALITY ignore TYPE MME-UE-S1AP-ID
                                                                                                    PRESENCE optional }
                                                                                                    PRESENCE optional
     ID id-ManagementBasedMDTAllowed
                                           CRITICALITY ignore TYPE ManagementBasedMDTAllowed
     ID id-ManagementBasedMDTPLMNList
                                           CRITICALITY ignore TYPE MDTPLMNList
                                                                                                    PRESENCE optional}
                                                                                                    PRESENCE conditional } |
     ID id-AdditionalCSFallbackIndicator
                                           CRITICALITY ignore TYPE AdditionalCSFallbackIndicator
                                                                                                    PRESENCE optional}
     ID id-Masked-IMEISV
                                           CRITICALITY ignore TYPE Masked-IMEISV
     ID id-ExpectedUEBehaviour
                                           CRITICALITY ignore TYPE ExpectedUEBehaviour
                                                                                                    PRESENCE optional}
                                                                                                    PRESENCE optional}
     ID id-ProSeAuthorized
                                           CRITICALITY ignore TYPE ProSeAuthorized
     ID id-UEUserPlaneCIoTSupportIndicator CRITICALITY ignore TYPE UEUserPlaneCIoTSupportIndicator PRESENCE optional
     ID id-V2XServicesAuthorized
                                           CRITICALITY ignore TYPE V2XServicesAuthorized
                                                                                                    PRESENCE optional }
     ID id-UESidelinkAggregateMaximumBitrate
                                                    CRITICALITY ignore TYPE UESidelinkAggregateMaximumBitrate PRESENCE optional | |
     ID id-EnhancedCoverageRestricted
                                           CRITICALITY ignore TYPE EnhancedCoverageRestricted
                                                                                                    PRESENCE optional |
     ID id-NRUESecurityCapabilities
                                                    CRITICALITY ignore TYPE NRUESecurityCapabilities
                                                                                                             PRESENCE optional |
     ID id-CE-ModeBRestricted
                                            CRITICALITY ignore TYPE CE-ModeBRestricted
                                                                                                PRESENCE optional |
     ID id-AerialUEsubscriptionInformation CRITICALITY ignore TYPE AerialUEsubscriptionInformation
                                                                                                             PRESENCE optional |
     ID id-PendingDataIndication
                                           CRITICALITY ignore TYPE PendingDataIndication
                                                                                                    PRESENCE optional } |
                                                           CRITICALITY ignore TYPE Subscription-Based-UE-DifferentiationInfo
     ID id-Subscription-Based-UE-DifferentiationInfo
                                                                                                                                  PRESENCE
optional}|
     ID id-AdditionalRRMPriorityIndex
                                           CRITICALITY ignore TYPE Additional RRMPriority Index
                                                                                                    PRESENCE optional } |
     ID id-IAB-Authorized
                                           CRITICALITY ignore TYPE IAB-Authorized
                                                                                                    PRESENCE optional |
     ID id-NRV2XServicesAuthorized
                                                        CRITICALITY ignore TYPE NRV2XServicesAuthorized
                                                                                                                            PRESENCE optional }
     ID id-NRUESidelinkAggregateMaximumBitrate
                                                        CRITICALITY ignore TYPE NRUESidelinkAggregateMaximumBitrate
                                                                                                                            PRESENCE optional }
                                                       CRITICALITY ignore TYPE PC50oSParameters
                                                                                                                         PRESENCE optional } |
     ID id-PC50oSParameters
     ID id-UERadioCapabilityID
                                                                                                                         PRESENCE optional }.
                                                       CRITICALITY reject TYPE UERadioCapabilityID
E-RABToBeSetupListCtxtSUReq ::= SEQUENCE (SIZE(1.. maxnoofE-RABs)) OF ProtocolIE-SingleContainer { {E-RABToBeSetupItemCtxtSUReqIEs} }
E-RABToBeSetupItemCtxtSURegIEs S1AP-PROTOCOL-IES ::= {
    { ID id-E-RABTOBeSetupItemCtxtSUReg CRITICALITY reject TYPE E-RABTOBeSetupItemCtxtSUReg
                                                                                                 PRESENCE mandatory },
    . . .
E-RABToBeSetupItemCtxtSUReg ::= SEQUENCE {
    e-RAB-ID
                                    E-RAB-ID,
    e-RABlevelOoSParameters
                                    E-RABLevelOoSParameters,
    transportLayerAddress
                                   TransportLayerAddress,
    qTP-TEID
                                   GTP-TEID,
```

```
nAS-PDU
                                 NAS-PDU
                                             OPTIONAL.
   iE-Extensions
                                 ProtocolExtensionContainer { {E-RABTOBeSetupItemCtxtSURegExtIEs} } OPTIONAL,
E-RABTOBeSetupItemCtxtSURegExtIEs S1AP-PROTOCOL-EXTENSION ::= {
     ID id-Correlation-ID
                                         CRITICALITY ignore EXTENSION Correlation-ID
                                                                                            PRESENCE optional}
     ID id-SIPTO-Correlation-ID
                                         CRITICALITY ignore EXTENSION Correlation-ID
                                                                                            PRESENCE optional}
                                         CRITICALITY reject EXTENSION BearerType
                                                                                            PRESENCE optional)
     ID id-BearerType
    ID id-Ethernet-Type
                                         CRITICALITY ignore EXTENSION Ethernet-Type
                                                                                            PRESENCE optional },
       -- Initial Context Setup Response
*****************
InitialContextSetupResponse ::= SEQUENCE {
                     ProtocolIE-Container
                                                { {InitialContextSetupResponseIEs} },
   protocolIEs
   . . .
InitialContextSetupResponseIEs S1AP-PROTOCOL-IES ::= {
                                             CRITICALITY ignore TYPE MME-UE-S1AP-ID
     ID id-MME-UE-S1AP-ID
                                                                                              PRESENCE mandatory
                                                                                              PRESENCE mandatory
     ID id-eNB-UE-S1AP-ID
                                             CRITICALITY ignore TYPE ENB-UE-S1AP-ID
                                                                                              PRESENCE mandatory
     ID id-E-RABSetupListCtxtSURes
                                             CRITICALITY ignore TYPE E-RABSetupListCtxtSURes
     ID id-E-RABFailedToSetupListCtxtSURes
                                             CRITICALITY ignore TYPE E-RABList
                                                                                              PRESENCE optional } |
    ID id-CriticalityDiagnostics
                                             CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                              PRESENCE optional },
   . . .
E-RABSetupListCtxtSURes ::= SEQUENCE (SIZE(1.. maxnoofE-RABs)) OF ProtocolIE-SingleContainer { {E-RABSetupItemCtxtSUResIEs} }
E-RABSetupItemCtxtSUResIEs S1AP-PROTOCOL-IES ::= {
   { ID id-E-RABSetupItemCtxtSURes
                                     CRITICALITY ignore TYPE E-RABSetupItemCtxtSURes
                                                                                     PRESENCE mandatory },
   . . .
E-RABSetupItemCtxtSURes ::= SEQUENCE {
   e-RAB-ID
                                 E-RAB-ID,
   transportLayerAddress
                                 TransportLayerAddress,
   aTP-TEID
                                 GTP-TEID,
   iE-Extensions
                                 ProtocolExtensionContainer { {E-RABSetupItemCtxtSUResExtIEs} } OPTIONAL,
E-RABSetupItemCtxtSUResExtIEs S1AP-PROTOCOL-EXTENSION ::=
   . . .
```

```
-- Initial Context Setup Failure
__ *********************
InitialContextSetupFailure ::= SEOUENCE {
                      ProtocolIE-Container
                                                { {InitialContextSetupFailureIEs} },
   protocolIEs
   . . .
InitialContextSetupFailureIEs S1AP-PROTOCOL-IES ::= 
     ID id-MME-UE-S1AP-ID
                                     CRITICALITY ignore TYPE MME-UE-S1AP-ID
                                                                                           PRESENCE mandatory
     ID id-eNB-UE-S1AP-ID
                                     CRITICALITY ignore TYPE ENB-UE-S1AP-ID
                                                                                           PRESENCE mandatory
     ID id-Cause
                                     CRITICALITY ignore TYPE Cause
                                                                                           PRESENCE mandatory
                                                                                           PRESENCE optional
     ID id-CriticalityDiagnostics
                                     CRITICALITY ignore TYPE CriticalityDiagnostics
-- PAGING ELEMENTARY PROCEDURE
-- Paging
Paging ::= SEQUENCE {
                                                {{PagingIEs}},
   protocolIEs
                      ProtocolIE-Container
PagingIEs S1AP-PROTOCOL-IES ::= {
     ID id-UEIdentityIndexValue
                                         CRITICALITY ignore TYPE UEIdentityIndexValue
                                                                                               PRESENCE mandatory}
     ID id-UEPagingID
                                         CRITICALITY ignore TYPE UEPagingID
                                                                                               PRESENCE mandatory }
     ID id-pagingDRX
                                         CRITICALITY ignore TYPE PagingDRX
                                                                                               PRESENCE optional }
     ID id-CNDomain
                                         CRITICALITY ignore TYPE CNDomain
                                                                                               PRESENCE mandatory
                                                                                               PRESENCE mandatory
     ID id-TAIList
                                         CRITICALITY ignore TYPE TAIList
                                         CRITICALITY ignore TYPE CSG-IdList
     ID id-CSG-IdList
                                                                                               PRESENCE optional}
     ID id-PagingPriority
                                         CRITICALITY ignore TYPE PagingPriority
                                                                                               PRESENCE optional}
     ID id-UERadioCapabilityForPaging
                                         CRITICALITY ignore TYPE UERadioCapabilityForPaging
                                                                                               PRESENCE optional }
-- Extension for Release 13 to support Paging Optimisation and Coverage Enhancement paging --
     ID id-AssistanceDataForPaging
                                         CRITICALITY ignore TYPE AssistanceDataForPaging
                                                                                               PRESENCE optional}
     ID id-Paging-eDRXInformation
                                         CRITICALITY ignore TYPE Paging-eDRXInformation
                                                                                               PRESENCE optional}
     ID id-extended-UEIdentityIndexValue
                                         CRITICALITY ignore TYPE Extended-UEIdentityIndexValue
                                                                                               PRESENCE optional}
     ID id-NB-IoT-Paging-eDRXInformation
                                         CRITICALITY ignore TYPE NB-IoT-Paging-eDRXInformation
                                                                                               PRESENCE optional}
```

```
ID id-NB-IoT-UEIdentityIndexValue
                                       CRITICALITY ignore TYPE NB-IoT-UEIdentityIndexValue
                                                                                           PRESENCE optional }
     ID id-EnhancedCoverageRestricted
                                       CRITICALITY ignore TYPE EnhancedCoverageRestricted
                                                                                           PRESENCE optional }
     ID id-CE-ModeBRestricted
                                       CRITICALITY ignore TYPE CE-ModeBRestricted
                                                                                           PRESENCE optional }
     ID id-DataSize
                                       CRITICALITY ignore TYPE DataSize
                                                                                           PRESENCE optional}
     ID id-WUS-Assistance-Information
                                       CRITICALITY ignore TYPE WUS-Assistance-Information
                                                                                           PRESENCE optional}
                                                                                           PRESENCE optional },
    ID id-NB-IoT-PagingDRX
                                       CRITICALITY ignore TYPE NB-IoT-PagingDRX
TAIList::= SEQUENCE (SIZE(1.. maxnoofTAIs)) OF ProtocolIE-SingleContainer {{TAIItemIEs}}
TAIItemIEs S1AP-PROTOCOL-IES ::= {
                                                     PRESENCE mandatory },
   { ID id-TAIItem CRITICALITY ignore
                                       TYPE TAIItem
TAIItem ::= SEOUENCE {
   tAI
                                TAI,
                                ProtocolExtensionContainer { {TAIItemExtIEs} } OPTIONAL,
   iE-Extensions
TAIItemExtIEs S1AP-PROTOCOL-EXTENSION ::= {
-- UE CONTEXT RELEASE ELEMENTARY PROCEDURE
  *****************
  *****************
-- UE Context Release Request
__ **********************
UEContextReleaseRequest ::= SEOUENCE {
                                                         {{UEContextReleaseRequest-IEs}},
   protocolIEs
                                ProtocolIE-Container
   . . .
UEContextReleaseRequest-IES S1AP-PROTOCOL-IES ::= {
     ID id-MME-UE-S1AP-ID
                                       CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                                        PRESENCE mandatory
     ID id-eNB-UE-S1AP-ID
                                       CRITICALITY reject TYPE ENB-UE-S1AP-ID
                                                                                        PRESENCE mandatory
     ID id-Cause
                                       CRITICALITY ignore TYPE Cause
                                                                                           PRESENCE mandatory }
     ID id-GWContextReleaseIndication
                                       CRITICALITY reject TYPE GWContextReleaseIndication PRESENCE optional }
   { ID id-SecondaryRATDataUsageReportList CRITICALITY ignore TYPE SecondaryRATDataUsageReportList PRESENCE optional },
__ **********************
```

```
-- UE Context Release Command
__ *********************
UEContextReleaseCommand ::= SEQUENCE {
  protocolIEs
                           ProtocolIE-Container
                                                {{UEContextReleaseCommand-IEs}},
UEContextReleaseCommand-IEs S1AP-PROTOCOL-IES ::= {
   { ID id-UE-S1AP-IDs
                              CRITICALITY reject TYPE UE-S1AP-IDs
                                                                         PRESENCE mandatory } |
                              CRITICALITY ignore TYPE Cause
                                                                         PRESENCE mandatory },
   { ID id-Cause
  *****************
-- UE Context Release Complete
  UEContextReleaseComplete ::= SEQUENCE {
  protocolIEs
                           ProtocolIE-Container
                                                {{UEContextReleaseComplete-IEs}},
UEContextReleaseComplete-IEs S1AP-PROTOCOL-IES ::= {
    ID id-MME-UE-S1AP-ID
                                          CRITICALITY ignore TYPE MME-UE-S1AP-ID
                                                                                   PRESENCE mandatory }
    ID id-eNB-UE-S1AP-ID
                                                                                   PRESENCE mandatory }
                                          CRITICALITY ignore TYPE ENB-UE-S1AP-ID
   { ID id-CriticalityDiagnostics
                                          CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                     PRESENCE optional}
-- Extension for Release 12 to support User Location Information --
   { ID id-UserLocationInformation
                                          CRITICALITY ignore TYPE UserLocationInformation
                                                                                       PRESENCE optional } |
-- Extension for Release 13 to support Paging Optimisation
   optional}|
-- Extension for Release 13 to support coverage enhancement paging -
    ID id-SecondaryRATDataUsageReportList
                                        CRITICALITY ignore TYPE SecondaryRATDataUsageReportList PRESENCE optional }
   { ID id-TimeSinceSecondaryNodeRelease
                                        CRITICALITY ignore TYPE TimeSinceSecondaryNodeRelease
                                                                                            PRESENCE optional },
-- UE CONTEXT MODIFICATION ELEMENTARY PROCEDURE
    *****************
-- UE Context Modification Request
```

```
__ *********************
UEContextModificationRequest ::= SEOUENCE {
   protocolIEs
                       ProtocolIE-Container
                                                 { { UEContextModificationRequestIEs} },
    . . .
UEContextModificationRequestIEs S1AP-PROTOCOL-IES ::= {
     ID id-MME-UE-S1AP-ID
                                              CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                                                       PRESENCE mandatory
     ID id-eNB-UE-S1AP-ID
                                              CRITICALITY reject TYPE ENB-UE-S1AP-ID
                                                                                                       PRESENCE mandatory
                                              CRITICALITY reject TYPE SecurityKey
                                                                                                       PRESENCE optional }
     ID id-SecurityKey
                                                                                                       PRESENCE optional }
     ID id-SubscriberProfileIDforRFP
                                              CRITICALITY ignore TYPE SubscriberProfileIDforRFP
                                              CRITICALITY ignore TYPE UEAggregateMaximumBitrate
                                                                                                       PRESENCE optional }
     ID id-uEaggregateMaximumBitrate
     ID id-CSFallbackIndicator
                                              CRITICALITY reject TYPE CSFallbackIndicator
                                                                                                       PRESENCE optional }
     ID id-UESecurityCapabilities
                                              CRITICALITY reject TYPE UESecurityCapabilities
                                                                                                       PRESENCE optional }
                                              CRITICALITY ignore TYPE CSGMembershipStatus
     ID id-CSGMembershipStatus
                                                                                                       PRESENCE optional }
     ID id-RegisteredLAI
                                              CRITICALITY ignore TYPE LAI
                                                                                                       PRESENCE optional }
     ID id-AdditionalCSFallbackIndicator
                                              CRITICALITY ignore TYPE AdditionalCSFallbackIndicator
                                                                                                       PRESENCE conditional |
                                                                                                       PRESENCE optional }
     ID id-ProSeAuthorized
                                              CRITICALITY ignore TYPE ProSeAuthorized
     ID id-SRVCCOperationPossible
                                              CRITICALITY ignore TYPE SRVCCOperationPossible
                                                                                                       PRESENCE optional }
     ID id-SRVCCOperationNotPossible
                                              CRITICALITY ignore TYPE SRVCCOperationNotPossible
                                                                                                       PRESENCE optional }
                                              CRITICALITY ignore TYPE V2XServicesAuthorized
     ID id-V2XServicesAuthorized
                                                                                                       PRESENCE optional }
     ID id-UESidelinkAggregateMaximumBitrate
                                              CRITICALITY ignore TYPE UESidelinkAggregateMaximumBitrate PRESENCE optional }
     ID id-NRUESecurityCapabilities
                                              CRITICALITY ignore TYPE NRUESecurityCapabilities
                                                                                                       PRESENCE optional }
     ID id-AerialUEsubscriptionInformation
                                              CRITICALITY ignore TYPE AerialUEsubscriptionInformation
                                                                                                       PRESENCE optional }
     ID id-AdditionalRRMPriorityIndex
                                              CRITICALITY ignore TYPE Additional RRMPriorityIndex
                                                                                                       PRESENCE optional }
     ID id-IAB-Authorized
                                              CRITICALITY ignore TYPE IAB-Authorized
                                                                                                       PRESENCE optional }
     ID id-NRV2XServicesAuthorized
                                                      CRITICALITY ignore TYPE NRV2XServicesAuthorized
                                                                                                                         PRESENCE optional }
                                                                                                                         PRESENCE optional }
     ID id-NRUESidelinkAggregateMaximumBitrate
                                                      CRITICALITY ignore TYPE NRUESidelinkAggregateMaximumBitrate
     ID id-PC50oSParameters
                                                                                                                      PRESENCE optional }
                                                      CRITICALITY ignore TYPE PC5QoSParameters
     ID id-UERadioCapabilityID
                                                      CRITICALITY reject TYPE UERadioCapabilityID
                                                                                                                      PRESENCE optional },
        UE Context Modification Response
UEContextModificationResponse ::= SEQUENCE {
                       ProtocolIE-Container
                                                 { { UEContextModificationResponseIEs} },
   protocolIEs
    . . .
UEContextModificationResponseIEs S1AP-PROTOCOL-IES ::= {
     ID id-MME-UE-S1AP-ID
                                      CRITICALITY ignore TYPE MME-UE-S1AP-ID
                                                                                             PRESENCE mandatory
     ID id-eNB-UE-S1AP-ID
                                      CRITICALITY ignore TYPE ENB-UE-S1AP-ID
                                                                                             PRESENCE mandatory }
     ID id-CriticalityDiagnostics
                                      CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                             PRESENCE optional
-- UE Context Modification Failure
```

```
__ *********************
UEContextModificationFailure ::= SEOUENCE {
   protocolIEs
                    ProtocolIE-Container
                                            { { UEContextModificationFailureIEs} },
   . . .
UEContextModificationFailureIEs S1AP-PROTOCOL-IES ::= {
     ID id-MME-UE-S1AP-ID CRITICALITY ignore TYPE MME-UE-S1AP-ID
                                                                                   PRESENCE mandatory
                                  CRITICALITY ignore TYPE ENB-UE-S1AP-ID
     ID id-eNB-UE-S1AP-ID
                                                                                   PRESENCE mandatory
                               CRITICALITY ignore TYPE Cause
     ID id-Cause
                                                                                   PRESENCE mandatory
   PRESENCE optional
-- UE RADIO CAPABILITY MATCH ELEMENTARY PROCEDURE
-- UE Radio Capability Match Request
  ******************
UERadioCapabilityMatchRequest ::= SEQUENCE {
                                            { { UERadioCapabilityMatchRequestIEs} },
   protocolIEs
               ProtocolIE-Container
UERadioCapabilityMatchRequestIEs S1AP-PROTOCOL-IES ::= {
    ID id-MME-UE-S1AP-ID
                                  CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                                   PRESENCE mandatory }
     ID id-eNB-UE-S1AP-ID
                                  CRITICALITY reject TYPE ENB-UE-S1AP-ID
                                                                                   PRESENCE mandatory
    ID id-UERadioCapability
                               CRITICALITY ignore TYPE UERadioCapability
                                                                                   PRESENCE optional
   { ID id-UERadioCapabilityID
                                  CRITICALITY reject TYPE UERadioCapabilityID
                                                                                   PRESENCE optional
-- UE Radio Capability Match Response
UERadioCapabilityMatchResponse ::= SEQUENCE {
   protocolIEs
                   ProtocolIE-Container
                                            { { UERadioCapabilityMatchResponseIEs} },
   . . .
UERadioCapabilityMatchResponseIEs S1AP-PROTOCOL-IES ::= {
     ID id-MME-UE-S1AP-ID
                        CRITICALITY ignore TYPE MME-UE-S1AP-ID
                                                                                   PRESENCE mandatory }
   { ID id-eNB-UE-S1AP-ID
                                  CRITICALITY ignore TYPE ENB-UE-S1AP-ID
                                                                                   PRESENCE mandatory }
```

```
ID id-VoiceSupportMatchIndicator CRITICALITY reject TYPE VoiceSupportMatchIndicator
                                                                                               PRESENCE mandatory } |
     ID id-CriticalityDiagnostics
                                       CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                               PRESENCE optional
  NAS TRANSPORT ELEMENTARY PROCEDURES
      ****************
-- DOWNLINK NAS TRANSPORT
DownlinkNASTransport ::= SEQUENCE {
                                                              {{DownlinkNASTransport-IEs}},
    protocolIEs
                                   ProtocolIE-Container
    . . .
DownlinkNASTransport-IEs S1AP-PROTOCOL-IES ::= {
     ID id-MME-UE-S1AP-ID
                                       CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                                               PRESENCE mandatory }
     ID id-eNB-UE-S1AP-ID
                                       CRITICALITY reject TYPE ENB-UE-S1AP-ID
                                                                                               PRESENCE mandatory
     ID id-NAS-PDU
                                                                                               PRESENCE mandatory }
                                       CRITICALITY reject TYPE NAS-PDU
                                                                                               PRESENCE optional }
     ID id-HandoverRestrictionList
                                       CRITICALITY ignore TYPE HandoverRestrictionList
     ID id-SubscriberProfileIDforRFP
                                       CRITICALITY ignore TYPE SubscriberProfileIDforRFP
                                                                                               PRESENCE optional }
     ID id-SRVCCOperationPossible
                                       CRITICALITY ignore TYPE SRVCCOperationPossible
                                                                                               PRESENCE optional }
     ID id-UERadioCapability
                                       CRITICALITY ignore TYPE UERadioCapability
                                                                                               PRESENCE optional }
     ID id-DLNASPDUDeliveryAckRequest
                                       CRITICALITY ignore TYPE DLNASPDUDeliveryAckRequest PRESENCE optional |
     ID id-EnhancedCoverageRestricted
                                       CRITICALITY ignore TYPE EnhancedCoverageRestricted
                                                                                               PRESENCE optional}
     ID id-NRUESecurityCapabilities
                                       CRITICALITY ignore TYPE NRUESecurityCapabilities
                                                                                               PRESENCE optional }
                                       CRITICALITY ignore TYPE CE-ModeBRestricted
     ID id-CE-ModeBRestricted
                                                                                               PRESENCE optional }
     ID id-UECapabilityInfoReguest
                                       CRITICALITY ignore TYPE UECapabilityInfoReguest
                                                                                           PRESENCE optional } |
                                       CRITICALITY ignore TYPE EndIndication
     ID id-EndIndication
                                                                                               PRESENCE optional }
     ID id-PendingDataIndication
                                       CRITICALITY ignore TYPE PendingDataIndication
                                                                                               PRESENCE optional }
                                                           CRITICALITY ignore TYPE Subscription-Based-UE-DifferentiationInfo
     ID id-Subscription-Based-UE-DifferentiationInfo
                                                                                                                                 PRESENCE
optional}
     ID id-AdditionalRRMPriorityIndex CRITICALITY ignore TYPE AdditionalRRMPriorityIndex
                                                                                               PRESENCE optional } |
     ID id-UERadioCapabilityID
                                                                                               PRESENCE optional }
                                       CRITICALITY reject TYPE UERadioCapabilityID
-- INITIAL UE MESSAGE
InitialUEMessage ::= SEQUENCE {
   protocolIEs
                                   ProtocolIE-Container
                                                              {{InitialUEMessage-IEs}},
    . . .
```

```
InitialUEMessage-IEs S1AP-PROTOCOL-IES ::= {
     ID id-eNB-UE-S1AP-ID
                                       CRITICALITY reject TYPE ENB-UE-S1AP-ID
                                                                                              PRESENCE mandatory }
     ID id-NAS-PDU
                                       CRITICALITY reject TYPE NAS-PDU
                                                                                              PRESENCE mandatory
                                                                                              PRESENCE mandatory
     ID id-TAI
                                       CRITICALITY reject TYPE TAI
     ID id-EUTRAN-CGI
                                       CRITICALITY ignore TYPE EUTRAN-CGI
                                                                                              PRESENCE mandatory
     ID id-RRC-Establishment-Cause
                                       CRITICALITY ignore TYPE RRC-Establishment-Cause
                                                                                              PRESENCE mandatory}
     TD id-S-TMST
                                       CRITICALITY reject TYPE S-TMSI
                                                                                              PRESENCE optional }
     ID id-CSG-Id
                                       CRITICALITY reject TYPE CSG-Id
                                                                                              PRESENCE optional
     ID id-GUMMEI-ID
                                                                                              PRESENCE optional }
                                       CRITICALITY reject TYPE GUMMEI
     ID id-CellAccessMode
                                       CRITICALITY reject TYPE CellAccessMode
                                                                                              PRESENCE optional }
                                                                                              PRESENCE optional}
     ID id-GW-TransportLayerAddress
                                       CRITICALITY ignore TYPE TransportLayerAddress
     ID id-RelayNode-Indicator
                                       CRITICALITY reject TYPE RelayNode-Indicator
                                                                                              PRESENCE optional }
     ID id-GUMMEIType
                                       CRITICALITY ignore TYPE GUMMEIType
                                                                                              PRESENCE optional }
-- Extension for Release 11 to support BBAI --
     ID id-Tunnel-Information-for-BBF CRITICALITY ignore TYPE TunnelInformation
                                                                                              PRESENCE optional }
     ID id-SIPTO-L-GW-TransportLayerAddress
                                               CRITICALITY ignore TYPE TransportLayerAddress
                                                                                              PRESENCE optional }
                                                                                              PRESENCE optional }
     ID id-LHN-ID
                                       CRITICALITY ignore TYPE LHN-ID
     ID id-MME-Group-ID
                                       CRITICALITY ignore TYPE MME-Group-ID
                                                                                              PRESENCE optional }
     ID id-UE-Usage-Type
                                       CRITICALITY ignore TYPE UE-Usage-Type
                                                                                              PRESENCE optional }
     ID id-CE-mode-B-SupportIndicator CRITICALITY ignore TYPE CE-mode-B-SupportIndicator
                                                                                              PRESENCE optional}
                                       CRITICALITY ignore TYPE DCN-ID
                                                                                              PRESENCE optional }
     ID id-DCN-ID
     ID id-Coverage-Level
                                       CRITICALITY ignore TYPE Coverage-Level
                                                                                          PRESENCE optional |
     ID id-UE-Application-Layer-Measurement-Capability
                                                           CRITICALITY ignore TYPE UE-Application-Layer-Measurement-Capability
    PRESENCE optional } |
     ID id-EDT-Session
                                       CRITICALITY ignore TYPE EDT-Session
                                                                                              PRESENCE optional |
     ID id-IAB-Node-Indication
                                       CRITICALITY reject TYPE IAB-Node-Indication
                                                                                              PRESENCE optional },
     ************
-- UPLINK NAS TRANSPORT
UplinkNASTransport ::= SEQUENCE {
    protocolIEs
                                   ProtocolIE-Container
                                                              {{UplinkNASTransport-IEs}},
UplinkNASTransport-IEs S1AP-PROTOCOL-IES ::= {
                                       CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                                              PRESENCE mandatory }
     ID id-MME-UE-S1AP-ID
                                                                                              PRESENCE mandatory
     ID id-eNB-UE-S1AP-ID
                                       CRITICALITY reject TYPE ENB-UE-S1AP-ID
     ID id-NAS-PDU
                                       CRITICALITY reject TYPE NAS-PDU
                                                                                              PRESENCE mandatory
     ID id-EUTRAN-CGI
                                       CRITICALITY ignore TYPE EUTRAN-CGI
                                                                                              PRESENCE mandatory }
     ID id-TAI
                                       CRITICALITY ignore TYPE TAI
                                                                                              PRESENCE mandatory }
                                       CRITICALITY ignore TYPE TransportLayerAddress
                                                                                              PRESENCE optional }
     ID id-GW-TransportLayerAddress
                                                                                              PRESENCE optional
                                               CRITICALITY ignore TYPE TransportLayerAddress
     ID id-SIPTO-L-GW-TransportLayerAddress
     ID id-LHN-ID
                                       CRITICALITY ignore TYPE LHN-ID
                                                                                              PRESENCE optional }
     ID id-PSCellInformation
                                       CRITICALITY ignore TYPE PSCellInformation
                                                                                              PRESENCE optional },
```

```
-- NAS NON DELIVERY INDICATION
__ ********************************
NASNonDelivervIndication ::= SEOUENCE {
   protocolIEs
                                ProtocolIE-Container
                                                         {{NASNonDeliveryIndication-IEs}},
   . . .
NASNonDeliveryIndication-IEs S1AP-PROTOCOL-IES ::= {
     ID id-MME-UE-S1AP-ID
                                   CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                                   PRESENCE mandatory
     ID id-eNB-UE-S1AP-ID
                                   CRITICALITY reject TYPE ENB-UE-S1AP-ID
                                                                                   PRESENCE mandatory
     ID id-NAS-PDU
                                   CRITICALITY ignore TYPE NAS-PDU
                                                                                   PRESENCE mandatory
                                    CRITICALITY ignore TYPE Cause
                                                                                   PRESENCE mandatory
     ID id-Cause
   -- REROUTE NAS REQUEST
__ ********************************
RerouteNASRequest ::= SEQUENCE {
                                                         {{RerouteNASRequest-IEs}},
   protocolIEs
                                ProtocolIE-Container
RerouteNASRequest-IEs S1AP-PROTOCOL-IES ::= {
     ID id-eNB-UE-S1AP-ID
                                CRITICALITY reject TYPE ENB-UE-S1AP-ID
                                                                            PRESENCE mandatory}
                                CRITICALITY ignore TYPE MME-UE-S1AP-ID
     ID id-MME-UE-S1AP-ID
                             CRITICALITY ignore TYPE MME-UE-S1AP-I
CRITICALITY reject TYPE OCTET STRING
                                                                           PRESENCE optional }
     ID id-S1-Message
                                                                           PRESENCE mandatory
     ID id-MME-Group-ID
                             CRITICALITY reject TYPE MME-Group-ID
                                                                           PRESENCE mandatory }
     ID id-Additional-GUTI
                                CRITICALITY ignore TYPE Additional-GUTI
                                                                            PRESENCE optional } |
                                                                            PRESENCE optional },
    ID id-UE-Usage-Type
                                CRITICALITY ignore TYPE UE-Usage-Type
-- NAS DELIVERY INDICATION
__ ****************
NASDeliveryIndication ::= SEQUENCE {
                ProtocolIE-Container { { NASDeliveryIndicationIEs} },
   protocolIEs
NASDeliveryIndicationIEs S1AP-PROTOCOL-IES ::= {
```

```
ID id-MME-UE-S1AP-ID
                                                                              PRESENCE mandatory}
                                      CRITICALITY reject TYPE MME-UE-S1AP-ID
    ID id-eNB-UE-S1AP-ID
                                      CRITICALITY reject TYPE ENB-UE-S1AP-ID
                                                                              PRESENCE mandatory },
  ******************
-- RESET ELEMENTARY PROCEDURE
  ***************
  *****************
-- Reset
Reset ::= SEQUENCE {
                                     { {ResetIEs} },
   protocolIEs
                 ProtocolIE-Container
ResetIEs S1AP-PROTOCOL-IES ::= {
   { ID id-Cause
                             CRITICALITY ignore TYPE Cause
                                                                   PRESENCE mandatory
   { ID id-ResetType
                             CRITICALITY reject TYPE ResetType
                                                                   PRESENCE mandatory },
   . . .
ResetType ::= CHOICE {
   s1-Interface
                          ResetAll,
  partOfS1-Interface
                          UE-associatedLogicalS1-ConnectionListRes,
ResetAll ::= ENUMERATED {
  reset-all,
UE-associatedLogicalS1-ConnectionListRes ::= SEQUENCE (SIZE(1.. maxnoofIndividualS1ConnectionsToReset)) OF ProtocolIE-SingleContainer { { UE-
associatedLogicalS1-ConnectionItemRes } }
UE-associatedLogicalS1-ConnectionItemRes S1AP-PROTOCOL-IES ::= {
   . . .
    -- Reset Acknowledge
```

```
__ **********************
ResetAcknowledge ::= SEQUENCE {
   protocolIEs
                   ProtocolIE-Container
                                          { {ResetAcknowledgeIEs} },
   . . .
ResetAcknowledgeIEs S1AP-PROTOCOL-IES ::= {
   { ID id-UE-associatedLogicalS1-ConnectionListResAck
                                                 CRITICALITY ignore TYPE UE-associatedLogicalS1-ConnectionListResAck
                                                                                                                 PRESENCE
optional }|
                                 CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                PRESENCE optional },
   { ID id-CriticalityDiagnostics
   . . .
UE-associatedLogicalS1-ConnectionListResAck ::= SEOUENCE (SIZE(1.. maxnoofIndividualS1ConnectionsToReset)) OF ProtocolIE-SingleContainer { { UE-
associatedLogicalS1-ConnectionItemResAck } }
UE-associatedLogicalS1-ConnectionItemResAck
                                       S1AP-PROTOCOL-IES ::= {
   { ID id-UE-associatedLogicalS1-ConnectionItem
                                           CRITICALITY ignore
                                                               TYPE UE-associatedLogicalS1-ConnectionItem PRESENCE mandatory },
   . . .
    -- ERROR INDICATION ELEMENTARY PROCEDURE
  ******************
-- Error Indication
  *****************
ErrorIndication ::= SEOUENCE {
                                          {{ErrorIndicationIEs}},
   protocolIEs
                   ProtocolIE-Container
ErrorIndicationIEs S1AP-PROTOCOL-IES ::= {
    ID id-MME-UE-S1AP-ID
                                 CRITICALITY ignore TYPE MME-UE-S1AP-ID
                                                                            PRESENCE optional }
    ID id-eNB-UE-S1AP-ID
                                 CRITICALITY ignore TYPE ENB-UE-S1AP-ID
                                                                            PRESENCE optional
                                                                            PRESENCE optional }
    ID id-Cause
                                 CRITICALITY ignore TYPE Cause
    ID id-CriticalityDiagnostics
                                 CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                            PRESENCE optional }
                                 CRITICALITY ignore TYPE S-TMSI
                                                                            PRESENCE optional },
   { ID id-S-TMSI
  -- S1 SETUP ELEMENTARY PROCEDURE
  ******************
```

```
__ *********************
-- S1 Setup Request
  *****************
S1SetupRequest ::= SEOUENCE {
   protocolIEs
                     ProtocolIE-Container
                                             { {S1SetupRequestIEs} },
S1SetupRequestIEs S1AP-PROTOCOL-IES ::= {
     ID id-Global-ENB-ID
                                   CRITICALITY reject TYPE Global-ENB-ID
                                                                                  PRESENCE mandatory }
     ID id-eNBname
                                   CRITICALITY ignore TYPE ENBname
                                                                                  PRESENCE optional }
     ID id-SupportedTAs
                                   CRITICALITY reject TYPE SupportedTAs
                                                                                  PRESENCE mandatory
     ID id-DefaultPagingDRX
                                   CRITICALITY ignore TYPE PagingDRX
                                                                                  PRESENCE mandatory }
     ID id-CSG-IdList
                                                                                  PRESENCE optional }
                                   CRITICALITY reject TYPE CSG-IdList
     ID id-UE-RetentionInformation
                                   CRITICALITY ignore TYPE UE-RetentionInformation
                                                                                  PRESENCE optional }
                                                                                  PRESENCE optional }
     ID id-NB-IoT-DefaultPagingDRX
                                   CRITICALITY ignore TYPE NB-IoT-DefaultPagingDRX
    ID id-ConnectedengNBList
                                   CRITICALITY ignore TYPE ConnectedengNBList
                                                                                  PRESENCE optional },
     ****************
  S1 Setup Response
S1SetupResponse ::= SEOUENCE {
   protocolIEs
                     ProtocolIE-Container
                                             { {S1SetupResponseIEs} },
S1SetupResponseIEs S1AP-PROTOCOL-IES ::= {
     ID id-MMEname
                                                                                  PRESENCE optional }
                                   CRITICALITY ignore TYPE MMEname
     ID id-ServedGUMMEIs
                                   CRITICALITY reject TYPE ServedGUMMEIS
                                                                                  PRESENCE mandatory
     ID id-RelativeMMECapacity
                                                                                  PRESENCE mandatory}
                                   CRITICALITY ignore TYPE RelativeMMECapacity
     ID id-MMERelaySupportIndicator
                                   CRITICALITY ignore TYPE MMERelaySupportIndicator
                                                                                  PRESENCE optional }
     ID id-CriticalityDiagnostics
                                                                                  PRESENCE optional }
                                   CRITICALITY ignore TYPE CriticalityDiagnostics
     ID id-UE-RetentionInformation
                                   CRITICALITY ignore TYPE UE-RetentionInformation
                                                                                  PRESENCE optional }
     ID id-ServedDCNs
                                   CRITICALITY ignore TYPE ServedDCNs
                                                                                  PRESENCE optional }
   { ID id-IAB-Supported
                                   CRITICALITY ignore TYPE IAB-Supported
                                                                                  PRESENCE optional },
   ******************
-- S1 Setup Failure
__ *********************
S1SetupFailure ::= SEOUENCE {
```

```
{ {S1SetupFailureIEs} },
   protocolIEs
                     ProtocolIE-Container
S1SetupFailureIEs S1AP-PROTOCOL-IES ::= {
    ID id-Cause
                                   CRITICALITY ignore TYPE Cause
                                                                                 PRESENCE mandatory } |
     ID id-TimeToWait
                                   CRITICALITY ignore TYPE TimeToWait
                                                                                 PRESENCE optional } |
   { ID id-CriticalityDiagnostics
                                   CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                 PRESENCE optional },
  ****************
-- ENB CONFIGURATION UPDATE ELEMENTARY PROCEDURE
     *****************
  eNB Configuration Update
__ *********************
ENBConfigurationUpdate ::= SEOUENCE {
   protocolIEs
                    ProtocolIE-Container
                                             { {ENBConfigurationUpdateIEs} },
   . . .
ENBConfigurationUpdateIEs S1AP-PROTOCOL-IES ::= {
     ID id-eNBname
                                   CRITICALITY ignore TYPE ENBname
                                                                                 PRESENCE optional }
     ID id-SupportedTAs
                                   CRITICALITY reject TYPE SupportedTAs
                                                                                 PRESENCE optional
     ID id-CSG-IdList
                                   CRITICALITY reject TYPE CSG-IdList
                                                                                 PRESENCE optional
     ID id-DefaultPagingDRX
                                  CRITICALITY ignore TYPE PagingDRX
                                                                                 PRESENCE optional
     ID id-NB-IoT-DefaultPagingDRX
                                   CRITICALITY ignore TYPE NB-IoT-DefaultPagingDRX
                                                                                 PRESENCE optional }
     ID id-ConnectedengNBToAddList
                                   CRITICALITY ignore TYPE ConnectedengNBList
                                                                                 PRESENCE optional }
   ID id-ConnectedengNBToRemoveList CRITICALITY ignore TYPE ConnectedengNBList
                                                                                 PRESENCE optional },
    *****************
-- eNB Configuration Update Acknowledge
__ *********************
ENBConfigurationUpdateAcknowledge ::= SEQUENCE {
   protocolIEs
                    ProtocolIE-Container
                                            { {ENBConfigurationUpdateAcknowledgeIEs} },
ENBConfigurationUpdateAcknowledgeIEs S1AP-PROTOCOL-IES ::= {
   { ID id-CriticalityDiagnostics
                                  CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },
   . . .
```

```
-- eNB Configuration Update Failure
  ******************
ENBConfigurationUpdateFailure ::= SEQUENCE {
                                            { {ENBConfigurationUpdateFailureIEs} },
   protocolIEs
                  ProtocolIE-Container
ENBConfigurationUpdateFailureIEs S1AP-PROTOCOL-IES ::= {
     ID id-Cause
                                                                                PRESENCE mandatory } |
                                  CRITICALITY ignore TYPE Cause
     ID id-TimeToWait
                                  CRITICALITY ignore TYPE TimeToWait
                                                                                PRESENCE optional } |
                                                                                PRESENCE optional },
     ID id-CriticalityDiagnostics
                                  CRITICALITY ignore TYPE CriticalityDiagnostics
  MME CONFIGURATION UPDATE ELEMENTARY PROCEDURE
-- MME Configuration Update
__ **********************
MMEConfigurationUpdate ::= SEQUENCE {
   protocolIEs
                    ProtocolIE-Container
                                            { {MMEConfigurationUpdateIEs} },
   . . .
MMEConfigurationUpdateIEs S1AP-PROTOCOL-IES ::= {
     ID id-MMEname
                   CRITICALITY ignore TYPE MMEname
                                                                         PRESENCE optional
    ID id-ServedGUMMEIS CRITICALITY reject TYPE ServedGUMMEIS
ID id-RelativeMMECapacity CRITICALITY reject TYPE RelativeMMECapacity
                                                                         PRESENCE optional
                                                                         PRESENCE optional
   { ID id-ServedDCNs
                        CRITICALITY ignore TYPE ServedDCNs
                                                                         PRESENCE optional },
    -- MME Configuration Update Acknowledge
MMEConfigurationUpdateAcknowledge ::= SEQUENCE {
                                            { {MMEConfigurationUpdateAcknowledgeIEs} },
   protocolIEs
                    ProtocolIE-Container
```

```
MMEConfigurationUpdateAcknowledgeIEs S1AP-PROTOCOL-IES ::= {
   PRESENCE optional },
   . . .
  ***************
-- MME Configuration Update Failure
  ********************
MMEConfigurationUpdateFailure ::= SEOUENCE {
             ProtocolIE-Container
                                     { {MMEConfigurationUpdateFailureIEs} },
   protocolIEs
MMEConfigurationUpdateFailureIEs S1AP-PROTOCOL-IES ::= {
    ID id-Cause
                             CRITICALITY ignore TYPE Cause
                                                                    PRESENCE mandatory } |
    ID id-TimeToWait
                                                                    PRESENCE optional } |
                             CRITICALITY ignore TYPE TimeToWait
                                                                    PRESENCE optional },
    ID id-CriticalityDiagnostics
                             CRITICALITY ignore TYPE CriticalityDiagnostics
-- DOWNLINK S1 CDMA2000 TUNNELLING ELEMENTARY PROCEDURE
  *****************
  -- Downlink S1 CDMA2000 Tunnelling
__ **********************
DownlinkS1cdma2000tunnelling ::= SEOUENCE {
                                     { {DownlinkS1cdma2000tunnellingIEs} },
   protocolIEs
             ProtocolIE-Container
DownlinkSlcdma2000tunnellingIEs S1AP-PROTOCOL-IES ::= {
    ID id-MME-UE-S1AP-ID
                                   CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                            PRESENCE mandatory
    ID id-eNB-UE-S1AP-ID
                                   CRITICALITY reject TYPE ENB-UE-S1AP-ID
                                                                            PRESENCE mandatory
    ID id-cdma2000HOStatus
                                   CRITICALITY ignore TYPE Cdma2000HOStatus
                                                                            PRESENCE optional } |
    ID id-cdma2000RATType
                                   CRITICALITY reject TYPE Cdma2000RATType
                                                                            PRESENCE mandatory
   { ID id-cdma2000PDU
                                   CRITICALITY reject TYPE Cdma2000PDU
                                                                            PRESENCE mandatory
   . . .
```

```
__ **********************
-- UPLINK S1 CDMA2000 TUNNELLING ELEMENTARY PROCEDURE
   *******************
-- Uplink S1 CDMA2000 Tunnelling
__ **********************
UplinkS1cdma2000tunnelling ::= SEQUENCE {
   protocolIEs
                     ProtocolIE-Container
                                             { {UplinkS1cdma2000tunnellingIEs} },
UplinkS1cdma2000tunnellingIEs S1AP-PROTOCOL-IES ::= {
     ID id-MME-UE-S1AP-ID
                                              CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                                               PRESENCE mandatory
     ID id-eNB-UE-S1AP-ID
                                              CRITICALITY reject TYPE ENB-UE-S1AP-ID
                                                                                               PRESENCE mandatory
     ID id-cdma2000RATType
                                              CRITICALITY reject TYPE Cdma2000RATType
                                                                                               PRESENCE mandatory
                                              CRITICALITY reject TYPE Cdma2000SectorID
                                                                                               PRESENCE mandatory
     ID id-cdma2000SectorID
     ID id-cdma2000HORequiredIndication
                                              CRITICALITY ignore TYPE Cdma2000HORequiredIndication
                                                                                                PRESENCE optional }
     ID id-cdma20000neXSRVCCInfo
                                              CRITICALITY reject TYPE Cdma20000neXSRVCCInfo
                                                                                               PRESENCE optional }
     ID id-cdma20000neXRAND
                                              CRITICALITY reject TYPE Cdma20000neXRAND
                                                                                               PRESENCE optional } |
     ID id-cdma2000PDU
                                              CRITICALITY reject TYPE Cdma2000PDU
                                                                                               PRESENCE mandatory
                                                                                                      PRESENCE optional },
   { ID id-EUTRANRoundTripDelayEstimationInfo
                                              CRITICALITY ignore TYPE EUTRANRoundTripDelayEstimationInfo
   -- Extension for Release 9 to assist target HRPD access with the acquisition of the UE --
  -- UE CAPABILITY INFO INDICATION ELEMENTARY PROCEDURE
-- UE Capability Info Indication
__ *********************
UECapabilityInfoIndication ::= SEOUENCE
   protocolIEs
                     ProtocolIE-Container
                                             { { UECapabilityInfoIndicationIEs} },
   . . .
UECapabilityInfoIndicationIEs S1AP-PROTOCOL-IES ::= {
     ID id-MME-UE-S1AP-ID
                                   CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                                     PRESENCE mandatory
     ID id-eNB-UE-S1AP-ID
                                   CRITICALITY reject TYPE ENB-UE-S1AP-ID
                                                                                     PRESENCE mandatory
     ID id-UERadioCapability
                                                                                     PRESENCE mandatory}
                                   CRITICALITY ignore TYPE UERadioCapability
     ID id-UERadioCapabilityForPaging CRITICALITY ignore TYPE UERadioCapabilityForPaging
                                                                                     PRESENCE optional } |
```

```
{ ID id-UE-Application-Layer-Measurement-Capability
                                               CRITICALITY ignore TYPE UE-Application-Layer-Measurement-Capability
   PRESENCE optional } |
   { ID id-LTE-M-Indication
                                   CRITICALITY ignore TYPE LTE-M-Indication
                                                                              PRESENCE optional } |
   { ID id-UERadioCapability-NR-Format CRITICALITY ignore TYPE UERadioCapability
                                                                            PRESENCE optional },
__ ********************
-- ENB STATUS TRANSFER ELEMENTARY PROCEDURE
  *****************
  -- eNB Status Transfer
__ *********************
ENBStatusTransfer ::= SEQUENCE {
   protocolIEs
                  ProtocolIE-Container
                                        { {ENBStatusTransferIEs} },
   . . .
ENBStatusTransferIEs S1AP-PROTOCOL-IES ::= {
    ID id-MME-UE-S1AP-ID
                                            CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                                                   PRESENCE mandatory }
                                                                                                   PRESENCE mandatory}
    ID id-eNB-UE-S1AP-ID
                                             CRITICALITY reject TYPE ENB-UE-S1AP-ID
   { ID id-eNB-StatusTransfer-TransparentContainer
                                            CRITICALITY reject TYPE ENB-StatusTransfer-TransparentContainer
                                                                                                   PRESENCE mandatory },
  *****************
-- MME STATUS TRANSFER ELEMENTARY PROCEDURE
     ******************
  -- MME Status Transfer
__ **********************
MMEStatusTransfer ::= SEOUENCE {
   protocolIEs
                ProtocolIE-Container
                                        { {MMEStatusTransferIEs} },
   . . .
MMEStatusTransferIEs S1AP-PROTOCOL-IES ::= {
    ID id-MME-UE-S1AP-ID
                                            CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                                                   PRESENCE mandatory}
    ID id-eNB-UE-S1AP-ID
                                            CRITICALITY reject TYPE ENB-UE-S1AP-ID
                                                                                                   PRESENCE mandatory}
   { ID id-eNB-StatusTransfer-TransparentContainer
                                            CRITICALITY reject TYPE ENB-StatusTransfer-TransparentContainer
                                                                                                   PRESENCE mandatory },
```

```
*****************
-- TRACE ELEMENTARY PROCEDURES
  *****************
-- Trace Start
__ *********************
TraceStart ::= SEQUENCE {
                                        { {TraceStartIEs} },
   protocolIEs
                  ProtocolIE-Container
TraceStartIEs S1AP-PROTOCOL-IES ::= {
    ID id-MME-UE-S1AP-ID
                               CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                         PRESENCE mandatory
    ID id-eNB-UE-S1AP-ID
                               CRITICALITY reject TYPE ENB-UE-S1AP-ID
                                                                         PRESENCE mandatory
                               CRITICALITY ignore TYPE TraceActivation
                                                                         PRESENCE mandatory
   { ID id-TraceActivation
__ **********************
-- Trace Failure Indication
__ *********************
TraceFailureIndication ::= SEQUENCE {
                                        { {TraceFailureIndicationIEs} },
                ProtocolIE-Container
   protocolIEs
TraceFailureIndicationIEs S1AP-PROTOCOL-IES ::= {
    ID id-MME-UE-S1AP-ID
                               CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                         PRESENCE mandatory
    ID id-eNB-UE-S1AP-ID
                               CRITICALITY reject TYPE ENB-UE-S1AP-ID
                                                                         PRESENCE mandatory
    ID id-E-UTRAN-Trace-ID
                               CRITICALITY ignore TYPE E-UTRAN-Trace-ID
                                                                         PRESENCE mandatory
   { ID id-Cause
                               CRITICALITY ignore TYPE Cause
                                                                         PRESENCE mandatory
  *****************
-- DEACTIVATE TRACE ELEMENTARY PROCEDURE
-- Deactivate Trace
```

```
DeactivateTrace ::= SEQUENCE {
   protocolIEs
                  ProtocolIE-Container
                                         { { DeactivateTraceIEs} },
DeactivateTraceIEs S1AP-PROTOCOL-IES ::= {
   { ID id-MME-UE-S1AP-ID CRITICALITY reject TYPE MME-UE-S1AP-ID PRESENCE mandatory
    ID id-eNB-UE-S1AP-ID CRITICALITY reject TYPE ENB-UE-S1AP-ID PRESENCE mandatory
   -- CELL TRAFFIC TRACE ELEMENTARY PROCEDURE
-- Cell Traffic Trace
CellTrafficTrace ::= SEOUENCE {
                                  { { CellTrafficTraceIEs } },
   protocolIEs
               ProtocolIE-Container
CellTrafficTraceIEs S1AP-PROTOCOL-IES ::= {
   {ID id-MME-UE-S1AP-ID
                                   CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                             PRESENCE mandatory
   {ID id-eNB-UE-S1AP-ID
                                   CRITICALITY reject TYPE ENB-UE-S1AP-ID
                                                                             PRESENCE mandatory
   {ID id-E-UTRAN-Trace-ID
                                   CRITICALITY ignore TYPE E-UTRAN-Trace-ID
                                                                             PRESENCE mandatory
   {ID id-EUTRAN-CGI
                                   CRITICALITY ignore TYPE EUTRAN-CGI
                                                                             PRESENCE mandatory
   PRESENCE mandatory
   {ID id-PrivacyIndicator
                                   CRITICALITY ignore TYPE PrivacyIndicator
                                                                             PRESENCE optional },
   . . .
-- LOCATION ELEMENTARY PROCEDURES
-- Location Reporting Control
__ **********************
```

```
LocationReportingControl ::= SEQUENCE {
   protocolIEs
                  ProtocolIE-Container
                                         { { LocationReportingControlIEs} },
LocationReportingControlIEs S1AP-PROTOCOL-IES ::= {
    ID id-MME-UE-S1AP-ID CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                       PRESENCE mandatory } |
    ID id-eNB-UE-S1AP-ID
                          CRITICALITY reject TYPE ENB-UE-S1AP-ID
                                                                       PRESENCE mandatory } |
   { ID id-RequestType
                          CRITICALITY ignore TYPE RequestType
                                                                       PRESENCE mandatory },
    *****************
-- Location Report Failure Indication
LocationReportingFailureIndication ::= SEQUENCE {
                  ProtocolIE-Container
   protocolIEs
                                         { { LocationReportingFailureIndicationIEs} },
   . . .
LocationReportingFailureIndicationIEs S1AP-PROTOCOL-IES ::= {
    ID id-MME-UE-S1AP-ID CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                       PRESENCE mandatory } |
                       CRITICALITY reject TYPE ENB-UE-S1AP-ID
    ID id-eNB-UE-S1AP-ID
                                                                       PRESENCE mandatory }
   { ID id-Cause
                            CRITICALITY ignore TYPE Cause
                                                                       PRESENCE mandatory },
  ***************
-- Location Report
  ····
LocationReport ::= SEQUENCE {
                                         { { LocationReportIEs} },
   protocolIEs
              ProtocolIE-Container
LocationReportIEs S1AP-PROTOCOL-IES ::= {
    ID id-MME-UE-S1AP-ID CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                       PRESENCE mandatory }
    ID id-eNB-UE-S1AP-ID
                                                                       PRESENCE mandatory
                            CRITICALITY reject TYPE ENB-UE-S1AP-ID
    ID id-EUTRAN-CGI
                            CRITICALITY ignore TYPE EUTRAN-CGI
                                                                       PRESENCE mandatory
    ID id-TAI
                            CRITICALITY ignore TYPE TAI
                                                                       PRESENCE mandatory }
   PRESENCE mandatory } |
                                                                       PRESENCE optional },
  -- OVERLOAD ELEMENTARY PROCEDURES
```

```
-- Overload Start
__ **********************
OverloadStart ::= SEQUENCE {
  protocolIEs ProtocolIE-Container
                                   { {OverloadStartIEs} },
  . . .
OverloadStartIEs S1AP-PROTOCOL-IES ::= {
    ID id-OverloadResponse
                                 CRITICALITY reject TYPE OverloadResponse
                                                                     PRESENCE mandatory } |
    ID id-GUMMEIList
                                 CRITICALITY ignore TYPE GUMMEIList
                                                                     PRESENCE optional }
   ID id-TrafficLoadReductionIndication
                                 CRITICALITY ignore TYPE TrafficLoadReductionIndication PRESENCE optional },
  -- Overload Stop
__ *********************
OverloadStop ::= SEOUENCE {
                                   { {OverloadStopIEs} },
  protocolIEs
                ProtocolIE-Container
OverloadStopIEs S1AP-PROTOCOL-IES ::= {
{ ID id-GUMMEIList
                                 CRITICALITY ignore TYPE GUMMEIList
                                                                     PRESENCE optional },
 *****************
-- WRITE-REPLACE WARNING ELEMENTARY PROCEDURE
   -- Write-Replace Warning Request
__ ********************
WriteReplaceWarningRequest ::= SEQUENCE {
                                   { {WriteReplaceWarningRequestIEs} },
  protocolIEs ProtocolIE-Container
WriteReplaceWarningRequestIEs S1AP-PROTOCOL-IES ::= {
```

```
ID id-MessageIdentifier
                                         CRITICALITY reject TYPE MessageIdentifier
                                                                                          PRESENCE mandatory
     ID id-SerialNumber
                                         CRITICALITY reject TYPE SerialNumber
                                                                                          PRESENCE mandatory
                                         CRITICALITY ignore TYPE WarningAreaList
     ID id-WarningAreaList
                                                                                          PRESENCE optional }
     ID id-RepetitionPeriod
                                         CRITICALITY reject TYPE RepetitionPeriod
                                                                                          PRESENCE mandatory
     ID id-ExtendedRepetitionPeriod
                                         CRITICALITY reject TYPE ExtendedRepetitionPeriod
                                                                                          PRESENCE optional } |
     ID id-NumberofBroadcastRequest
                                         CRITICALITY reject TYPE NumberofBroadcastRequest
                                                                                          PRESENCE mandatory
     ID id-WarningType
                                         CRITICALITY ignore TYPE WarningType
                                                                                          PRESENCE optional }
     ID id-WarningSecurityInfo
                                         CRITICALITY ignore TYPE WarningSecurityInfo
                                                                                          PRESENCE optional
     ID id-DataCodingScheme
                                         CRITICALITY ignore TYPE DataCodingScheme
                                                                                          PRESENCE optional
     ID id-WarningMessageContents
                                         CRITICALITY ignore TYPE WarningMessageContents
                                                                                          PRESENCE optional }
     ID id-ConcurrentWarningMessageIndicator
                                         CRITICALITY reject TYPE ConcurrentWarningMessageIndicator PRESENCE optional }
    ID id-WarningAreaCoordinates
                                         CRITICALITY ignore TYPE WarningAreaCoordinates
                                                                                          PRESENCE optional },
    ****************
  Write-Replace Warning Response
    WriteReplaceWarningResponse ::= SEQUENCE {
                    ProtocolIE-Container
                                             { {WriteReplaceWarningResponseIEs} },
   protocolIEs
WriteReplaceWarningResponseIEs S1AP-PROTOCOL-IES ::= {
     ID id-MessageIdentifier
                                      CRITICALITY reject TYPE MessageIdentifier
                                                                                       PRESENCE mandatory
                                                                                       PRESENCE mandatory
     ID id-SerialNumber
                                      CRITICALITY reject TYPE SerialNumber
     ID id-BroadcastCompletedAreaList
                                                                                       PRESENCE optional } |
                                      CRITICALITY ignore TYPE BroadcastCompletedAreaList
    ID id-CriticalityDiagnostics
                                      CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                       PRESENCE optional },
  enb Direct information transfer elementary procedure
     *****************
  eNB Direct Information Transfer
  ******************
ENBDirectInformationTransfer ::= SEQUENCE {
   protocolIEs
                    ProtocolIE-Container
                                            {{ ENBDirectInformationTransferIEs}},
   . . .
ENBDirectInformationTransferIEs S1AP-PROTOCOL-IES ::= {
   PRESENCE mandatory },
```

```
Inter-SystemInformationTransferType ::= CHOICE {
  rIMTransfer RIMTransfer.
 ******************
-- MME DIRECT INFORMATION TRANSFER ELEMENTARY PROCEDURE
 *****************
   *****************
-- MME Direct Information Transfer
MMEDirectInformationTransfer ::= SEQUENCE {
  protocolIEs
            ProtocolIE-Container
                                {{ MMEDirectInformationTransferIEs}},
MMEDirectInformationTransferIEs S1AP-PROTOCOL-IES ::= {
  . . .
  ********************
-- enb configuration transfer elementary procedure
 *****************
 *****************
-- eNB Configuration Transfer
__ **********************
ENBConfigurationTransfer ::= SEQUENCE {
                                {{ ENBConfigurationTransferIEs}},
  protocolIEs
           ProtocolIE-Container
  . . .
ENBConfigurationTransferIEs S1AP-PROTOCOL-IES ::= {
   ID id-SONConfigurationTransferECT CRITICALITY ignore TYPE SONConfigurationTransfer
                                                                 PRESENCE optional }
   ID id-IntersystemSONConfigurationTransferECT CRITICALITY ignore TYPE IntersystemSONConfigurationTransferPRESENCE optional },
__ ***********************
-- MME CONFIGURATION TRANSFER ELEMENTARY PROCEDURE
```

```
-- MME Configuration Transfer
__ ********************
MMEConfigurationTransfer ::= SEQUENCE {
  protocolIEs
             ProtocolIE-Container
                              {{ MMEConfigurationTransferIEs}},
  . . .
MMEConfigurationTransferIEs S1AP-PROTOCOL-IES ::= {
   ID id-SONConfigurationTransferMCT
                         CRITICALITY ignore TYPE SONConfigurationTransfer
                                                             PRESENCE optional }
   ID id-IntersystemSONConfigurationTransferMCT CRITICALITY ignore TYPE IntersystemSONConfigurationTransfer PRESENCE optional },
 *****************
-- PRIVATE MESSAGE ELEMENTARY PROCEDURE
  -- Private Message
__ *********************
PrivateMessage ::= SEQUENCE {
                             {{PrivateMessageIEs}},
  privateIEs
             PrivateIE-Container
  . . .
PrivateMessageIEs S1AP-PRIVATE-IES ::= {
-- KILL PROCEDURE
__ ********************
 *****************
-- Kill Request
__ **********************************
```

```
KillRequest ::= SEQUENCE {
   protocolIEs
                     ProtocolIE-Container
                                              { {KillRequestIEs} },
KillRequestIEs S1AP-PROTOCOL-IES ::= {
     ID id-MessageIdentifier
                                    CRITICALITY reject TYPE MessageIdentifier
                                                                                 PRESENCE mandatory
     ID id-SerialNumber
                                    CRITICALITY reject TYPE SerialNumber
                                                                                 PRESENCE mandatory }
     ID id-WarningAreaList
                                    CRITICALITY ignore TYPE WarningAreaList
                                                                                 PRESENCE optional}
    ID id-KillAllWarningMessages
                                    CRITICALITY reject TYPE KillallWarningMessages PRESENCE optional },
    *****************
-- Kill Response
KillResponse ::= SEQUENCE {
                                                { {KillResponseIEs} },
   protocolIEs
                     ProtocolIE-Container
KillResponseIEs S1AP-PROTOCOL-IES ::= {
     ID id-MessageIdentifier
                                    CRITICALITY reject TYPE MessageIdentifier
                                                                                          PRESENCE mandatory
     ID id-SerialNumber
                                    CRITICALITY reject TYPE SerialNumber
                                                                                          PRESENCE mandatory
     ID id-BroadcastCancelledAreaList CRITICALITY ignore TYPE BroadcastCancelledAreaList
                                                                                          PRESENCE optional } |
    { ID id-CriticalityDiagnostics
                                    CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                          PRESENCE optional },
   . . .
-- PWS RESTART INDICATION PROCEDURE
    *****************
-- PWS Restart Indication
  ******************
PWSRestartIndication::= SEQUENCE {
   protocolIEs
                     ProtocolIE-Container
                                               {{ PWSRestartIndicationIEs}},
PWSRestartIndicationIEs S1AP-PROTOCOL-IES ::= {
     ID id-ECGIListForRestart
                                        CRITICALITY reject TYPE ECGIListForRestart
                                                                                            PRESENCE mandatory}
     ID id-Global-ENB-ID
                                        CRITICALITY reject TYPE Global-ENB-ID
                                                                                            PRESENCE mandatory }
    ID id-TAIListForRestart
                                        CRITICALITY reject TYPE TAIListForRestart
                                                                                            PRESENCE mandatory }
```

```
*****************
-- PWS Failure Indication
PWSFailureIndication::= SEQUENCE {
                                     {{ PWSFailureIndicationIEs}},
  protocolIEs
               ProtocolIE-Container
PWSFailureIndicationIEs S1AP-PROTOCOL-IES ::= {
    { ID id-Global-ENB-ID
                          CRITICALITY reject TYPE Global-ENB-ID
                                                          PRESENCE mandatory },
  *****************
-- LPPA TRANSPORT ELEMENTARY PROCEDURES
-- DOWNLINK UE ASSOCIATED LPPA TRANSPORT
__ ********************
DownlinkUEAssociatedLPPaTransport ::= SEQUENCE {
  protocolIEs
                 ProtocolIE-Container
                                     {{DownlinkUEAssociatedLPPaTransport-IEs}},
  . . .
DownlinkUEAssociatedLPPaTransport-IES S1AP-PROTOCOL-IES ::= {
    ID id-MME-UE-S1AP-ID CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                PRESENCE mandatory }
                       CRITICALITY reject TYPE ENB-UE-S1AP-ID CRITICALITY reject TYPE Routing-ID
    ID id-eNB-UE-S1AP-ID
                                                                PRESENCE mandatory }
    ID id-Routing-ID
                                                                PRESENCE mandatory } |
                                                                PRESENCE mandatory },
   { ID id-LPPa-PDU
                        CRITICALITY reject TYPE LPPa-PDU
  ******************
-- UPLINK UE ASSOCIATED LPPA TRANSPORT
  *****************
UplinkUEAssociatedLPPaTransport ::= SEQUENCE {
                                     {{UplinkUEAssociatedLPPaTransport-IEs}},
  protocolIEs
                 ProtocolIE-Container
```

```
UplinkUEAssociatedLPPaTransport-IES S1AP-PROTOCOL-IES ::= {
    ID id-MME-UE-S1AP-ID CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                    PRESENCE mandatory }
                       CRITICALITY reject TYPE ENB-UE-S1AP-ID CRITICALITY reject TYPE Routing-ID
    ID id-eNB-UE-S1AP-ID
                                                                    PRESENCE mandatory }
    ID id-Routing-ID
                                                                    PRESENCE mandatory }
   { ID id-LPPa-PDU
                         CRITICALITY reject TYPE LPPa-PDU
                                                                    PRESENCE mandatory },
__ **********************
-- DOWNLINK NON UE ASSOCIATED LPPA TRANSPORT
  ******************
DownlinkNonUEAssociatedLPPaTransport ::= SEQUENCE {
   protocolIEs
             ProtocolIE-Container
                                       {{DownlinkNonUEAssociatedLPPaTransport-IEs}},
DownlinkNonUEAssociatedLPPaTransport-IES S1AP-PROTOCOL-IES ::= {
   { ID id-Routing-ID
                   CRITICALITY reject TYPE Routing-ID
                                                                    PRESENCE mandatory } |
   { ID id-LPPa-PDU
                                                                    PRESENCE mandatory },
                          CRITICALITY reject TYPE LPPa-PDU
  *****************
-- UPLINK NON UE ASSOCIATED LPPA TRANSPORT
__ ********************
UplinkNonUEAssociatedLPPaTransport ::= SEOUENCE {
                                  {{UplinkNonUEAssociatedLPPaTransport-IEs}},
   protocolIEs
               ProtocolIE-Container
   . . .
UplinkNonUEAssociatedLPPaTransport-IES S1AP-PROTOCOL-IES ::= {
   PRESENCE mandatory } |
                                                                    PRESENCE mandatory },
__ *********************
-- E-RAB MODIFICATION INDICATION ELEMENTARY PROCEDURE
__ ***********************
__ *********************
```

```
-- E-RAB Modification Indication
__ *********************
E-RABModificationIndication ::= SEQUENCE {
                      ProtocolIE-Container
                                                { { E-RABModificationIndicationIEs} },
   protocolIEs
E-RABModificationIndicationIEs S1AP-PROTOCOL-IES ::= {
                                                 CRITICALITY reject TYPE MME-UE-S1AP-ID
     ID id-MME-UE-S1AP-ID
                                                                                                    PRESENCE mandatory }
     ID id-eNB-UE-S1AP-ID
                                                 CRITICALITY reject TYPE ENB-UE-S1AP-ID
                                                                                                    PRESENCE mandatory }
     ID id-E-RABToBeModifiedListBearerModInd
                                                 CRITICALITY reject TYPE E-RABToBeModifiedListBearerModInd
                                                                                                            PRESENCE mandatory } |
                                                 CRITICALITY reject TYPE E-RABNotToBeModifiedListBearerModInd PRESENCE optional | |
     ID id-E-RABNotToBeModifiedListBearerModInd
    { ID id-CSGMembershipInfo
                                                 CRITICALITY reject TYPE CSGMembershipInfo
                                                                                                    PRESENCE optional } |
-- Extension for Release 11 to support BBAI --
     ID id-Tunnel-Information-for-BBF
                                                 CRITICALITY ignore TYPE TunnelInformation
                                                                                                    PRESENCE optional }
                                                                                                         PRESENCE optional } |
    { ID id-SecondaryRATDataUsageReportList
                                                 CRITICALITY ignore TYPE SecondaryRATDataUsageReportList
{ ID id-UserLocationInformation
                                             CRITICALITY ignore TYPE UserLocationInformation
                                                                                                 PRESENCE optional },
E-RABToBeModifiedListBearerModInd ::= E-RAB-IE-ContainerList { {E-RABToBeModifiedItemBearerModIndIEs} }
E-RABToBeModifiedItemBearerModIndIEs S1AP-PROTOCOL-IES ::= {
   { ID id-E-RABToBeModifiedItemBearerModInd
                                                CRITICALITY reject TYPE E-RABToBeModifiedItemBearerModInd
                                                                                                            PRESENCE mandatory },
E-RABToBeModifiedItemBearerModInd ::= SEOUENCE {
                                 E-RAB-ID,
   e-RAB-ID
                                 TransportLayerAddress,
   transportLayerAddress
   dL-GTP-TEID
                                 GTP-TEID,
   iE-Extensions
                                 ProtocolExtensionContainer { { E-RABToBeModifiedItemBearerModInd-ExtIEs} }
                                                                                                               OPTIONAL.
E-RABToBeModifiedItemBearerModInd-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
E-RABNotToBeModifiedItemBearerModIndIEs S1AP-PROTOCOL-IES ::= {
   { ID id-E-RABNotToBeModifiedItemBearerModInd
                                                    CRITICALITY reject TYPE E-RABNotToBeModifiedItemBearerModInd
                                                                                                                  PRESENCE mandatory },
   . . .
E-RABNotToBeModifiedItemBearerModInd ::= SEQUENCE {
   e-RAB-ID
                                 E-RAB-ID,
   transportLayerAddress
                                 TransportLayerAddress,
   dL-GTP-TEID
                                 GTP-TEID,
   iE-Extensions
                                  ProtocolExtensionContainer { { E-RABNotToBeModifiedItemBearerModInd-ExtIEs} }
                                                                                                               OPTIONAL,
```

```
E-RABNotToBeModifiedItemBearerModInd-ExtIEs S1AP-PROTOCOL-EXTENSION ::=
CSGMembershipInfo ::= SEOUENCE {
   cSGMembershipStatus CSGMembershipStatus,
   cSG-Id
                          CSG-Id,
   cellAccessMode
                          CellAccessMode OPTIONAL,
   pLMNidentity
                          PLMNidentity
                                          OPTIONAL,
                          ProtocolExtensionContainer { { CSGMembershipInfo-ExtIEs} }
   iE-Extensions
                                                                                         OPTIONAL,
CSGMembershipInfo-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
-- E-RAB Modification Confirm
__ **********************
E-RABModificationConfirm ::= SEQUENCE {
   protocolIEs
                       ProtocolIE-Container { {E-RABModificationConfirmIEs} },
E-RABModificationConfirmIEs S1AP-PROTOCOL-IES ::= {
     ID id-MME-UE-S1AP-ID
                                                  CRITICALITY ignore TYPE MME-UE-S1AP-ID
                                                                                                    PRESENCE mandatory}
     ID id-eNB-UE-S1AP-ID
                                                  CRITICALITY ignore TYPE ENB-UE-S1AP-ID
                                                                                                    PRESENCE mandatory}
     ID id-E-RABModifyListBearerModConf
                                                  CRITICALITY ignore TYPE E-RABModifyListBearerModConf PRESENCE optional}
     ID id-E-RABFailedToModifyListBearerModConf CRITICALITY ignore TYPE E-RABList
                                                                                                   PRESENCE optional }
     ID id-E-RABToBeReleasedListBearerModConf
                                                  CRITICALITY ignore TYPE E-RABList
                                                                                                    PRESENCE optional }
     ID id-CriticalityDiagnostics
                                                  CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                                    PRESENCE optional }
    { ID id-CSGMembershipStatus
                                                  CRITICALITY ignore TYPE CSGMembershipStatus
                                                                                                    PRESENCE optional },
   . . .
E-RABModifyListBearerModConf ::= SEQUENCE (SIZE(1.. maxnoofE-RABs)) OF ProtocolIE-SingleContainer { {E-RABModifyItemBearerModConfIEs}
E-RABModifyItemBearerModConfIEs
                                  S1AP-PROTOCOL-IES ::= {
    { ID id-E-RABModifyItemBearerModConf
                                         CRITICALITY ignore TYPE E-RABModifyItemBearerModConf
                                                                                                       PRESENCE mandatory },
   . . .
E-RABModifyItemBearerModConf ::= SEQUENCE {
   e-RAB-ID
   iE-Extensions
                              ProtocolExtensionContainer { {E-RABModifyItemBearerModConfExtIEs} } OPTIONAL,
```

```
E-RABModifyItemBearerModConfExtIEs S1AP-PROTOCOL-EXTENSION ::= {
__ **********************
-- UE CONTEXT MODIFICATION INDICATION ELEMENTARY PROCEDURE
  ********************
-- UE Context Modification Indication
__ *********************
UEContextModificationIndication ::= SEQUENCE {
  protocolIEs
               ProtocolIE-Container
                                  { { UEContextModificationIndicationIEs} },
  . . .
UEContextModificationIndicationIEs S1AP-PROTOCOL-IES ::= {
   ID id-MME-UE-S1AP-ID CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                         PRESENCE mandatory}
  PRESENCE mandatory}
                                                         PRESENCE optional },
 *****************
-- UE Context Modification Confirm
 ******************
UEContextModificationConfirm ::= SEQUENCE {
  protocolIEs
            ProtocolIE-Container { {UEContextModificationConfirmIEs} },
UEContextModificationConfirmIEs S1AP-PROTOCOL-IES ::= {
   ID id-MME-UE-S1AP-ID CRITICALITY ignore TYPE MME-UE-S1AP-ID
                                                              PRESENCE mandatory
  PRESENCE mandatory }
                                                              PRESENCE optional } |
                                                              PRESENCE optional },
-- UE CONTEXT SUSPEND ELEMENTARY PROCEDURE
```

```
-- UE Context Suspend Request
__ **********************
UEContextSuspendRequest ::= SEQUENCE {
   protocolIEs
                    ProtocolIE-Container
                                           { { UEContextSuspendRequestIEs} },
   . . .
UEContextSuspendRequestIEs S1AP-PROTOCOL-IES ::= {
     ID id-MME-UE-S1AP-ID
                                                   CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                                              PRESENCE mandatory}
                                                                                              PRESENCE mandatory }
     ID id-eNB-UE-S1AP-ID
                                                   CRITICALITY reject TYPE ENB-UE-S1AP-ID
    ID id-InformationOnRecommendedCellsAndENBsForPaging
                                                   CRITICALITY ignore TYPE InformationOnRecommendedCellsAndENBsForPaging PRESENCE
optional}
    ID id-CellIdentifierAndCELevelForCECapableUEs
                                                   CRITICALITY ignore TYPE CellIdentifierAndCELevelForCECapableUEs PRESENCE optional } |
     ID id-SecondaryRATDataUsageReportList
                                                CRITICALITY ignore TYPE SecondaryRATDataUsageReportList PRESENCE optional }
    ID id-UserLocationInformation
                                                   CRITICALITY ignore TYPE UserLocationInformation
                                                                                                   PRESENCE optional }
   ID id-TimeSinceSecondaryNodeRelease
                                                   CRITICALITY ignore TYPE TimeSinceSecondaryNodeRelease PRESENCE optional },
   . . .
  -- UE Context Suspend Response
*****************
UEContextSuspendResponse ::= SEQUENCE {
                    ProtocolIE-Container { {UEContextSuspendResponseIEs} },
   protocolIEs
   . . .
UEContextSuspendResponseIEs S1AP-PROTOCOL-IES ::= {
     ID id-MME-UE-S1AP-ID
                                  CRITICALITY ignore TYPE MME-UE-S1AP-ID
                                                                               PRESENCE mandatory
     ID id-eNB-UE-S1AP-ID
                                  CRITICALITY ignore TYPE ENB-UE-S1AP-ID
                                                                               PRESENCE mandatory
                                                                               PRESENCE optional } |
    ID id-CriticalityDiagnostics
                                  CRITICALITY ignore TYPE CriticalityDiagnostics
   { ID id-SecurityContext
                                  CRITICALITY reject TYPE SecurityContext
                                                                               PRESENCE optional },
   . . .
  ****************
-- UE CONTEXT RESUME ELEMENTARY PROCEDURE
-- UE Context Resume Request
```

```
UEContextResumeRequest ::= SEQUENCE {
                     ProtocolIE-Container
                                             { { UEContextResumeRequestIEs} },
   protocolIEs
UEContextResumeRequestIEs S1AP-PROTOCOL-IES ::= {
     ID id-MME-UE-S1AP-ID
                                                     CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                                                  PRESENCE mandatory }
     ID id-eNB-UE-S1AP-ID
                                                                                                  PRESENCE mandatory
                                                     CRITICALITY reject TYPE ENB-UE-S1AP-ID
     ID id-E-RABFailedToResumeListResumeReq
                                                     CRITICALITY reject TYPE E-RABFailedToResumeListResumeReq
                                                                                                            PRESENCE optional |
    { ID id-RRC-Resume-Cause
                                                     CRITICALITY ignore TYPE RRC-Establishment-Cause PRESENCE optional },
E-RABFailedToResumeListResumeReq ::= E-RAB-IE-ContainerList { {E-RABFailedToResumeItemResumeReqIEs} }
E-RABFailedToResumeItemResumeRegIEs S1AP-PROTOCOL-IES ::= {
   . . .
E-RABFailedToResumeItemResumeReg ::= SEOUENCE {
   e-RAB-ID
                                   E-RAB-ID,
   cause
                                   Cause,
                                   ProtocolExtensionContainer { { E-RABFailedToResumeItemResumeReg-ExtIEs} }
   iE-Extensions
                                                                                                          OPTIONAL,
E-RABFailedToResumeItemResumeReq-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
   -- UE Context Resume Response
__ ********************************
UEContextResumeResponse ::= SEQUENCE {
   protocolIEs
                     ProtocolIE-Container
                                             { { UEContextResumeResponseIEs} },
   . . .
UEContextResumeResponseIEs S1AP-PROTOCOL-IES ::= {
     ID id-MME-UE-S1AP-ID
                                           CRITICALITY ignore TYPE MME-UE-S1AP-ID
                                                                                               PRESENCE mandatory}
     ID id-eNB-UE-S1AP-ID
                                          CRITICALITY ignore TYPE ENB-UE-S1AP-ID
                                                                                               PRESENCE mandatory }
     ID id-E-RABFailedToResumeListResumeRes
                                          CRITICALITY reject TYPE E-RABFailedToResumeListResumeRes
                                                                                                  PRESENCE optional |
     ID id-CriticalityDiagnostics
                                          CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                               PRESENCE optional }
     ID id-SecurityContext
                                          CRITICALITY reject TYPE SecurityContext
                                                                                               PRESENCE optional }
    { ID id-PendingDataIndication
                                          CRITICALITY ignore TYPE PendingDataIndication
                                                                                               PRESENCE optional },
```

```
E-RABFailedToResumeListResumeRes ::= E-RAB-IE-ContainerList { {E-RABFailedToResumeItemResumeResIEs} }
E-RABFailedToResumeItemResumeResIEs S1AP-PROTOCOL-IES ::=
   E-RABFailedToResumeItemResumeRes ::= SEQUENCE
   e-RAB-ID
                                 E-RAB-ID,
   cause
                                 Cause,
                                 ProtocolExtensionContainer { { E-RABFailedToResumeItemResumeRes-ExtIEs} } 
   iE-Extensions
                                                                                                  OPTIONAL,
E-RABFailedToResumeItemResumeRes-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
  ****************
-- UE Context Resume Failure
__ ********************
UEContextResumeFailure ::= SEQUENCE {
                                          { { UEContextResumeFailureIEs} },
   protocolIEs
                   ProtocolIE-Container
UEContextResumeFailureIEs S1AP-PROTOCOL-IES ::= {
    ID id-MME-UE-S1AP-ID
                                       CRITICALITY ignore TYPE MME-UE-S1AP-ID
                                                                                      PRESENCE mandatory}
    ID id-eNB-UE-S1AP-ID
                                       CRITICALITY ignore TYPE ENB-UE-S1AP-ID
                                                                                      PRESENCE mandatory }
   { ID id-Cause
                                       CRITICALITY ignore TYPE Cause
                                                                                      PRESENCE mandatory}
   { ID id-CriticalityDiagnostics
                                       CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                                      PRESENCE optional },
   ******************
-- Connection Establishment Indication
  ******************
ConnectionEstablishmentIndication::= SEOUENCE {
   protocolIEs
                   ProtocolIE-Container { {ConnectionEstablishmentIndicationIEs} },
   . . .
ConnectionEstablishmentIndicationIEs S1AP-PROTOCOL-IES ::= {
    ID id-MME-UE-S1AP-ID
                       CRITICALITY ignore TYPE MME-UE-S1AP-ID
                                                                            PRESENCE mandatory}
    ID id-eNB-UE-S1AP-ID
                                CRITICALITY ignore TYPE ENB-UE-S1AP-ID
                                                                            PRESENCE mandatory }
                          CRITICALITY ignore TYPE UERadioCapability
    ID id-UERadioCapability
                                                                            PRESENCE optional }
    ID id-EnhancedCoverageRestricted CRITICALITY ignore TYPE EnhancedCoverageRestricted PRESENCE optional }
```

```
ID id-DL-CP-SecurityInformation
                                  CRITICALITY ignore TYPE DL-CP-SecurityInformation PRESENCE optional }
     ID id-CE-ModeBRestricted
                                  CRITICALITY ignore TYPE CE-ModeBRestricted
                                                                                PRESENCE optional }
     ID id-EndIndication
                                  CRITICALITY ignore TYPE EndIndication
                                                                                PRESENCE optional }
     ID id-Subscription-Based-UE-DifferentiationInfo
                                                    CRITICALITY ignore TYPE Subscription-Based-UE-DifferentiationInfo
                                                                                                                 PRESENCE
optional}
   { ID id-UE-Level-OoS-Parameters
                                  CRITICALITY ignore TYPE E-RABLevelOoSParameters
                                                                                PRESENCE optional }
    *****************
-- Retrieve UE Information
__ *********************
RetrieveUEInformation ::= SEQUENCE {
   protocolIEs
                    ProtocolIE-Container
                                            { { RetrieveUEInformationIEs} },
   . . .
RetrieveUEInformationIEs S1AP-PROTOCOL-IES ::= {
 { ID id-S-TMSI
                               CRITICALITY reject TYPE S-TMSI
                                                                     PRESENCE mandatory },
. . .
__ ********************************
-- UE Information Transfer
UEInformationTransfer ::= SEQUENCE {
   protocolIEs
                    ProtocolIE-Container
                                            { { UEInformationTransferIEs} },
   . . .
UEInformationTransferIEs S1AP-PROTOCOL-IES ::= {
     ID id-S-TMSI
                                  CRITICALITY reject TYPE S-TMSI
                                                                                PRESENCE mandatory}
     ID id-UE-Level-QoS-Parameters
                                  CRITICALITY ignore TYPE E-RABLevelQoSParameters
                                                                                PRESENCE optional }
     ID id-UERadioCapability
                                  CRITICALITY ignore TYPE UERadioCapability
                                                                                PRESENCE optional }
   { ID id-Subscription-Based-UE-DifferentiationInfo
                                                    CRITICALITY ignore TYPE Subscription-Based-UE-DifferentiationInfo
                                                                                                                 PRESENCE
optional}|
   { ID id-PendingDataIndication
                                  CRITICALITY ignore TYPE PendingDataIndication
                                                                                PRESENCE optional },
__ ********************************
-- eNB CP Relocation Indication
__ **********************
```

```
ENBCPRelocationIndication ::= SEQUENCE {
   protocolIEs ProtocolIE-Container { { ENBCPRelocationIndicationIEs} },
ENBCPRelocationIndicationIEs S1AP-PROTOCOL-IES ::= {
    ID id-eNB-UE-S1AP-ID
                                CRITICALITY reject TYPE ENB-UE-S1AP-ID
                                                                          PRESENCE mandatory}
    ID id-S-TMSI
                                CRITICALITY reject TYPE S-TMSI
                                                                           PRESENCE mandatory }
    ID id-EUTRAN-CGI
                                CRITICALITY ignore TYPE EUTRAN-CGI
                                                                           PRESENCE mandatory }
                                CRITICALITY ignore TYPE TAI
                                                                           PRESENCE mandatory
    ID id-TAI
   -- MME CP Relocation Indication
  MMECPRelocationIndication ::= SEQUENCE {
   protocolIEs ProtocolIE-Container { { MMECPRelocationIndicationIEs} } },
MMECPRelocationIndicationIEs S1AP-PROTOCOL-IES ::= {
    ID id-MME-UE-S1AP-ID
                                CRITICALITY reject TYPE MME-UE-S1AP-ID
                                                                           PRESENCE mandatory}
    ID id-eNB-UE-S1AP-ID
                                                                           PRESENCE mandatory },
                                CRITICALITY reject TYPE ENB-UE-S1AP-ID
    -- Secondary RAT Data Usage Report
__ ********************************
SecondaryRATDataUsageReport ::= SEQUENCE {
   protocolIEs
                   ProtocolIE-Container
                                         { { SecondaryRATDataUsageReportIEs} },
   . . .
SecondaryRATDataUsageReportIEs S1AP-PROTOCOL-IES ::= {
    ID id-MME-UE-S1AP-ID
                                       CRITICALITY ignore TYPE MME-UE-S1AP-ID
                                                                               PRESENCE mandatory}
    ID id-eNB-UE-S1AP-ID
                                       CRITICALITY ignore TYPE ENB-UE-S1AP-ID
                                                                               PRESENCE mandatory |
    ID id-SecondaryRATDataUsageReportList
                                          CRITICALITY ignore TYPE SecondaryRATDataUsageReportList PRESENCE mandatory }
    ID id-HandoverFlag
                                          CRITICALITY ignore TYPE HandoverFlag
                                                                                    PRESENCE optional }
    ID id-UserLocationInformation
                                       CRITICALITY ignore TYPE UserLocationInformation
                                                                                    PRESENCE optional }
   { ID id-TimeSinceSecondaryNodeRelease
                                       CRITICALITY ignore TYPE TimeSinceSecondaryNodeRelease PRESENCE optional },
```

```
-- UE RADIO CAPABILITY ID MAPPING PROCEDURE
     -- UE Radio Capability ID Mapping Request
__ ********************
UERadioCapabilityIDMappingRequest::= SEQUENCE {
   protocolIEs
                  ProtocolIE-Container
                                        { { UERadioCapabilityIDMappingRequestIEs} },
   . . .
UERadioCapabilityIDMappingRequestIEs S1AP-PROTOCOL-IES ::= {
   { ID id-UERadioCapabilityID
                           CRITICALITY reject TYPE UERadioCapabilityID
                                                                     PRESENCE mandatory },
   . . .
__ ********************
-- UE Radio Capability ID Mapping Response
__ ********************
UERadioCapabilityIDMappingResponse ::= SEQUENCE {
   protocolIEs
                  ProtocolIE-Container
                                        { { UERadioCapabilityIDMappingResponseIEs} },
   . . .
UERadioCapabilityIDMappingResponseIEs S1AP-PROTOCOL-IES ::= {
    ID id-UERadioCapabilityID CRITICALITY reject TYPE UERadioCapabilityID
                                                                               PRESENCE mandatory
    ID id-UERadioCapability
                                     CRITICALITY ignore TYPE UERadioCapability
                                                                               PRESENCE mandatory
   { ID id-CriticalityDiagnostics
                                     CRITICALITY ignore TYPE CriticalityDiagnostics
                                                                               PRESENCE optional },
   . . .
END
```

9.3.4 Information Element Definitions

```
-- Information Element Definitions
****************
S1AP-IEs {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
eps-Access (21) modules (3) slap (1) version1 (1) slap-IEs (2) }
DEFINITIONS AUTOMATIC TAGS ::=
BEGIN
TMPORTS
   id-E-RABInformationListItem,
   id-E-RABItem,
   id-GUMMEIType,
   id-Bearers-SubjectToStatusTransfer-Item,
   id-Time-Synchronisation-Info,
   id-x2TNLConfigurationInfo,
   id-eNBX2ExtendedTransportLayerAddresses,
   id-MDTConfiguration,
   id-Time-UE-StayedInCell-EnhancedGranularity,
   id-HO-Cause,
   id-M3Configuration,
   id-M4Configuration,
   id-M5Configuration,
   id-MDT-Location-Info,
   id-SignallingBasedMDTPLMNList,
   id-MobilityInformation,
   id-ULCOUNTValueExtended,
   id-DLCOUNTValueExtended,
   id-ReceiveStatusOfULPDCPSDUsExtended,
   id-eNBIndirectX2TransportLayerAddresses,
   id-Muting-Availability-Indication,
   id-Muting-Pattern-Information,
   id-NRrestrictioninEPSasSecondaryRAT,
   id-NRrestrictionin5GS.
   id-Synchronisation-Information,
   id-uE-HistoryInformationFromTheUE,
   id-LoggedMBSFNMDT,
   id-SON-Information-Report,
   id-RecommendedCellItem,
   id-RecommendedENBItem,
   id-ProSeUEtoNetworkRelaying,
   id-ULCOUNTValuePDCP-SNlength18,
   id-DLCOUNTValuePDCP-SNlength18,
   id-ReceiveStatusOfULPDCPSDUsPDCP-SNlength18,
   id-M6Configuration,
   id-M7Configuration,
```

```
id-RAT-Type,
id-extended-e-RAB-MaximumBitrateDL.
id-extended-e-RAB-MaximumBitrateUL.
id-extended-e-RAB-GuaranteedBitrateDL,
id-extended-e-RAB-GuaranteedBitrateUL,
id-extended-uEaggregateMaximumBitRateDL,
id-extended-uEaggregateMaximumBitRateUL,
id-SecondaryRATDataUsageReportItem,
id-E-RABUsageReportItem,
id-UEAppLayerMeasConfig,
id-serviceType,
id-UnlicensedSpectrumRestriction,
id-CNTypeRestrictions,
id-DownlinkPacketLossRate,
id-UplinkPacketLossRate,
id-BluetoothMeasurementConfiguration,
id-WLANMeasurementConfiguration,
id-LastNG-RANPLMNIdentity,
id-PSCellInformation,
id-IMSvoiceEPSfallbackfrom5G,
id-RequestTypeAdditionalInfo,
id-AdditionalRRMPriorityIndex,
id-ContextatSource,
id-IntersystemMeasurementConfiguration,
id-SourceNodeID,
id-NB-IoT-RLF-Report-Container,
id-MDTConfigurationNR,
id-DAPSRequestInfo,
id-DAPSResponseInfoList,
id-DAPSResponseInfoItem,
id-Bearers-SubjectToEarlyStatusTransfer-Item,
maxnoofCSGs,
maxnoofE-RABs,
maxnoofErrors,
maxnoofBPLMNs,
maxnoofPLMNsPerMME,
maxnoofTACs,
maxnoofEPLMNs,
maxnoofEPLMNsPlusOne,
maxnoofForbLACs,
maxnoofForbTACs,
maxnoofCellsinUEHistoryInfo,
maxnoofCellID,
maxnoofDCNs,
maxnoofEmergencyAreaID,
maxnoofTAIforWarning,
maxnoofCellinTAI,
maxnoofCellinEAI,
maxnoofeNBX2TLAs,
maxnoofeNBX2ExtTLAs,
maxnoofeNBX2GTPTLAs,
maxnoofRATs,
maxnoofGroupIDs,
maxnoofMMECs,
```

```
maxnoofTAforMDT,
    maxnoofCellIDforMDT,
    maxnoofMDTPLMNs,
    maxnoofCellsforRestart,
    maxnoofRestartTAIs,
    maxnoofRestartEmergencyAreaIDs,
    maxnoofMBSFNAreaMDT,
    maxEARFCN,
    maxnoofCellsineNB,
    maxnoofRecommendedCells,
    maxnoofRecommendedENBs,
    maxnooftimeperiods,
    maxnoofCellIDforQMC,
    maxnoofTAforQMC,
    maxnoofPLMNforOMC,
    maxnoofBluetoothName,
    maxnoofWLANName,
    maxnoofConnectedengNBs,
    maxnoofPC5OoSFlows,
    maxnooffrequencies,
    maxNARFCN,
    maxRS-IndexCellQual
FROM S1AP-Constants
    Criticality,
    ProcedureCode,
    ProtocolIE-ID,
    TriggeringMessage
FROM S1AP-CommonDataTypes
    ProtocolExtensionContainer{},
    S1AP-PROTOCOL-EXTENSION,
    ProtocolIE-SingleContainer{},
    S1AP-PROTOCOL-IES
FROM S1AP-Containers;
-- A
Additional-GUTI::= SEQUENCE {
    gUMMEI
                            GUMMEI,
    m-TMSI
                            M-TMSI,
                            ProtocolExtensionContainer { {Additional-GUTI-ExtIEs} } OPTIONAL,
    iE-Extensions
Additional-GUTI-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    . . .
```

```
AdditionalRRMPriorityIndex ::= BIT STRING (SIZE(32))
AerialUEsubscriptionInformation ::= ENUMERATED {
   allowed,
   not-allowed,
    . . .
AreaScopeOfMDT ::= CHOICE {
   cellBased
                             CellBasedMDT,
   tABased
                             TABasedMDT,
   pLMNWide
                             NULL,
    . . . ,
    tAIBased
                             TAIBasedMDT
AreaScopeOfQMC ::= CHOICE {
   cellBased
                             CellBasedOMC,
   tABased
                             TABasedQMC,
    tAIBased
                                 TAIBasedQMC
   pLMNAreaBased
                             PLMNAreaBasedQMC,
AllocationAndRetentionPriority ::= SEQUENCE
                             PriorityLevel,
   priorityLevel
   pre-emptionCapability
                             Pre-emptionCapability,
   pre-emptionVulnerability
                             Pre-emptionVulnerability,
                             ProtocolExtensionContainer { {AllocationAndRetentionPriority-ExtIEs} } OPTIONAL,
   iE-Extensions
    . . .
AllocationAndRetentionPriority-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
AssistanceDataForCECapableUEs ::= SEOUENCE {
   cellIdentifierAndCELevelForCECapableUEs
                                            CellIdentifierAndCELevelForCECapableUEs,
   iE-Extensions
                                            . . .
InformationForCECapableUEs-ExtIES S1AP-PROTOCOL-EXTENSION ::= {
AssistanceDataForPaging ::= SEQUENCE
    assistanceDataForRecommendedCells
                                    AssistanceDataForRecommendedCells
                                                                         OPTIONAL,
   assistanceDataForCECapableUEs
                                    AssistanceDataForCECapableUEs
                                                                         OPTIONAL,
   pagingAttemptInformation
                                    PagingAttemptInformation
                                                                         OPTIONAL,
   iE-Extensions
```

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```
AssistanceDataForPaging-ExtlEs S1AP-PROTOCOL-EXTENSION ::= {
AssistanceDataForRecommendedCells ::= SEOUENCE {
   recommendedCellsForPaging RecommendedCellsForPaging,
   iE-Extensions
                            ProtocolExtensionContainer { { AssistanceDataForRecommendedCells-ExtIEs} } OPTIONAL,
AssistanceDataForRecommendedCells-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
-- R
Bearers-SubjectToStatusTransferList ::= SEQUENCE (SIZE(1.. maxnoofE-RABs)) OF ProtocolIE-SingleContainer {    Bearers-SubjectToStatusTransfer-
ItemIEs } }
Bearers-SubjectToStatusTransfer-ItemIEs S1AP-PROTOCOL-IES ::= {
   Bearers-SubjectToStatusTransfer-Item ::= SEQUENCE
   e-RAB-ID
                                      E-RAB-ID,
   uL-COUNTvalue
                                      COUNTvalue,
   dL-COUNTvalue
                                      COUNTvalue,
   receiveStatusofULPDCPSDUs
                                      ReceiveStatusofULPDCPSDUs
                                                                      OPTIONAL,
   iE-Extensions
                                      ProtocolExtensionContainer { {Bearers-SubjectToStatusTransfer-ItemExtIEs} } OPTIONAL,
Bearers-SubjectToStatusTransfer-ItemExtIEs S1AP-PROTOCOL-EXTENSION ::= {
     ID id-ULCOUNTValueExtended
                                                 CRITICALITY ignore EXTENSION COUNTValueExtended
                                                                                                     PRESENCE optional }
     ID id-DLCOUNTValueExtended
                                                                                                     PRESENCE optional }
                                                 CRITICALITY ignore EXTENSION COUNTValueExtended
                                                                                                             PRESENCE optional } |
     ID id-ReceiveStatusOfULPDCPSDUsExtended
                                                 CRITICALITY ignore EXTENSION ReceiveStatusOfULPDCPSDUsExtended
     ID id-ULCOUNTValuePDCP-SNlength18
                                                                                                        PRESENCE optional }
                                                 CRITICALITY ignore EXTENSION COUNTvaluePDCP-SNlength18
     ID id-DLCOUNTValuePDCP-SNlength18
                                                 CRITICALITY ignore EXTENSION COUNTvaluePDCP-SNlength18
                                                                                                        PRESENCE optional }
    ID id-ReceiveStatusOfULPDCPSDUsPDCP-SNlength18
                                                CRITICALITY ignore EXTENSION ReceiveStatusOfULPDCPSDUsPDCP-SNlength18 PRESENCE optional },
Bearers-SubjectToEarlyStatusTransferList ::= SEQUENCE (SIZE(1.. maxnoofE-RABs)) OF ProtocolIE-SingleContainer {    Bearers-
SubjectToEarlyStatusTransfer-ItemIEs } }
Bearers-SubjectToEarlyStatusTransfer-ItemIEs S1AP-PROTOCOL-IES ::= {
   . . .
Bearers-SubjectToEarlyStatusTransfer-Item ::= SEQUENCE {
   e-RAB-ID
                                      E-RAB-ID,
```

```
dLCOUNT-PDCP-SNlength
                                            DLCOUNT-PDCP-SNlength,
   iE-Extensions
                                            ProtocolExtensionContainer { {Bearers-SubjectToEarlyStatusTransfer-ItemExtIEs} } OPTIONAL,
Bearers-SubjectToEarlyStatusTransfer-ItemExtIEs S1AP-PROTOCOL-EXTENSION ::= {
BearerType ::= ENUMERATED {
   non-IP,
    . . .
BitRate ::= INTEGER (0..1000000000)
BluetoothMeasurementConfiguration ::= SEQUENCE {
    bluetoothMeasConfig
                                   BluetoothMeasConfig,
   bluetoothMeasConfigNameList
                                    BluetoothMeasConfigNameList
                                                                    OPTIONAL,
   bt-rssi
                                    ENUMERATED {true, ...}
                                                                    OPTIONAL,
   iE-Extensions
                       ProtocolExtensionContainer { { BluetoothMeasurementConfiguration-ExtIEs } } OPTIONAL,
BluetoothMeasurementConfiguration-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
BluetoothMeasConfigNameList ::= SEQUENCE (SIZE(1..maxnoofBluetoothName)) OF BluetoothName
BluetoothMeasConfig::= ENUMERATED {setup,...}
BluetoothName ::= OCTET STRING (SIZE (1..248))
BPLMNs ::= SEQUENCE (SIZE(1.. maxnoofBPLMNs)) OF PLMNidentity
BroadcastCancelledAreaList ::= CHOICE {
                                   CellID-Cancelled,
    cellID-Cancelled
                                   TAI-Cancelled,
    tAI-Cancelled
    emergencyAreaID-Cancelled
                                   EmergencyAreaID-Cancelled,
BroadcastCompletedAreaList ::= CHOICE {
    cellID-Broadcast
                                   CellID-Broadcast,
                                   TAI-Broadcast,
    tAI-Broadcast
    emergencyAreaID-Broadcast
                                  EmergencyAreaID-Broadcast,
-- C
CancelledCellinEAI ::= SEQUENCE (SIZE(1..maxnoofCellinEAI)) OF CancelledCellinEAI-Item
```

```
CancelledCellinEAI-Item ::= SEQUENCE {
                            EUTRAN-CGI.
    numberOfBroadcasts
                            NumberOfBroadcasts,
    iE-Extensions
                            ProtocolExtensionContainer { {CancelledCellinEAI-Item-ExtIEs} } OPTIONAL,
CancelledCellinEAI-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
CancelledCellinTAI ::= SEQUENCE (SIZE(1..maxnoofCellinTAI)) OF CancelledCellinTAI-Item
CancelledCellinTAI-Item ::= SEQUENCE{
    eCGI
                        EUTRAN-CGI,
    numberOfBroadcasts NumberOfBroadcasts,
                        ProtocolExtensionContainer { {CancelledCellinTAI-Item-ExtIEs} } OPTIONAL,
    iE-Extensions
    . . .
CancelledCellinTAI-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
Cause ::= CHOICE {
    radioNetwork
                        CauseRadioNetwork,
    transport
                        CauseTransport,
    nas
                        CauseNas,
                        CauseProtocol,
    protocol
    misc
                        CauseMisc,
CauseMisc ::= ENUMERATED {
    control-processing-overload,
    not-enough-user-plane-processing-resources,
    hardware-failure,
    om-intervention,
    unspecified,
    unknown-PLMN,
CauseProtocol ::= ENUMERATED {
    transfer-syntax-error,
    abstract-syntax-error-reject,
    abstract-syntax-error-ignore-and-notify,
    message-not-compatible-with-receiver-state,
    semantic-error,
    abstract-syntax-error-falsely-constructed-message,
    unspecified,
```

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```
CauseRadioNetwork ::= ENUMERATED {
    unspecified,
    tx2relocoverall-expiry,
    successful-handover,
    release-due-to-eutran-generated-reason,
    handover-cancelled,
    partial-handover,
    ho-failure-in-target-EPC-eNB-or-target-system,
    ho-target-not-allowed,
    tS1relocoverall-expiry,
    tS1relocprep-expiry,
    cell-not-available,
    unknown-targetID,
    no-radio-resources-available-in-target-cell,
    unknown-mme-ue-slap-id,
    unknown-enb-ue-slap-id,
    unknown-pair-ue-slap-id,
    handover-desirable-for-radio-reason,
    time-critical-handover,
    resource-optimisation-handover,
    reduce-load-in-serving-cell,
    user-inactivity,
    radio-connection-with-ue-lost,
    load-balancing-tau-required,
    cs-fallback-triggered,
    ue-not-available-for-ps-service,
    radio-resources-not-available,
    failure-in-radio-interface-procedure,
    invalid-gos-combination,
    interrat-redirection,
    interaction-with-other-procedure,
    unknown-E-RAB-ID,
    multiple-E-RAB-ID-instances,
    encryption-and-or-integrity-protection-algorithms-not-supported,
    sl-intra-system-handover-triggered,
    sl-inter-system-handover-triggered,
    x2-handover-triggered,
    redirection-towards-1xRTT,
    not-supported-QCI-value,
    invalid-CSG-Id,
    release-due-to-pre-emption,
    n26-interface-not-available
CauseTransport ::= ENUMERATED {
    transport-resource-unavailable,
    unspecified,
    . . .
CauseNas ::= ENUMERATED {
```

```
normal-release,
    authentication-failure,
    detach.
    unspecified,
    csq-subscription-expiry
CellAccessMode ::= ENUMERATED {
    hybrid,
CellIdentifierAndCELevelForCECapableUEs ::= SEQUENCE {
    global-Cell-ID
                       EUTRAN-CGI,
    cELevel
                        CELevel,
                        ProtocolExtensionContainer { { CellIdentifierAndCELevelForCECapableUEs-ExtIEs} } OPTIONAL,
    iE-Extensions
CellIdentifierAndCELevelForCECapableUEs-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
-- Coverage Enhancement level encoded according to TS 36.331 [16] --
CELevel ::= OCTET STRING
CE-mode-B-SupportIndicator ::= ENUMERATED {
    supported,
    . . .
CellIdentity ::= BIT STRING (SIZE (28))
CellID-Broadcast ::= SEQUENCE (SIZE(1..maxnoofCellID)) OF CellID-Broadcast-Item
CellID-Broadcast-Item ::= SEQUENCE {
                        ProtocolExtensionContainer { {CellID-Broadcast-Item-ExtIEs} } OPTIONAL,
    iE-Extensions
CellID-Broadcast-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
CellID-Cancelled::= SEQUENCE (SIZE(1..maxnoofCellID)) OF CellID-Cancelled-Item
CellID-Cancelled-Item ::= SEQUENCE {
                        EUTRAN-CGI,
    numberOfBroadcasts NumberOfBroadcasts,
    iE-Extensions
                        ProtocolExtensionContainer { {CellID-Cancelled-Item-ExtIEs} } OPTIONAL,
```

```
CellID-Cancelled-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
CellBasedMDT::= SEQUENCE {
    cellIdListforMDT CellIdListforMDT,
                       ProtocolExtensionContainer { {CellBasedMDT-ExtIEs} } OPTIONAL,
    iE-Extensions
CellBasedMDT-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
CellIdListforMDT ::= SEQUENCE (SIZE(1..maxnoofCellIDforMDT)) OF EUTRAN-CGI
CellBasedQMC::= SEQUENCE {
                            CellIdListforOMC,
    cellIdListforOMC
                        ProtocolExtensionContainer { {CellBasedQMC-ExtIEs} } OPTIONAL,
    iE-Extensions
CellBasedQMC-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
CellIdListforQMC ::= SEQUENCE (SIZE(1..maxnoofCellIDforQMC)) OF EUTRAN-CGI
Cdma2000PDU ::= OCTET STRING
Cdma2000RATType ::= ENUMERATED {
   hRPD,
    onexRTT,
Cdma2000SectorID ::= OCTET STRING
Cdma2000HOStatus ::= ENUMERATED {
    hOSuccess,
   hOFailure,
Cdma2000HORequiredIndication ::= ENUMERATED {
    true,
Cdma2000OneXSRVCCInfo ::= SEQUENCE {
    cdma20000neXMEID
                                Cdma2000OneXMEID,
    cdma20000neXMSI
                                Cdma20000neXMSI,
                                Cdma2000OneXPilot,
    cdma20000neXPilot
```

```
ProtocolExtensionContainer { {Cdma20000neXSRVCCInfo-ExtIEs} } OPTIONAL,
    iE-Extensions
Cdma2000OneXSRVCCInfo-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
Cdma2000OneXMEID ::= OCTET STRING
Cdma2000OneXMSI ::= OCTET STRING
Cdma20000neXPilot ::= OCTET STRING
Cdma2000OneXRAND ::= OCTET STRING
Cell-Size ::= ENUMERATED {verysmall, small, medium, large, ...}
CellType ::= SEQUENCE {
    cell-Size
                            Cell-Size,
    iE-Extensions
                           ProtocolExtensionContainer { { CellType-ExtIEs}} OPTIONAL,
CellType-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
CGI ::= SEQUENCE {
    pLMNidentity
                   PLMNidentity,
    lac
                    LAC,
    сI
                    CI,
                    RAC
                                                                    OPTIONAL,
    rAC
    iE-Extensions ProtocolExtensionContainer { (CGI-ExtIEs) }
                                                                    OPTIONAL,
CGI-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
                   ::= OCTET STRING (SIZE (2))
CI
CNDomain ::= ENUMERATED {
    ps,
    CS
CNTypeRestrictions::= SEQUENCE (SIZE(1.. maxnoofEPLMNsPlusOne)) OF CNTypeRestrictions-Item
CNTypeRestrictions-Item ::= SEQUENCE {
    pLMN-Identity
                       PLMNidentity,
    cNType
                        CNType,
```

```
ProtocolExtensionContainer { { CNTypeRestrictions-Item-ExtIEs} } OPTIONAL,
    iE-Extensions
CNTypeRestrictions-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
CNType ::= ENUMERATED {
    fiveGCForbidden,
    epc-Forbiddden
ConcurrentWarningMessageIndicator ::= ENUMERATED {
    true
ConnectedengNBList ::= SEQUENCE (SIZE(1..maxnoofConnectedengNBs)) OF ConnectedengNBItem
ConnectedengNBItem ::= SEQUENCE {
    en-gNB-ID
                   En-gNB-ID,
    supportedTAs
                    SupportedTAs,
   iE-Extensions ProtocolExtensionContainer { {ConnectedengNBItem-ExtIEs} } OPTIONAL,
ConnectedengNBItem-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
ContextatSource ::= SEQUENCE {
    sourceNG-RAN-node-ID
                                        Global-RAN-NODE-ID,
   rAN-UE-NGAP-ID
                                       RAN-UE-NGAP-ID,
                    ProtocolExtensionContainer { {ContextatSource-ExtIEs} } OPTIONAL,
   iE-Extensions
ContextatSource-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
Correlation-ID
                 ::= OCTET STRING (SIZE (4))
CSFallbackIndicator ::= ENUMERATED {
    cs-fallback-required,
    cs-fallback-high-priority
AdditionalCSFallbackIndicator ::= ENUMERATED {
    no-restriction,
    restriction,
    . . .
```

```
CSG-Id
           ::= BIT STRING (SIZE (27))
CSG-IdList ::= SEOUENCE (SIZE (1.. maxnoofCSGs)) OF CSG-IdList-Item
CSG-IdList-Item ::= SEOUENCE {
    cSG-Id
                   CSG-Id,
    iE-Extensions ProtocolExtensionContainer { {CSG-IdList-Item-ExtIEs} } OPTIONAL,
CSG-IdList-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
CSGMembershipStatus ::= ENUMERATED {
    member,
    not-member
COUNTvalue ::= SEOUENCE {
    pDCP-SN
                   PDCP-SN,
    iE-Extensions ProtocolExtensionContainer { {COUNTvalue-ExtIEs} } OPTIONAL,
COUNTvalue-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
COUNTValueExtended ::= SEQUENCE {
    pDCP-SNExtended PDCP-SNExtended,
   hFNModified
                      HFNModified,
   iE-Extensions
                       ProtocolExtensionContainer { {COUNTValueExtended-ExtIEs} } OPTIONAL,
COUNTValueExtended-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
COUNTvaluePDCP-SNlength18 ::= SEQUENCE {
    pDCP-SNlength18
                               PDCP-SNlength18,
    hFNforPDCP-SNlength18
                               HFNforPDCP-SNlength18,
                               ProtocolExtensionContainer { {COUNTvaluePDCP-SNlength18-ExtIEs} } OPTIONAL,
    iE-Extensions
    . . .
COUNTvaluePDCP-SNlength18-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
```

```
Coverage-Level ::= ENUMERATED {
    extendedcoverage,
CriticalityDiagnostics ::= SEQUENCE {
    procedureCode
                                    ProcedureCode
                                                                                                     OPTIONAL,
    triggeringMessage
                                    TriggeringMessage
                                                                                                     OPTIONAL,
                                    Criticality
    procedureCriticality
                                                                                                     OPTIONAL,
    iEsCriticalityDiagnostics
                                    CriticalityDiagnostics-IE-List
                                                                                                     OPTIONAL,
                                    ProtocolExtensionContainer {{CriticalityDiagnostics-ExtIEs}}
    iE-Extensions
                                                                                                     OPTIONAL,
CriticalityDiagnostics-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
CriticalityDiagnostics-IE-List ::= SEQUENCE (SIZE (1.. maxnoofErrors)) OF CriticalityDiagnostics-IE-Item
CriticalityDiagnostics-IE-Item ::= SEQUENCE {
    iECriticality
                           Criticality,
   iE-ID
                            ProtocolIE-ID,
    typeOfError
                            TypeOfError,
    iE-Extensions
                            ProtocolExtensionContainer {{CriticalityDiagnostics-IE-Item-ExtIEs}} OPTIONAL,
CriticalityDiagnostics-IE-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
-- D
DAPSRequestInfo ::= SEQUENCE {
    dAPSIndicator
                                ENUMERATED {dAPS-HO-required, ...},
    iE-Extensions
                                ProtocolExtensionContainer { {DAPSRequestInfo-ExtIEs} } OPTIONAL,
    . . .
DAPSRequestInfo-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
DAPSResponseInfoList ::= SEQUENCE (SIZE(1.. maxnoofE-RABs)) OF ProtocolIE-SingleContainer { { DAPSResponseInfoListIEs } }
DAPSResponseInfoListIEs S1AP-PROTOCOL-IES ::= {
    { ID id-DAPSResponseInfoItem
                                        CRITICALITY ignore TYPE DAPSResponseInfoItem PRESENCE mandatory },
DAPSResponseInfoItem ::= SEQUENCE {
```

```
e-RAB-ID
                                  E-RAB-ID,
    dAPSResponseInfo
                                  DAPSResponseInfo,
   iE-Extensions
                                  OPTIONAL,
DAPSResponseInfoItem-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
DAPSResponseInfo ::= SEQUENCE {
                              ENUMERATED {daps-H0-accepted,daps-H0-not-accepted,...},
    dapsresponseindicator
   iE-Extensions
                              ProtocolExtensionContainer { { DAPSResponseInfo-ExtIEs} } OPTIONAL,
DAPSResponseInfo-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
DataCodingScheme ::= BIT STRING (SIZE (8))
DataSize ::= INTEGER(1..4095, ...)
DCN-ID ::= INTEGER (0..65535)
ServedDCNs ::= SEQUENCE (SIZE(0..maxnoofDCNs)) OF ServedDCNsItem
ServedDCNsItem ::= SEQUENCE {
    dCN-ID
                              DCN-ID,
   relativeDCNCapacity
                              RelativeMMECapacity,
   iE-Extensions
                          ProtocolExtensionContainer { {ServedDCNsItem-ExtIEs} } OPTIONAL,
ServedDCNsItem-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
DL-CP-SecurityInformation ::= SEQUENCE {
   dl-NAS-MAC
                          DL-NAS-MAC,
   iE-Extensions
                          ProtocolExtensionContainer { { DL-CP-SecurityInformation-ExtIEs} } OPTIONAL,
DL-CP-SecurityInformation-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
DL-Forwarding ::= ENUMERATED {
   dL-Forwarding-proposed,
```

```
DL-NAS-MAC ::= BIT STRING (SIZE (16))
DLCOUNT-PDCP-SNlength ::= CHOICE {
    dLCOUNTValuePDCP-SNlength12
                                                    COUNTvalue.
                                                    COUNTValueExtended,
    dLCOUNTValuePDCP-SNlength15
    dLCOUNTValuePDCP-SNlength18
                                                    COUNTvaluePDCP-SNlength18,
Direct-Forwarding-Path-Availability ::= ENUMERATED {
    directPathAvailable,
Data-Forwarding-Not-Possible ::= ENUMERATED {
    data-Forwarding-not-Possible,
DLNASPDUDeliveryAckRequest ::= ENUMERATED {
    requested,
-- E
EARFCN ::= INTEGER(0..maxEARFCN, ...)
ECGIList ::= SEQUENCE (SIZE(1..maxnoofCellID)) OF EUTRAN-CGI
PWSfailedECGIList ::= SEQUENCE (SIZE(1..maxnoofCellsineNB)) OF EUTRAN-CGI
EDT-Session ::= ENUMERATED {
    true,
    . . .
EmergencyAreaIDList ::= SEQUENCE (SIZE(1..maxnoofEmergencyAreaID)) OF EmergencyAreaID
EmergencyAreaID ::= OCTET STRING (SIZE (3))
EmergencyAreaID-Broadcast ::= SEQUENCE (SIZE(1..maxnoofEmergencyAreaID)) OF EmergencyAreaID-Broadcast-Item
EmergencyAreaID-Broadcast-Item ::= SEQUENCE {
    emergencyAreaID
                           EmergencyAreaID,
    completedCellinEAI
                           CompletedCellinEAI,
                           ProtocolExtensionContainer { { EmergencyAreaID-Broadcast-Item-ExtIEs} } OPTIONAL,
    iE-Extensions
EmergencyAreaID-Broadcast-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
```

```
EmergencyAreaID-Cancelled ::= SEOUENCE (SIZE(1..maxnoofEmergencyAreaID)) OF EmergencyAreaID-Cancelled-Item
EmergencyAreaID-Cancelled-Item ::= SEQUENCE
    emergencyAreaID
                           EmergencyAreaID,
    cancelledCellinEAI
                           CancelledCellinEAI,
    iE-Extensions
                           ProtocolExtensionContainer { {EmergencyAreaID-Cancelled-Item-ExtIEs} } OPTIONAL,
EmergencyAreaID-Cancelled-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
CompletedCellinEAI ::= SEQUENCE (SIZE(1..maxnoofCellinEAI)) OF CompletedCellinEAI-Item
CompletedCellinEAI-Item ::= SEQUENCE {
    eCGI
                            ProtocolExtensionContainer { {CompletedCellinEAI-Item-ExtIEs} } OPTIONAL,
    iE-Extensions
    . . .
CompletedCellinEAI-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    . . .
ECGI-List ::= SEOUENCE (SIZE(1..maxnoofCellsineNB)) OF EUTRAN-CGI
EmergencyAreaIDListForRestart ::= SEQUENCE (SIZE(1..maxnoofRestartEmergencyAreaIDs)) OF EmergencyAreaID
ENB-EarlyStatusTransfer-TransparentContainer ::= SEQUENCE {
    bearers-SubjectToEarlyStatusTransferList
                                                    Bearers-SubjectToEarlyStatusTransferList,
   iE-Extensions
                                                    ProtocolExtensionContainer { {ENB-EarlyStatusTransfer-TransparentContainer-ExtIEs} }OPTIONAL,
    . . .
ENB-EarlyStatusTransfer-TransparentContainer-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
ENB-ID ::= CHOICE {
   macroENB-ID
                       BIT STRING (SIZE(20)),
   homeENB-ID
                       BIT STRING (SIZE(28)),
    short-macroENB-ID BIT STRING (SIZE(18)),
    long-macroENB-ID
                           BIT STRING (SIZE(21))
En-gNB-ID ::= BIT STRING (SIZE(22..32, ...))
GERAN-Cell-ID ::= SEQUENCE {
   lai
                    LAI,
    rAC
                    RAC,
                    CI,
    сI
```

```
ProtocolExtensionContainer { { GERAN-Cell-ID-ExtIEs} } OPTIONAL,
    iE-Extensions
GERAN-Cell-ID-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
Global-ENB-ID ::= SEQUENCE {
   pLMNidentity
                           PLMNidentity,
    eNB-ID
                           ENB-ID,
                           ProtocolExtensionContainer { {GlobalENB-ID-ExtIEs} }
   iE-Extensions
                                                                                      OPTIONAL,
GlobalENB-ID-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
Global-en-gNB-ID ::= SEQUENCE {
   pLMNidentity
                          PLMNidentity,
    en-gNB-ID
                           En-gNB-ID,
                           ProtocolExtensionContainer { Global-en-gNB-ID-ExtIEs} }
   iE-Extensions
                                                                                          OPTIONAL,
Global-en-qNB-ID-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
GUMMEIList::= SEQUENCE (SIZE (1.. maxnoofMMECs)) OF GUMMEI
ENB-StatusTransfer-TransparentContainer
                                           ::= SEQUENCE {
                                           Bearers-SubjectToStatusTransferList,
    bearers-SubjectToStatusTransferList
                   ProtocolExtensionContainer { {ENB-StatusTransfer-TransparentContainer-ExtIEs} } OPTIONAL,
ENB-StatusTransfer-TransparentContainer-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
ENB-UE-S1AP-ID
                          ::= INTEGER (0..16777215)
ENBname ::= PrintableString (SIZE (1..150,...))
ENBX2TLAs ::= SEQUENCE (SIZE(1.. maxnoofeNBX2TLAs)) OF TransportLayerAddress
EncryptionAlgorithms ::= BIT STRING (SIZE (16,...))
EN-DCSONConfigurationTransfer ::= SEQUENCE {
    transfertype
                      EN-DCSONTransferType,
    sONInformation
                                   SONInformation,
                                   X2TNLConfigurationInfo OPTIONAL,
    x2TNLConfigInfo
```

```
-- This IE shall be present if the SON Information IE contains the SON Information Request IE and the SON Information Request IE is set to
"X2TNL Configuration Info" --
    iE-Extensions
                            ProtocolExtensionContainer { {EN-DCSONConfigurationTransfer-ExtIEs} }
                                                                                                        OPTIONAL.
EN-DCSONConfigurationTransfer-ExtIEs S1AP-PROTOCOL-EXTENSION ::=
EN-DCSONTransferType ::= CHOICE {
                        EN-DCTransferTypeRequest,
   request
                        EN-DCTransferTypeReply,
    reply
EN-DCTransferTypeRequest ::= SEQUENCE {
    sourceeNB
                            EN-DCSONeNBIdentification,
    targetengNB
                            EN-DCSONengNBIdentification,
    targeteNB
                            EN-DCSONeNBIdentification
                                                                                                      OPTIONAL,
    associatedTAI
                            TAT
                                                                                                     OPTIONAL,
    broadcast5GSTAI
                            FiveGSTAI
                                                                                                     OPTIONAL,
                            ProtocolExtensionContainer { {EN-DCTransferTypeRequest-ExtIEs} }
    iE-Extensions
                                                                                                     OPTIONAL,
EN-DCTransferTypeRequest-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
EN-DCTransferTypeReply ::= SEQUENCE {
    sourceengNB
                            EN-DCSONengNBIdentification,
    targeteNB
                            EN-DCSONeNBIdentification,
    iE-Extensions
                            ProtocolExtensionContainer { {EN-DCTransferTypeReply-ExtIEs} }
                                                                                                   OPTIONAL,
EN-DCTransferTypeReply-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
EN-DCSONeNBIdentification ::= SEQUENCE {
                            Global-ENB-ID,
    globaleNBID
    selectedTAI
                            TAI,
                            ProtocolExtensionContainer { {EN-DCSONeNBIdentification-ExtIEs} }
    iE-Extensions
                                                                                                     OPTIONAL,
EN-DCSONenBIdentification-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
EN-DCSONengNBIdentification ::= SEQUENCE {
                            Global-en-gNB-ID,
    globalengNBID
```

```
selectedTAI
    iE-Extensions
                            ProtocolExtensionContainer { {EN-DCSONengNBIdentification-ExtIEs} }
                                                                                                     OPTIONAL,
EN-DCSONengNBIdentification-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
EndIndication ::= ENUMERATED {
    no-further-data,
    further-data-exists,
EnhancedCoverageRestricted ::= ENUMERATED {
    restricted,
CE-ModeBRestricted ::= ENUMERATED {
    restricted,
   not-restricted,
    . . .
EPLMNs ::= SEQUENCE (SIZE(1..maxnoofEPLMNs)) OF PLMNidentity
EventType ::= ENUMERATED {
    direct,
    change-of-serve-cell,
    stop-change-of-serve-cell,
E-RAB-ID
                ::= INTEGER (0..15, ...)
E-RABInformationList
                      ::= SEQUENCE (SIZE (1.. maxnoofE-RABs)) OF ProtocolIE-SingleContainer { { E-RABInformationListIEs } }
E-RABInformationListIEs S1AP-PROTOCOL-IES ::= {
    { ID id-E-RABInformationListItem
                                                CRITICALITY ignore TYPE E-RABInformationListItem
                                                                                                        PRESENCE mandatory },
    . . .
E-RABInformationListItem ::= SEQUENCE {
    e-RAB-ID
                                    E-RAB-ID,
    dL-Forwarding
                                    DL-Forwarding
                                                        OPTIONAL,
    iE-Extensions
                                    ProtocolExtensionContainer { {E-RABInformationListItem-ExtIEs} }
                                                                                                           OPTIONAL,
E-RABInformationListItem-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    { ID id-DAPSRequestInfo
                                                CRITICALITY ignore EXTENSION DAPSRequestInfo PRESENCE optional },
```

```
E-RABList ::= SEOUENCE (SIZE(1.. maxnoofE-RABs)) OF ProtocolIE-SingleContainer { {E-RABItemIEs} }
E-RABItemIEs
               S1AP-PROTOCOL-IES ::= {
    TYPE E-RABItem PRESENCE mandatory },
E-RABItem ::= SEQUENCE {
   e-RAB-ID
                               E-RAB-ID
   cause
                               Cause,
                               ProtocolExtensionContainer { {E-RABItem-ExtIEs} } OPTIONAL,
   iE-Extensions
E-RABItem-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
E-RABLevelQoSParameters ::= SEQUENCE {
               QCI,
                                   AllocationAndRetentionPriority,
   allocationRetentionPriority
   qbr0osInformation
                                       GBR-OosInformation
                                                                                                  OPTIONAL,
   iE-Extensions
                                       ProtocolExtensionContainer { {E-RABQoSParameters-ExtIEs} }
                                                                                                  OPTIONAL,
    . . .
E-RABUsageReportList ::= SEQUENCE (SIZE(1..maxnooftimeperiods)) OF ProtocolIE-SingleContainer { {E-RABUsageReportItemIEs} }
E-RABUsageReportItemIEs
                           S1AP-PROTOCOL-IES ::= {
    { ID id-E-RABUsageReportItem
                                    CRITICALITY ignore
                                                          TYPE E-RABUsageReportItem PRESENCE mandatory },
   . . .
E-RABUsageReportItem ::= SEQUENCE {
   startTimestamp
                                   OCTET STRING (SIZE(4)),
    endTimestamp
                                   OCTET STRING (SIZE(4)),
                                   INTEGER (0..18446744073709551615),
   usageCountUL
    usageCountDL
                                   INTEGER (0..18446744073709551615),
                               ProtocolExtensionContainer { { E-RABUsageReportItem-ExtIEs} } OPTIONAL,
   iE-Extensions
E-RABUsageReportItem-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
E-RABQoSParameters-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
-- Extended for introduction of downlink and uplink packet loss rate for enhanced Voice performance --
     ID id-DownlinkPacketLossRate
                                      CRITICALITY ignore EXTENSION Packet-LossRate
                                                                                          PRESENCE optional |
     ID id-UplinkPacketLossRate
                                          CRITICALITY ignore EXTENSION Packet-LossRate
                                                                                              PRESENCE optional },
```

```
Ethernet-Type ::= ENUMERATED {
    true.
EUTRAN-CGI ::= SEQUENCE {
   pLMNidentity
                            PLMNidentity,
   cell-ID
                            CellIdentity,
                            ProtocolExtensionContainer { {EUTRAN-CGI-ExtIEs} } OPTIONAL,
   iE-Extensions
EUTRAN-CGI-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
EUTRANRoundTripDelayEstimationInfo ::= INTEGER (0..2047)
ExpectedUEBehaviour ::= SEQUENCE {
    expectedActivity
                            ExpectedUEActivityBehaviour OPTIONAL,
                            ExpectedHOInterval
    expectedHOInterval
                                                        OPTIONAL,
    iE-Extensions
                       ProtocolExtensionContainer { { ExpectedUEBehaviour-ExtIEs} } OPTIONAL,
    . . .
ExpectedUEBehaviour-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
ExpectedUEActivityBehaviour ::= SEQUENCE {
    expectedActivityPeriod
                                            ExpectedActivityPeriod
                                                                                     OPTIONAL,
    expectedIdlePeriod
                                            ExpectedIdlePeriod
                                                                                     OPTIONAL,
    sourceofUEActivityBehaviourInformation SourceOfUEActivityBehaviourInformation OPTIONAL,
                        ProtocolExtensionContainer { { ExpectedUEActivityBehaviour-ExtIEs} } OPTIONAL,
ExpectedUEActivityBehaviour-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
ExpectedActivityPeriod ::= INTEGER (1..30|40|50|60|80|100|120|150|180|181,...)
ExpectedIdlePeriod ::= INTEGER (1..30|40|50|60|80|100|120|150|180|181,...)
SourceOfUEActivityBehaviourInformation ::= ENUMERATED {
    subscription-information,
    statistics.
    . . .
ExpectedHOInterval ::= ENUMERATED {
    sec15, sec30, sec60, sec90, sec120, sec180, long-time,
```

```
ExtendedBitRate ::= INTEGER (1000000001..400000000000, ...)
ExtendedRNC-ID
                               ::= INTEGER (4096..65535)
ExtendedRepetitionPeriod ::= INTEGER (4096..131071)
Extended-UEIdentityIndexValue ::= BIT STRING (SIZE (14))
-- F
FiveGSTAC ::= OCTET STRING (SIZE (3))
FiveGSTAI ::= SEQUENCE {
    pLMNidentity
                            PLMNidentity,
    fiveGSTAC
                           FiveGSTAC,
                           ProtocolExtensionContainer { {FiveGSTAI-ExtIEs} } OPTIONAL,
    iE-Extensions
FiveGSTAI-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
FiveOI ::= INTEGER (0..255, ...)
ForbiddenInterRATs ::= ENUMERATED {
    all,
    geran,
    utran,
    cdma2000,
    geranandutran,
    cdma2000andutran
ForbiddenTAs ::= SEQUENCE (SIZE(1.. maxnoofEPLMNsPlusOne)) OF ForbiddenTAs-Item
ForbiddenTAs-Item ::= SEQUENCE {
    pLMN-Identity
                      PLMNidentity,
    forbiddenTACs
                       ForbiddenTACs,
                       ProtocolExtensionContainer { {ForbiddenTAs-Item-ExtIEs} } OPTIONAL,
    iE-Extensions
ForbiddenTAs-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
ForbiddenTACs ::= SEQUENCE (SIZE(1..maxnoofForbTACs)) OF TAC
```

```
ForbiddenLAs ::= SEOUENCE (SIZE(1..maxnoofEPLMNsPlusOne)) OF ForbiddenLAs-Item
ForbiddenLAs-Item ::= SEOUENCE {
    pLMN-Identity
                       PLMNidentity,
    forbiddenLACs
                        ForbiddenLACs.
                        ProtocolExtensionContainer { {ForbiddenLAs-Item-ExtIEs} } OPTIONAL,
    iE-Extensions
ForbiddenLAs-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
ForbiddenLACs ::= SEOUENCE (SIZE(1..maxnoofForbLACs)) OF LAC
-- G
GBR-OosInformation ::= SEQUENCE {
    e-RAB-MaximumBitrateDL
                                    BitRate,
    e-RAB-MaximumBitrateUL
                                    BitRate,
    e-RAB-GuaranteedBitrateDL
                                   BitRate,
    e-RAB-GuaranteedBitrateUL
                                    BitRate,
                                    ProtocolExtensionContainer { GBR-QosInformation-ExtIEs} } OPTIONAL,
    iE-Extensions
    . . .
GBR-OosInformation-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
-- Extension for maximum bitrate > 10G bps --
     ID id-extended-e-RAB-MaximumBitrateDL CRITICALITY ignore EXTENSION ExtendedBitRate PRESENCE optional
     ID id-extended-e-RAB-MaximumBitrateUL CRITICALITY ignore EXTENSION ExtendedBitRate PRESENCE optional |
     ID id-extended-e-RAB-GuaranteedBitrateDL CRITICALITY ignore EXTENSION ExtendedBitRate PRESENCE optional |
    ID id-extended-e-RAB-GuaranteedBitrateUL CRITICALITY ignore EXTENSION ExtendedBitRate
                                                                                               PRESENCE optional },
    . . . }
GTP-TEID
                           ::= OCTET STRING (SIZE (4))
GUMMEI
               ::= SEOUENCE {
    pLMN-Identity
                       PLMNidentity,
   mME-Group-ID
                        MME-Group-ID,
   mME-Code
                       MME-Code,
                       ProtocolExtensionContainer { GUMMEI-ExtIEs} } OPTIONAL,
    iE-Extensions
GUMMEI-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
GUMMEIType ::= ENUMERATED {
   native,
   mapped,
    mappedFrom5G
```

```
GWContextReleaseIndication ::= ENUMERATED {
    true,
    . . .
-- H
HandoverFlag ::= ENUMERATED {
    handoverPreparation,
    . . .
HandoverRestrictionList ::= SEQUENCE {
    servingPLMN
                                PLMNidentity,
    equivalentPLMNs
                                EPLMNs
                                                         OPTIONAL,
    forbiddenTAs
                                ForbiddenTAs
                                                         OPTIONAL,
    forbiddenLAs
                                ForbiddenLAs
                                                         OPTIONAL,
    forbiddenInterRATs
                                ForbiddenInterRATs
                                                         OPTIONAL,
                                ProtocolExtensionContainer { {HandoverRestrictionList-ExtIEs} } OPTIONAL,
    iE-Extensions
HandoverRestrictionList-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
      ID id-NRrestrictioninEPSasSecondaryRAT
                                                     CRITICALITY ignore EXTENSION NRrestrictioninEPSasSecondaryRAT
                                                                                                                        PRESENCE optional |
      ID id-UnlicensedSpectrumRestriction
                                                CRITICALITY ignore EXTENSION UnlicensedSpectrumRestriction PRESENCE optional | |
      ID id-CNTypeRestrictions
                                    CRITICALITY ignore EXTENSION CNTypeRestrictions
                                                                                         PRESENCE optional }
      ID id-NRrestrictionin5GS
                                    CRITICALITY ignore EXTENSION NRrestrictionin5GS
                                                                                         PRESENCE optional}
     ID id-LastNG-RANPLMNIdentity
                                        CRITICALITY ignore EXTENSION PLMNidentity
                                                                                             PRESENCE optional },
HandoverType ::= ENUMERATED {
    intralte,
    ltetoutran,
    ltetogeran,
    utrantolte,
    gerantolte,
    eps-to-5qs,
    fivegs-to-eps
HFN ::= INTEGER (0..1048575)
HFNModified ::= INTEGER (0..131071)
HFNforPDCP-SNlength18 ::= INTEGER (0..16383)
-- I
Masked-IMEISV ::= BIT STRING (SIZE (64))
```

```
ImmediateMDT ::= SEQUENCE {
    measurementsToActivate
                                MeasurementsToActivate.
    mlreportingTrigger
                                MlReportingTrigger,
    m1thresholdeventA2
                                M1ThresholdEventA2
                                                                OPTIONAL.
-- Included in case of event-triggered, or event-triggered periodic reporting for measurement M1
    mlperiodicReporting
                                MlPeriodicReporting
                                                                OPTIONAL,
-- Included in case of periodic or event-triggered periodic reporting
    iE-Extensions
                                ProtocolExtensionContainer { { ImmediateMDT-ExtIEs} } OPTIONAL,
ImmediateMDT-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
      ID id-M3Configuration
                                CRITICALITY ignore EXTENSION M3Configuration
                                                                                     PRESENCE conditional }
      ID id-M4Configuration
                                CRITICALITY ignore EXTENSION M4Configuration
                                                                                     PRESENCE conditional
      ID id-M5Configuration
                                CRITICALITY ignore EXTENSION M5Configuration
                                                                                     PRESENCE conditional }
      ID id-MDT-Location-Info CRITICALITY ignore EXTENSION MDT-Location-Info
                                                                                     PRESENCE optional } |
      ID id-M6Configuration
                                CRITICALITY ignore EXTENSION M6Configuration
                                                                                     PRESENCE conditional }
      ID id-M7Configuration
                                CRITICALITY ignore EXTENSION M7Configuration
                                                                                     PRESENCE conditional }
      ID id-BluetoothMeasurementConfiguration
                                                    CRITICALITY ignore EXTENSION BluetoothMeasurementConfiguration
                                                                                                                       PRESENCE optional |
     ID id-WLANMeasurementConfiguration
                                                CRITICALITY ignore EXTENSION WLANMeasurementConfiguration
                                                                                                              PRESENCE optional },
IMSI
        ::= OCTET STRING (SIZE (3..8))
InformationOnRecommendedCellsAndENBsForPaging ::= SEQUENCE {
    recommendedCellsForPaging
                                RecommendedCellsForPaging,
    recommendENBsForPaging
                                Recommended ENBs For Paging,
                                ProtocolExtensionContainer { { InformationOnRecommendedCellsAndENBsForPaging-ExtIEs} } OPTIONAL,
    iE-Extensions
InformationOnRecommendedCellsAndENBsForPaging-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
IntegrityProtectionAlgorithms ::= BIT STRING (SIZE (16,...))
IntendedNumberOfPagingAttempts ::= INTEGER (1..16, ...)
InterfacesToTrace ::= BIT STRING (SIZE (8))
IntersystemMeasurementConfiguration ::= SEQUENCE {
                                        INTEGER (0.. 127)
    rSRP
                                                                                         OPTIONAL,
    rSRO
                                        INTEGER (0.. 127)
                                                                                         OPTIONAL,
                                        INTEGER (0.. 127)
                                                                                         OPTIONAL,
    interSystemMeasurementParameters
                                        InterSystemMeasurementParameters,
    iE-Extensions
                                    ProtocolExtensionContainer { { IntersystemMeasurementConfiguration-ExtIEs} } OPTIONAL,
IntersystemMeasurementConfiguration-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
```

```
InterSystemMeasurementParameters ::= SEQUENCE {
                                        INTEGER (1..100).
    measurementDuration
    interSystemMeasurementList
                                        InterSystemMeasurementList
                                                                             OPTIONAL,
    iE-Extensions
                                    ProtocolExtensionContainer { { InterSystemMeasurementParameters-ExtIEs} } OPTIONAL,
InterSystemMeasurementParameters-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
InterSystemMeasurementList ::= SEQUENCE (SIZE(1.. maxnooffrequencies)) OF InterSystemMeasurementItem
InterSystemMeasurementItem ::= SEQUENCE {
    fregBandIndicatorNR
                                INTEGER (1..1024),
    sSBfrequencies
                                INTEGER (0..maxNARFCN),
    subcarrierSpacingSSB
                                ENUMERATED {kHz15, kHz30, kHz60, kHz120, kHz240, ...},
                                INTEGER (1..maxRS-IndexCellQual)
    maxRSIndexCellQual
                                                                     OPTIONAL,
    sMTC
                                OCTET STRING
                                                                     OPTIONAL,
    threshRS-Index-r15
                                OCTET STRING
                                                                     OPTIONAL,
    sSBToMeasure
                                OCTET STRING
                                                                     OPTIONAL,
    sSRSSIMeasurement
                                OCTET STRING
                                                                     OPTIONAL,
    quantityConfigNR-R15
                                OCTET STRING
                                                                     OPTIONAL,
    blackCellsToAddModList
                                OCTET STRING
                                                                     OPTIONAL,
    iE-Extensions
                                ProtocolExtensionContainer { { InterSystemMeasurementItem-ExtIEs} } OPTIONAL
InterSystemMeasurementItem-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
IntersystemSONConfigurationTransfer ::= OCTET STRING
IMSvoiceEPSfallbackfrom5G ::= ENUMERATED {
    true,
    . . .
IAB-Authorized ::= ENUMERATED {
    authorized,
    not-authorized,
    . . .
IAB-Node-Indication ::= ENUMERATED {
    true,
    . . .
IAB-Supported ::= ENUMERATED {
    true,
    . . .
```

```
-- J
-- K
KillAllWarningMessages ::= ENUMERATED {true}
-- L
LAC ::= OCTET STRING (SIZE (2))
LAI ::= SEQUENCE {
   pLMNidentity
                             PLMNidentity,
   lac
                  LAC,
   iE-Extensions
                         ProtocolExtensionContainer { {LAI-ExtIEs} } OPTIONAL,
LAI-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
LastVisitedCell-Item ::= CHOICE {
                                LastVisitedEUTRANCellInformation,
   e-UTRAN-Cell
   uTRAN-Cell
                                LastVisitedUTRANCellInformation,
   qERAN-Cell
                                LastVisitedGERANCellInformation,
   nG-RAN-Cell
                                LastVisitedNGRANCellInformation
LastVisitedEUTRANCellInformation ::= SEQUENCE {
   global-Cell-ID
                                EUTRAN-CGI,
   cellType
                                CellType,
   time-UE-StayedInCell
                                Time-UE-StayedInCell,
   iE-Extensions
                                ProtocolExtensionContainer { { LastVisitedEUTRANCellInformation-ExtIEs} } OPTIONAL,
LastVisitedEUTRANCellInformation-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
-- Extension for Rel-11 to support enhanced granularity for time UE stayed in cell --
     { ID id-HO-Cause
                                                  CRITICALITY ignore EXTENSION Cause
                                                                                                   PRESENCE optional },
   . . .
LastVisitedNGRANCellInformation ::= OCTET STRING
LastVisitedUTRANCellInformation ::= OCTET STRING
LastVisitedGERANCellInformation ::= CHOICE {
   undefined
                                NULL,
   . . .
L3-Information
                         ::= OCTET STRING
-- This is a dummy IE used only as a reference to the actual definition in relevant specification.
```

```
LPPa-PDU ::= OCTET STRING
LHN-ID ::= OCTET STRING(SIZE (32..256))
Links-to-log ::= ENUMERATED {uplink, downlink, both-uplink-and-downlink, ...}
ListeningSubframePattern ::= SEOUENCE {
    pattern-period
                                ENUMERATED {ms1280, ms2560, ms5120, ms10240, ...},
   pattern-offset
                                INTEGER (0..10239, ...),
                                ProtocolExtensionContainer { { ListeningSubframePattern-ExtIEs} } OPTIONAL,
   iE-Extensions
ListeningSubframePattern-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
LoggedMDT ::= SEOUENCE {
    loggingInterval
                                LoggingInterval,
    loggingDuration
                                LoggingDuration,
    iE-Extensions
                                ProtocolExtensionContainer { {LoggedMDT-ExtIEs} } OPTIONAL,
LoggedMDT-ExtIEs
                   S1AP-PROTOCOL-EXTENSION ::= {
      ID id-BluetoothMeasurementConfiguration
                                                    CRITICALITY ignore EXTENSION BluetoothMeasurementConfiguration
                                                                                                                        PRESENCE optional }
     ID id-WLANMeasurementConfiguration
                                                    CRITICALITY ignore EXTENSION WLANMeasurementConfiguration
                                                                                                                           PRESENCE optional },
LoggingInterval ::= ENUMERATED {ms128, ms256, ms512, ms1024, ms2048, ms3072, ms4096, ms6144}
LoggingDuration ::= ENUMERATED {m10, m20, m40, m60, m90, m120}
LoggedMBSFNMDT ::= SEQUENCE {
    loggingInterval
                                LoggingInterval,
    loggingDuration
                                LoggingDuration,
    mBSFN-ResultToLog
                                MBSFN-ResultToLog
                                                        OPTIONAL,
                                ProtocolExtensionContainer { { LoggedMBSFNMDT-ExtIEs } } OPTIONAL,
    iE-Extensions
    . . .
LoggedMBSFNMDT-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
LTE-M-Indication ::= ENUMERATED {lte-m, ... }
-- M
M3Configuration ::= SEQUENCE {
    m3period
    iE-Extensions
                        ProtocolExtensionContainer { { M3Configuration-ExtIEs} } OPTIONAL,
    . . .
```

```
M3Configuration-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
M3period ::= ENUMERATED {ms100, ms1000, ms10000, ..., ms1024, ms1280, ms2048, ms2560, ms5120, ms10240, min1 }
M4Configuration ::= SEQUENCE {
   m4period
                       M4period,
                       Links-to-log,
   m4-links-to-log
                       ProtocolExtensionContainer { { M4Configuration-ExtIEs} } OPTIONAL,
   iE-Extensions
M4Configuration-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
M4period ::= ENUMERATED {ms1024, ms2048, ms5120, ms10240, min1, ... }
M5Configuration ::= SEQUENCE {
   m5period
                       M5period,
   m5-links-to-log
                       Links-to-log,
   iE-Extensions
                       ProtocolExtensionContainer { { M5Configuration-ExtIEs} } OPTIONAL,
    . . .
M5Configuration-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
M5period ::= ENUMERATED {ms1024, ms2048, ms5120, ms10240, min1, ... }
M6Configuration ::= SEQUENCE {
   m6report-Interval M6report-Interval,
   m6delay-threshold M6delay-threshold
                                                OPTIONAL,
-- This IE shall be present if the M6 Links to log IE is set to "uplink" or to "both-uplink-and-downlink" --
   m6-links-to-log Links-to-log,
   iE-Extensions
                       ProtocolExtensionContainer { { M6Configuration-ExtIEs} } OPTIONAL,
    . . .
M6Configuration-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    . . .
M6report-Interval ::= ENUMERATED { ms1024, ms2048, ms5120, ms10240, ... }
M6delay-threshold ::= ENUMERATED { ms30, ms40, ms50, ms60, ms70, ms80, ms90, ms100, ms150, ms300, ms500, ms750, ... }
M7Configuration ::= SEQUENCE {
   m7period
                       M7period,
   m7-links-to-log
                       Links-to-log,
```

```
ProtocolExtensionContainer { { M7Configuration-ExtIEs} } OPTIONAL,
    iE-Extensions
M7Configuration-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
M7period ::= INTEGER(1..60, ...)
MDT-Activation ::= ENUMERATED {
    immediate-MDT-only,
    immediate-MDT-and-Trace,
    logged-MDT-only,
    logged-MBSFN-MDT
MDT-Location-Info ::= BIT STRING (SIZE (8))
MDT-Configuration ::= SEQUENCE {
    mdt-Activation
                       MDT-Activation,
                       AreaScopeOfMDT,
    areaScopeOfMDT
    mDTMode
                        MDTMode,
    iE-Extensions
                        ProtocolExtensionContainer { { MDT-Configuration-ExtIEs} } OPTIONAL,
    . . .
MDT-Configuration-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    { ID id-SignallingBasedMDTPLMNList
                                                CRITICALITY ignore EXTENSION MDTPLMNList PRESENCE optional },
ManagementBasedMDTAllowed ::= ENUMERATED {allowed, ...}
MBSFN-ResultToLog ::= SEQUENCE (SIZE(1..maxnoofMBSFNAreaMDT)) OF MBSFN-ResultToLogInfo
MBSFN-ResultToLogInfo ::= SEQUENCE {
                        INTEGER (0..255)
    mBSFN-AreaId
                                                OPTIONAL,
    carrierFreq
                        EARFCN,
    iE-Extensions
                        ProtocolExtensionContainer { { MBSFN-ResultToLogInfo-ExtIEs} } OPTIONAL,
    . . .
MBSFN-ResultToLogInfo-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    . . .
MDTPLMNList ::= SEQUENCE (SIZE(1..maxnoofMDTPLMNs)) OF PLMNidentity
PrivacyIndicator ::= ENUMERATED {
    immediate-MDT,
    logged-MDT,
```

```
MDTMode ::= CHOICE {
    immediateMDT
                                ImmediateMDT.
    loggedMDT
                                LoggedMDT,
                                MDTMode-Extension
    mDTMode-Extension
MDTMode-Extension ::= ProtocolIE-SingleContainer {{ MDTMode-ExtensionIE }}
MDTMode-ExtensionIE S1AP-PROTOCOL-IES ::= {
                                CRITICALITY ignore TYPE LoggedMBSFNMDT
    { ID id-LoggedMBSFNMDT
                                                                             PRESENCE mandatory }
MeasurementsToActivate ::= BIT STRING (SIZE (8))
MeasurementThresholdA2 ::= CHOICE {
    threshold-RSRP
                                Threshold-RSRP,
                                Threshold-RSRO,
    threshold-RSRO
    . . .
MessageIdentifier ::= BIT STRING (SIZE (16))
MobilityInformation ::= BIT STRING (SIZE(32))
MMEname ::= PrintableString (SIZE (1..150,...))
MMEPagingTarget ::= CHOICE {
    global-ENB-ID
                        Global-ENB-ID,
    tAI
                        TAI,
    . . .
MMERelaySupportIndicator ::= ENUMERATED {true, ...}
MME-Group-ID
               ::= OCTET STRING (SIZE (2))
MME-Code
                ::= OCTET STRING (SIZE (1))
MME-UE-S1AP-ID ::= INTEGER (0..4294967295)
M-TMSI
                ::= OCTET STRING (SIZE (4))
MSClassmark2
               ::= OCTET STRING
MSClassmark3
                ::= OCTET STRING
MutingAvailabilityIndication ::= ENUMERATED {
    available,
    unavailable,
    . . .
MutingPatternInformation ::= SEQUENCE {
```

```
muting-pattern-period
                                        ENUMERATED {ms0, ms1280, ms2560, ms5120, ms10240, ...},
    muting-pattern-offset
                                        INTEGER (0..10239, ...)
                                                                    OPTIONAL,
    iE-Extensions
                                        ProtocolExtensionContainer { {MutingPatternInformation-ExtIEs} } OPTIONAL,
MutingPatternInformation-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
MDT-ConfigurationNR ::= OCTET STRING
-- N
NAS-PDU ::= OCTET STRING
NASSecurityParametersfromE-UTRAN ::= OCTET STRING
NASSecurityParameterstoE-UTRAN ::= OCTET STRING
NB-IoT-DefaultPagingDRX ::= ENUMERATED {
    v128,
    v256,
    v512,
    v1024,
NB-IOT-PagingDRX ::= ENUMERATED { v32, v64, v128, v256, v512, v1024,...}
NB-IoT-Paging-eDRXInformation ::= SEQUENCE {
    nB-IoT-paging-eDRX-Cycle
                                   NB-IoT-Paging-eDRX-Cycle,
    nB-IoT-pagingTimeWindow
                                   NB-IoT-PagingTimeWindow
                                                                    OPTIONAL,
    iE-Extensions
                                    ProtocolExtensionContainer { { NB-IoT-Paging-eDRXInformation-ExtIEs} } OPTIONAL,
NB-IoT-Paging-eDRXInformation-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
NB-IoT-Paging-eDRX-Cycle ::= ENUMERATED{hf2, hf4, hf6, hf8, hf10, hf12, hf14, hf16, hf32, hf64, hf128, hf256, hf512, hf1024, ...}
NB-IoT-PagingTimeWindow ::= ENUMERATED{s1, s2, s3, s4, s5, s6, s7, s8, s9, s10, s11, s12, s13, s14, s15, s16, ...}
NB-IoT-RLF-Report-Container ::= OCTET STRING
NB-IoT-UEIdentityIndexValue ::= BIT STRING (SIZE (12))
NextPagingAreaScope ::= ENUMERATED {
    same,
    changed,
```

```
NotifySourceeNB ::= ENUMERATED {
    notifySource,
NRCellIdentity ::= BIT STRING (SIZE(36))
NR-CGI ::= SEQUENCE {
                        PLMNidentity,
    pLMNIdentity
    nRCellIdentity
                        NRCellIdentity,
                        ProtocolExtensionContainer { {NR-CGI-ExtIEs} } OPTIONAL,
    iE-Extensions
NR-CGI-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
NRencryptionAlgorithms ::= BIT STRING (SIZE (16,...))
NRintegrityProtectionAlgorithms ::= BIT STRING (SIZE (16,...))
NRrestrictioninEPSasSecondaryRAT ::= ENUMERATED {
    nRrestrictedinEPSasSecondaryRAT,
    . . .
NRrestrictionin5GS ::= ENUMERATED {
    nRrestrictedin5GS,
    . . .
NRUESecurityCapabilities ::= SEQUENCE {
                                        NRencryptionAlgorithms,
    nRencryptionAlgorithms
    nRintegrityProtectionAlgorithms
                                        NRintegrityProtectionAlgorithms,
    iE-Extensions
                                        ProtocolExtensionContainer { { NRUESecurityCapabilities-ExtIEs} } OPTIONAL,
NRUESecurityCapabilities-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
NumberofBroadcastRequest ::= INTEGER (0..65535)
NumberOfBroadcasts ::= INTEGER (0..65535)
NRV2XServicesAuthorized ::= SEQUENCE {
    vehicleUE
                        VehicleUE
                                                             OPTIONAL,
    pedestrianUE
                        PedestrianUE
                                                                 OPTIONAL,
    iE-Extensions
                        ProtocolExtensionContainer { {NRV2XServicesAuthorized-ExtIEs} } OPTIONAL,
```

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```
NRV2XServicesAuthorized-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
NRUESidelinkAggregateMaximumBitrate ::= SEOUENCE {
    uEaggregateMaximumBitRate
                                    BitRate,
    iE-Extensions
                                    ProtocolExtensionContainer { {NRUESidelinkAggregateMaximumBitrate-ExtIEs} } OPTIONAL,
NRUESidelinkAggregateMaximumBitrate-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
-- 0
OldBSS-ToNewBSS-Information
                                ::= OCTET STRING
-- This is a dummy IE used only as a reference to the actual definition in relevant specification.
OverloadAction ::= ENUMERATED {
    reject-non-emergency-mo-dt,
    reject-rrc-cr-signalling,
    permit-emergency-sessions-and-mobile-terminated-services-only,
    permit-high-priority-sessions-and-mobile-terminated-services-only,
    reject-delay-tolerant-access,
    permit-high-priority-sessions-and-exception-reporting-and-mobile-terminated-services-only,
    not-accept-mo-data-or-delay-tolerant-access-from-CP-CIoT
OverloadResponse ::= CHOICE {
    overloadAction
                                    OverloadAction,
Packet-LossRate ::= INTEGER(0..1000)
PagingAttemptInformation ::= SEQUENCE {
    pagingAttemptCount
                                        PagingAttemptCount,
    intendedNumberOfPagingAttempts
                                        IntendedNumberOfPagingAttempts,
    nextPagingAreaScope
                                        NextPagingAreaScope
                                                                OPTIONAL,
                                        ProtocolExtensionContainer { { PagingAttemptInformation-ExtIEs} } OPTIONAL,
    iE-Extensions
    . . .
PagingAttemptInformation-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
PagingAttemptCount ::= INTEGER (1..16, ...)
```

```
Paging-eDRXInformation ::= SEQUENCE {
    paging-eDRX-Cycle
                                Paging-eDRX-Cycle,
    pagingTimeWindow
                                PagingTimeWindow
                                                            OPTIONAL,
    iE-Extensions
                                ProtocolExtensionContainer { { Paging-eDRXInformation-ExtIEs} } OPTIONAL,
Paging-eDRXInformation-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
Paging-eDRX-Cycle ::= ENUMERATED{hfhalf, hf1, hf2, hf4, hf6, hf8, hf10, hf12, hf14, hf16, hf32, hf64, hf128, hf256, ...}
PagingTimeWindow ::= ENUMERATED[s1, s2, s3, s4, s5, s6, s7, s8, s9, s10, s11, s12, s13, s14, s15, s16, ...]
PagingDRX ::= ENUMERATED {
    v32,
    v64,
    v128,
   v256,
    . . .
PagingPriority ::= ENUMERATED {
    priolevel1,
    priolevel2,
    priolevel3,
    priolevel4,
    priolevel5,
    priolevel6,
    priolevel7,
    priolevel8,
    . . .
PagingProbabilityInformation ::= ENUMERATED {p00, p05, p10, p15, p20, p25, p30, p35, p40, p45, p50, p55, p60, p65, p70, p75, p80, p85, p90, p95,
p100, ...}
PC50oSParameters ::= SEOUENCE {
                                PC5QoSFlowList,
    pc5QoSFlowList
    pc5LinkAggregatedBitRates BitRate
                                                     OPTIONAL,
    iE-Extensions
                        ProtocolExtensionContainer { { PC5QoSParameters-ExtIEs} }
                                                                                     OPTIONAL,
PC5QoSParameters-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
PC5QoSFlowList ::= SEQUENCE (SIZE(1..maxnoofPC5QoSFlows)) OF PC5QoSFlowItem
PC5QoSFlowItem::= SEQUENCE {
    IQq
                                FiveQI,
```

```
pc5FlowBitRates
                                PC5FlowBitRates
                                                            OPTIONAL,
    range
                                Range
                                                            OPTIONAL,
    iE-Extensions
                        ProtocolExtensionContainer { { PC50oSFlowItem-ExtIEs} } OPTIONAL,
PC5OoSFlowItem-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
PC5FlowBitRates ::= SEQUENCE {
    guaranteedFlowBitRate
                                BitRate,
    maximumFlowBitRate
                                BitRate,
    iE-Extensions
                        ProtocolExtensionContainer { { PC5FlowBitRates-ExtIEs} }
                                                                                     OPTIONAL,
PC5FlowBitRates-ExtIEs S1AP-PROTOCOL-EXTENSION ::=
PDCP-SN ::= INTEGER (0..4095)
PDCP-SNExtended ::= INTEGER (0..32767)
PDCP-SNlength18 ::= INTEGER (0..262143)
PendingDataIndication ::= ENUMERATED {
    true,
    . . .
M1PeriodicReporting ::= SEQUENCE {
    reportInterval
                                ReportIntervalMDT,
    reportAmount
                                ReportAmountMDT,
                                ProtocolExtensionContainer { { MlPeriodicReporting-ExtIEs} } OPTIONAL,
    iE-Extensions
MlPeriodicReporting-ExtIEs SlAP-PROTOCOL-EXTENSION ::= {
PLMNidentity
                            ::= TBCD-STRING
PLMNAreaBasedQMC ::= SEQUENCE {
    plmnListforQMC
                        PLMNListforOMC,
                        ProtocolExtensionContainer { {PLMNAreaBasedQMC-ExtIEs} } OPTIONAL,
    iE-Extensions
PLMNAreaBasedQMC-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
```

```
PLMNListforQMC ::= SEQUENCE (SIZE(1..maxnoofPLMNforQMC)) OF PLMNidentity
Port-Number
                ::= OCTET STRING (SIZE (2))
Pre-emptionCapability ::= ENUMERATED {
    shall-not-trigger-pre-emption,
    may-trigger-pre-emption
Pre-emptionVulnerability ::= ENUMERATED {
    not-pre-emptable,
    pre-emptable
PriorityLevel
                            ::= INTEGER { spare (0), highest (1), lowest (14), no-priority (15) } (0..15)
ProSeAuthorized ::= SEOUENCE {
                                ProSeDirectDiscovery
                                                                                         OPTIONAL,
    proSeDirectDiscovery
    proSeDirectCommunication
                                ProSeDirectCommunication
                                                                                         OPTIONAL,
    iE-Extensions
                                ProtocolExtensionContainer { {ProSeAuthorized-ExtIEs} } OPTIONAL,
ProSeAuthorized-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    { ID id-ProSeUEtoNetworkRelaying
                                       CRITICALITY ignore EXTENSION ProSeUEtoNetworkRelaying
                                                                                                 PRESENCE optional },
    . . .
ProSeDirectDiscovery ::= ENUMERATED {
    authorized.
    not-authorized,
    . . .
ProSeUEtoNetworkRelaying ::= ENUMERATED {
    authorized,
    not-authorized,
ProSeDirectCommunication ::= ENUMERATED {
    authorized,
    not-authorized,
    . . .
PS-ServiceNotAvailable ::= ENUMERATED {
    ps-service-not-available,
    . . .
PSCellInformation ::= SEQUENCE
    nCGI
                                NR-CGI,
```

```
ProtocolExtensionContainer { { PSCellInformation-ExtIEs} } OPTIONAL,
    iE-Extensions
PSCellInformation-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
-- Q
QCI
                       ::= INTEGER (0..255)
-- R
RAN-UE-NGAP-ID ::= INTEGER (0..4294967295)
Range ::= ENUMERATED {m50, m80, m180, m200, m350, m400, m500, m700, m1000, ...}
ReceiveStatusofULPDCPSDUs ::= BIT STRING (SIZE(4096))
ReceiveStatusOfULPDCPSDUsExtended ::= BIT STRING (SIZE(1..16384))
ReceiveStatusOfULPDCPSDUsPDCP-SNlength18 ::= BIT STRING (SIZE(1..131072))
RecommendedCellsForPaging ::= SEQUENCE {
    recommendedCellList
                                RecommendedCellList,
                                ProtocolExtensionContainer { { RecommendedCellsForPaging-ExtIEs} } OPTIONAL,
    iE-Extensions
RecommendedCellsForPaging-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
RecommendedCellList ::= SEQUENCE (SIZE(1.. maxnoofRecommendedCells)) OF ProtocolIE-SingleContainer { { RecommendedCellItemIEs } }
RecommendedCellItemIEs S1AP-PROTOCOL-IES ::= {
    { ID id-RecommendedCellItem CRITICALITY ignore TYPE RecommendedCellItem
                                                                                    PRESENCE mandatory },
RecommendedCellItem::= SEQUENCE {
    eUTRAN-CGI
                            EUTRAN-CGI,
    timeStayedInCell
                           INTEGER (0..4095)
                                                    OPTIONAL,
                           ProtocolExtensionContainer { { RecommendedCellsForPagingItem-ExtIEs} } OPTIONAL,
    iE-Extensions
RecommendedCellsForPagingItem-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
RecommendedENBsForPaging ::= SEQUENCE {
    recommendedENBList
                           RecommendedENBList,
```

```
ProtocolExtensionContainer { { RecommendedENBsForPaging-ExtIEs} }
    iE-Extensions
RecommendedENBsForPaging-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
RecommendedENBList::= SEQUENCE (SIZE(1.. maxnoofRecommendedENBs)) OF ProtocolIE-SingleContainer { { RecommendedENBItemIEs } }
RecommendedENBItemIEs S1AP-PROTOCOL-IES ::= {
    PRESENCE mandatory },
    . . .
RecommendedENBItem ::= SEQUENCE {
   mMEPagingTarget
                          MMEPagingTarget,
                          ProtocolExtensionContainer { { RecommendedENBItem-ExtIEs} } OPTIONAL,
   iE-Extensions
    . . .
RecommendedENBItem-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
RelativeMMECapacity
                              ::= INTEGER (0..255)
RelayNode-Indicator ::= ENUMERATED {
    true,
RAC
                  ::= OCTET STRING (SIZE (1))
RAT-Type ::= ENUMERATED {
   nbiot,
ReportAmountMDT ::= ENUMERATED{r1, r2, r4, r8, r16, r32, r64, rinfinity}
ReportIntervalMDT ::= ENUMERATED {ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240, min1, min6, min12, min30, min60}
MlReportingTrigger ::= ENUMERATED{
    periodic,
    a2eventtriggered,
    a2eventtriggered-periodic
RequestType ::= SEQUENCE {
    eventType
                          EventType,
   reportArea
                          ReportArea,
                          ProtocolExtensionContainer { { RequestType-ExtIEs} }
   iE-Extensions
                                                                                OPTIONAL,
```

```
RequestType-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
   . . .
RequestTypeAdditionalInfo ::= ENUMERATED {
   includePSCell,
   . . .
RIMTransfer ::= SEQUENCE {
   rIMInformation
                         RIMInformation,
   rIMRoutingAddress
                         RIMRoutingAddress
                                               OPTIONAL,
                         ProtocolExtensionContainer { { RIMTransfer-ExtIEs} }
   iE-Extensions
                                                                            OPTIONAL,
    . . .
RIMTransfer-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
RIMInformation ::= OCTET STRING
RIMRoutingAddress ::= CHOICE {
   qERAN-Cell-ID
                         GERAN-Cell-ID,
   targetRNC-ID
                         TargetRNC-ID,
                         OCTET STRING (SIZE(16))
   eHRPD-Sector-ID
ReportArea ::= ENUMERATED {
   ecgi,
RepetitionPeriod ::= INTEGER (0..4095)
RLFReportInformation ::= SEQUENCE {
   uE-RLF-Report-Container
                                               UE-RLF-Report-Container,
   uE-RLF-Report-Container-for-extended-bands
                                               UE-RLF-Report-Container-for-extended-bands OPTIONAL,
                                               ProtocolExtensionContainer {{ RLFReportInformation-ExtIEs}} OPTIONAL,
   iE-Extensions
RLFReportInformation-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    {ID id-NB-IoT-RLF-Report-Container
                                        CRITICALITY ignore EXTENSION NB-IOT-RLF-Report-Container PRESENCE optional \},
RNC-ID ::= INTEGER (0..4095)
```

```
RRC-Container ::= OCTET STRING
RRC-Establishment-Cause ::= ENUMERATED {
    emergency,
   highPriorityAccess,
   mt-Access,
   mo-Signalling,
   mo-Data,
    delay-TolerantAccess,
   mo-VoiceCall,
   mo-ExceptionData
ECGIListForRestart ::= SEOUENCE (SIZE(1..maxnoofCellsforRestart)) OF EUTRAN-CGI
Routing-ID ::= INTEGER (0..255)
-- S
SecurityKey ::= BIT STRING (SIZE(256))
SecurityContext ::= SEQUENCE {
    nextHopChainingCount
                              INTEGER (0..7),
   nextHopParameter
                              SecurityKey,
   iE-Extensions
                              ProtocolExtensionContainer { { SecurityContext-ExtIEs} }
                                                                                       OPTIONAL,
SecurityContext-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
SecondaryRATType ::= ENUMERATED {
   nR,
    unlicensed
SecondaryRATDataUsageRequest ::= ENUMERATED {
   requested,
    . . .
SecondaryRATDataUsageReportList ::= SEQUENCE (SIZE(1.. maxnoofE-RABs)) OF ProtocolIE-SingleContainer { {SecondaryRATDataUsageReportItemIEs} }
SecondaryRATDataUsageReportItemIEs S1AP-PROTOCOL-IES ::= {
    TYPE SecondaryRATDataUsageReportItem PRESENCE mandatory },
```

```
SecondaryRATDataUsageReportItem ::= SEQUENCE {
    e-RAB-ID
                                E-RAB-ID,
    secondaryRATType
                                SecondaryRATType,
    e-RABUsageReportList
                                E-RABUsageReportList,
    iE-Extensions
                                ProtocolExtensionContainer { { SecondaryRATDataUsageReportItem-ExtIEs} } OPTIONAL,
SecondaryRATDataUsageReportItem-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
SerialNumber ::= BIT STRING (SIZE (16))
ServiceType ::= ENUMERATED{
    qMC-for-streaming-service,
    qMC-for-MTSI-service,
SONInformation ::= CHOICE{
    sONInformationRequest
                                SONInformationRequest,
    sONInformationReply
                                SONInformationReply,
    sONInformation-Extension
                                SONInformation-Extension
SONInformation-Extension ::= ProtocolIE-SingleContainer {{ SONInformation-ExtensionIE }}
SONInformation-ExtensionIE S1AP-PROTOCOL-IES ::= {
    { ID id-SON-Information-Report CRITICALITY ignore TYPE SONInformationReport PRESENCE mandatory}
SONInformationRequest ::= ENUMERATED {
    x2TNL-Configuration-Info,
    time-Synchronisation-Info,
    activate-Muting,
    deactivate-Muting}
SONInformationReply ::= SEQUENCE {
    x2TNLConfigurationInfo
                                    X2TNLConfigurationInfo
                                    ProtocolExtensionContainer {{SONInformationReply-ExtIEs}} OPTIONAL,
    iE-Extensions
    . . .
SONInformationReply-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
-- Extension for Release 9 to transfer Time synchronisation information --
    {ID id-Time-Synchronisation-Info
                                            CRITICALITY ignore EXTENSION TimeSynchronisationInfo
                                                                                                     PRESENCE optional },
    {ID id-Muting-Pattern-Information
                                            CRITICALITY ignore EXTENSION MutingPatternInformation
                                                                                                     PRESENCE optional }
```

```
SONInformationReport ::= CHOICE
    rLFReportInformation
                                RLFReportInformation,
SONConfigurationTransfer ::= SEQUENCE {
    targeteNB-ID
                                    TargeteNB-ID,
                                    SourceeNB-ID,
    sourceeNB-ID
                                    SONInformation,
    sONInformation
    iE-Extensions
                            ProtocolExtensionContainer { { SONConfigurationTransfer-ExtIEs} }
                                                                                                     OPTIONAL,
SONConfigurationTransfer-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
-- Extension for Release 10 to transfer the IP addresses of the eNB initiating the ANR action --
    {ID id-x2TNLConfigurationInfo
                                        CRITICALITY ignore EXTENSION X2TNLConfigurationInfo
                                                                                                        PRESENCE conditional
    -- This IE shall be present if the SON Information IE contains the SON Information Request IE and the SON Information Request IE is set to
"X2TNL Configuration Info" --}
-- Extension for Release 12 to transfer information concerning the source cell of synchronisation and the aggressor cell --
    {ID id-Synchronisation-Information CRITICALITY ignore EXTENSION SynchronisationInformation
                                                                                                        PRESENCE conditional
    -- This IE shall be present if the SON Information IE contains the SON Information Request IE set to "Activate Muting " -- },
    . . .
SynchronisationInformation ::= SEOUENCE {
    sourceStratumLevel
                                    StratumLevel
                                                                OPTIONAL,
    listeningSubframePattern
                                    ListeningSubframePattern
                                                                OPTIONAL,
    aggressoreCGI-List
                                    ECGI-List
                                                                OPTIONAL,
    iE-Extensions
                                    ProtocolExtensionContainer { {SynchronisationInformation-ExtIEs} } OPTIONAL,
    . . .
SynchronisationInformation-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
Source-ToTarget-TransparentContainer ::= OCTET STRING
-- This IE includes a transparent container from the source RAN node to the target RAN node.
-- The octets of the OCTET STRING are encoded according to the specifications of the target system.
SourceBSS-ToTargetBSS-TransparentContainer
                                                ::= OCTET STRING
-- This is a dummy IE used only as a reference to the actual definition in relevant specification.
SourceeNB-ID ::= SEQUENCE {
    global-ENB-ID
                   Global-ENB-ID,
    selected-TAI
    iE-Extensions ProtocolExtensionContainer { {SourceeNB-ID-ExtIEs} } OPTIONAL
SourceeNB-ID-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
```

```
SRVCCOperationNotPossible ::= ENUMERATED {
    not.Possible.
SRVCCOperationPossible ::= ENUMERATED {
    possible,
SRVCCHOIndication ::= ENUMERATED {
   pSandCS,
    cSonly,
    . . .
SourceNodeID ::= CHOICE {
    sourceNgRanNode-ID
                            SourceNgRanNode-ID,
    sourceNodeID-Extension
                                    SourceNodeID-Extension
SourceNodeID-Extension ::= ProtocolIE-SingleContainer {{ SourceNodeID-ExtensionIE }}
SourceNodeID-ExtensionIE S1AP-PROTOCOL-IES ::= {
SourceeNB-ToTargeteNB-TransparentContainer
                                                ::= SEOUENCE {
    rRC-Container
                                RRC-Container,
    e-RABInformationList
                                E-RABInformationList
                                                                 OPTIONAL,
    targetCell-ID
                                EUTRAN-CGI,
                                SubscriberProfileIDforRFP
    subscriberProfileIDforRFP
                                                                 OPTIONAL.
    uE-HistoryInformation
                                UE-HistoryInformation,
    iE-Extensions
                                ProtocolExtensionContainer { {SourceeNB-ToTargeteNB-TransparentContainer-ExtIEs} } OPTIONAL,
    . . .
SourceeNB-ToTargeteNB-TransparentContainer-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    {ID id-MobilityInformation
                                                CRITICALITY ignore EXTENSION MobilityInformation
                                                                                                                  PRESENCE optional }
    {ID id-uE-HistoryInformationFromTheUE
                                                CRITICALITY ignore EXTENSION UE-HistoryInformationFromTheUE
                                                                                                                  PRESENCE optional}
    {ID id-IMSvoiceEPSfallbackfrom5G
                                                CRITICALITY ignore EXTENSION IMSvoiceEPSfallbackfrom5G
                                                                                                                  PRESENCE optional }
    {ID id-AdditionalRRMPriorityIndex
                                                CRITICALITY ignore EXTENSION Additional RRMPriorityIndex
                                                                                                                     PRESENCE optional }
    {ID id-ContextatSource
                                                CRITICALITY ignore EXTENSION ContextatSource
                                                                                                                  PRESENCE optional } |
    {ID id-IntersystemMeasurementConfiguration CRITICALITY ignore EXTENSION IntersystemMeasurementConfiguration PRESENCE optional}
                                                                                                                        PRESENCE optional },
    {ID id-SourceNodeID
                                                CRITICALITY ignore EXTENSION SourceNodeID
    . . .
SourceNgRanNode-ID ::= SEQUENCE {
    global-RAN-NODE-ID
                            Global-RAN-NODE-ID,
    selected-TAI
                        FiveGSTAI,
```

```
ProtocolExtensionContainer { { SourceNqRanNode-ID-ExtIEs} } OPTIONAL,
    iE-Extensions
SourceNgRanNode-ID-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
SourceRNC-ToTargetRNC-TransparentContainer
                                                ::= OCTET STRING
-- This is a dummy IE used only as a reference to the actual definition in relevant specification.
SourceNgRanNode-ToTargetNgRanNode-TransparentContainer
                                                            ::= OCTET STRING
-- This is a dummy IE used only as a reference to the actual definition in relevant specification.
ServedGUMMEIs ::= SEQUENCE (SIZE (1.. maxnoofRATs)) OF ServedGUMMEIsItem
ServedGUMMEIsItem ::= SEQUENCE {
    servedPLMNs
                            ServedPLMNs,
    servedGroupIDs
                            ServedGroupIDs,
    servedMMECs
                            ServedMMECs,
    iE-Extensions
                            ProtocolExtensionContainer { {ServedGUMMEIsItem-ExtIEs} } OPTIONAL,
ServedGUMMEIsItem-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    {ID id-GUMMEIType
                           CRITICALITY ignore EXTENSION GUMMEIType
                                                                            PRESENCE optional },
    . . .
ServedGroupIDs ::= SEQUENCE (SIZE(1.. maxnoofGroupIDs)) OF MME-Group-ID
ServedMMECs ::= SEQUENCE (SIZE(1.. maxnoofMMECs)) OF MME-Code
ServedPLMNs ::= SEQUENCE (SIZE(1.. maxnoofPLMNsPerMME)) OF PLMNidentity
SubscriberProfileIDforRFP ::= INTEGER (1..256)
Subscription-Based-UE-DifferentiationInfo ::= SEQUENCE {
    periodicCommunicationIndicator ENUMERATED {periodically, ondemand, ...}
                                                                                OPTIONAL,
    periodicTime
                                        INTEGER (1..3600, ...)
                                                                                    OPTIONAL,
    scheduledCommunicationTime
                                    ScheduledCommunicationTime
                                                                                OPTIONAL,
    stationaryIndication
                                        ENUMERATED {stationary, mobile, ...}
                                                                                        OPTIONAL,
    trafficProfile
                                    ENUMERATED {single-packet, dual-packets, multiple-packets, ...}
                                                                                                           OPTIONAL.
    batteryIndication
                                    ENUMERATED {battery-powered, battery-powered-not-rechargeable-or-replaceable, not-battery-powered, ...}
    OPTIONAL,
                                    ProtocolExtensionContainer { { Subscription-Based-UE-DifferentiationInfo-ExtIEs} } OPTIONAL.
    iE-Extensions
Subscription-Based-UE-DifferentiationInfo-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
ScheduledCommunicationTime ::= SEQUENCE {
    dayofWeek
                           BIT STRING (SIZE(7))
                                                                                    OPTIONAL,
```

```
timeofDayStart
                           INTEGER (0..86399, ...)
                                                                                    OPTIONAL,
    timeofDayEnd
                               INTEGER (0..86399, ...)
                                                                                        OPTIONAL,
    iE-Extensions
                           ProtocolExtensionContainer { { ScheduledCommunicationTime-ExtIEs}} OPTIONAL,
ScheduledCommunicationTime-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
SupportedTAs ::= SEQUENCE (SIZE(1.. maxnoofTACs)) OF SupportedTAs-Item
SupportedTAs-Item ::= SEQUENCE {
    t.AC
                       TAC,
    broadcastPLMNs
                        BPLMNs,
    iE-Extensions
                        ProtocolExtensionContainer { {SupportedTAs-Item-ExtIEs} } OPTIONAL,
SupportedTAs-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    -- Extension for Release 13 to transfer RAT-Type per TAC --
   {ID id-RAT-Type
                     CRITICALITY reject EXTENSION RAT-Type
                                                                    PRESENCE optional },
StratumLevel ::= INTEGER (0..3, ...)
SynchronisationStatus ::= ENUMERATED { synchronous, asynchronous, ... }
TimeSynchronisationInfo ::= SEQUENCE {
    stratumLevel
                                    StratumLevel,
                                    SynchronisationStatus,
    synchronisationStatus
   iE-Extensions
                                    ProtocolExtensionContainer { { TimeSynchronisationInfo-ExtIEs} } OPTIONAL,
TimeSynchronisationInfo-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    -- Extension for Release 12 to transfer Muting Availability Indication --
    {ID id-Muting-Availability-Indication
                                               CRITICALITY ignore EXTENSION MutingAvailabilityIndication PRESENCE optional },
    . . .
S-TMSI ::= SEQUENCE {
   mMEC MME-Code,
   m-TMSI M-TMSI,
                       ProtocolExtensionContainer { {S-TMSI-ExtIEs} } OPTIONAL,
   iE-Extensions
S-TMSI-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
-- T
```

```
TAC ::= OCTET STRING (SIZE (2))
TAIBasedMDT ::= SEQUENCE {
    tAIListforMDT
                           TAIListforMDT.
                           ProtocolExtensionContainer { {TAIBasedMDT-ExtIEs} } OPTIONAL,
    iE-Extensions
TAIBasedMDT-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
TAIListforMDT ::= SEQUENCE (SIZE(1..maxnoofTAforMDT)) OF TAI
TAIListforWarning ::= SEQUENCE (SIZE(1..maxnoofTAIforWarning)) OF TAI
TAI ::= SEOUENCE {
                           PLMNidentity,
    pLMNidentity
   iE-Extensions
                           ProtocolExtensionContainer { {TAI-ExtIEs} } OPTIONAL,
TAI-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
TAI-Broadcast ::= SEQUENCE (SIZE(1..maxnoofTAIforWarning)) OF TAI-Broadcast-Item
TAI-Broadcast-Item ::= SEQUENCE {
    completedCellinTAI CompletedCellinTAI,
                       ProtocolExtensionContainer { {TAI-Broadcast-Item-ExtIEs} } OPTIONAL,
    iE-Extensions
TAI-Broadcast-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
TAI-Cancelled ::= SEQUENCE (SIZE(1..maxnoofTAIforWarning)) OF TAI-Cancelled-Item
TAI-Cancelled-Item ::= SEQUENCE {
    cancelledCellinTAI CancelledCellinTAI,
    iE-Extensions ProtocolExtensionContainer { {TAI-Cancelled-Item-ExtIEs} } OPTIONAL,
TAI-Cancelled-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    . . .
```

```
TABasedMDT ::= SEQUENCE {
    tAListforMDT
                        TAListforMDT,
    iE-Extensions
                        ProtocolExtensionContainer { {TABasedMDT-ExtIEs} } OPTIONAL,
TABasedMDT-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
TAListforMDT ::= SEQUENCE (SIZE(1..maxnoofTAforMDT)) OF TAC
TABasedQMC ::= SEQUENCE {
    tAListforOMC
                        TAListforQMC,
    iE-Extensions
                        ProtocolExtensionContainer { {TABasedQMC-ExtIEs} } OPTIONAL,
TABasedOMC-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
TAListforQMC ::= SEQUENCE (SIZE(1..maxnoofTAforQMC)) OF TAC
TAIBasedQMC ::= SEQUENCE {
    tAIListforOMC
                        TAIListforQMC,
                        ProtocolExtensionContainer { {TAIBasedOMC-ExtIEs} } OPTIONAL,
    iE-Extensions
TAIBasedQMC-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
TAIListforQMC ::= SEQUENCE (SIZE(1..maxnoofTAforQMC)) OF TAI
CompletedCellinTAI ::= SEQUENCE (SIZE(1..maxnoofCellinTAI)) OF CompletedCellinTAI-Item
CompletedCellinTAI-Item ::= SEQUENCE{
    eCGI
                        EUTRAN-CGI,
                        ProtocolExtensionContainer { {CompletedCellinTAI-Item-ExtIEs} } OPTIONAL,
    iE-Extensions
CompletedCellinTAI-Item-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
TBCD-STRING ::= OCTET STRING (SIZE (3))
TargetID ::= CHOICE {
    targeteNB-ID
                        TargeteNB-ID,
    targetRNC-ID
                        TargetRNC-ID,
    cGI
                        CGI,
```

```
targetgNgRanNode-ID
                           TargetNgRanNode-ID
TargeteNB-ID ::= SEQUENCE {
    global-ENB-ID
                        Global-ENB-ID,
    selected-TAI
                       TAI,
                       ProtocolExtensionContainer { {TargeteNB-ID-ExtIEs} } OPTIONAL,
    iE-Extensions
TargeteNB-ID-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
TargetRNC-ID ::= SEQUENCE {
    lai
    rAC
                       RAC
                                   OPTIONAL,
    rNC-ID
                       RNC-ID,
    extendedRNC-ID
                       ExtendedRNC-ID
                                           OPTIONAL,
    iE-Extensions
                      ProtocolExtensionContainer { {TargetRNC-ID-ExtIEs} } OPTIONAL,
TargetRNC-ID-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
TargetNgRanNode-ID ::= SEQUENCE {
    global-RAN-NODE-ID
                           Global-RAN-NODE-ID,
    selected-TAI
                   FiveGSTAI,
    iE-Extensions
                       ProtocolExtensionContainer { { TargetNgRanNode-ID-ExtIEs} } OPTIONAL,
TargetNgRanNode-ID-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
Global-RAN-NODE-ID::= CHOICE {
    qNB
               GNB,
              NG-eNB,
    ng-eNB
GNB ::= SEQUENCE {
    global-gNB-ID
                        Global-GNB-ID,
    iE-Extensions
                       ProtocolExtensionContainer { GNB-ExtIEs} } OPTIONAL,
GNB-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    . . .
```

```
Global-GNB-ID ::= SEQUENCE {
    pLMN-Identity
                       PLMNidentity,
                        GNB-Identity,
    qNB-ID
                       ProtocolExtensionContainer { { Global-GNB-ID-ExtIEs} } OPTIONAL,
    iE-Extensions
Global-GNB-ID-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
GNB-Identity ::= CHOICE {
    qNB-ID
              GNB-ID,
NG-eNB ::= SEOUENCE {
    global-ng-eNB-ID
                            Global-ENB-ID,
    iE-Extensions
                        ProtocolExtensionContainer { { NG-eNB-ExtIEs} } OPTIONAL,
NG-eNB-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
GNB-ID ::= BIT STRING (SIZE(22..32))
TargeteNB-ToSourceeNB-TransparentContainer
                                               ::= SEQUENCE {
   rRC-Container
                      RRC-Container,
    iE-Extensions
                       ProtocolExtensionContainer { {TargeteNB-ToSourceeNB-TransparentContainer-ExtIEs} } OPTIONAL,
TargeteNB-ToSourceeNB-TransparentContainer-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    { ID id-DAPSResponseInfoList
                                                       CRITICALITY reject EXTENSION DAPSResponseInfoList PRESENCE optional },
Target-ToSource-TransparentContainer ::= OCTET STRING
-- This IE includes a transparent container from the target RAN node to the source RAN node.
-- The octets of the OCTET STRING are coded according to the specifications of the target system.
TargetRNC-ToSourceRNC-TransparentContainer
                                                ::= OCTET STRING
-- This is a dummy IE used only as a reference to the actual definition in relevant specification.
TargetBSS-ToSourceBSS-TransparentContainer
                                                ::= OCTET STRING
-- This is a dummy IE used only as a reference to the actual definition in relevant specification.
TargetNgRanNode-ToSourceNgRanNode-TransparentContainer
-- This is a dummy IE used only as a reference to the actual definition in relevant specification.
```

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```
M1ThresholdEventA2 ::= SEQUENCE {
   measurementThreshold
                          MeasurementThresholdA2,
   iE-Extensions
                          ProtocolExtensionContainer { { MlThresholdEventA2-ExtIEs} } OPTIONAL,
M1ThresholdEventA2-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
Threshold-RSRP ::= INTEGER(0..97)
Threshold-RSRQ ::= INTEGER(0..34)
TimeToWait ::= ENUMERATED {v1s, v2s, v5s, v10s, v20s, v60s, ...}
Time-UE-StayedInCell ::= INTEGER (0..4095)
Time-UE-StayedInCell-EnhancedGranularity ::= INTEGER (0..40950)
TimeSinceSecondaryNodeRelease ::= OCTET STRING (SIZE(4))
TransportInformation ::= SEQUENCE {
   transportLayerAddress
                                      TransportLayerAddress,
   uL-GTP-TEID
                                      GTP-TEID,
    . . .
TransportLayerAddress
                          ::= BIT STRING (SIZE(1..160, ...))
TraceActivation ::= SEQUENCE {
   e-UTRAN-Trace-ID
                                      E-UTRAN-Trace-ID,
   interfacesToTrace
                                      InterfacesToTrace,
    traceDepth
                                      TraceDepth,
    traceCollectionEntityIPAddress
                                      TransportLayerAddress,
                                      ProtocolExtensionContainer { { TraceActivation-ExtIEs} } OPTIONAL,
   iE-Extensions
TraceActivation-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
-- Extension for Rel-10 to support MDT --
    PRESENCE optional }
-- Extension for Rel-15 to support QMC -
     ID id-UEAppLayerMeasConfig CRITICALITY ignore EXTENSION UEAppLayerMeasConfig
                                                                                        PRESENCE optional }
     ID id-MDTConfigurationNR
                                  CRITICALITY ignore EXTENSION MDT-ConfigurationNR
                                                                                       PRESENCE optional },
TraceDepth ::= ENUMERATED {
   minimum,
   medium,
   maximum,
   minimumWithoutVendorSpecificExtension,
   mediumWithoutVendorSpecificExtension,
```

```
maximumWithoutVendorSpecificExtension,
E-UTRAN-Trace-ID ::= OCTET STRING (SIZE (8))
TrafficLoadReductionIndication ::= INTEGER (1..99)
TunnelInformation ::= SEQUENCE {
    transportLayerAddress TransportLayerAddress,
    uDP-Port-Number
                            Port-Number
                                                OPTIONAL,
                            ProtocolExtensionContainer { {Tunnel-Information-ExtIEs} } OPTIONAL.
    iE-Extensions
Tunnel-Information-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
TypeOfError ::= ENUMERATED {
   not-understood,
   missing,
TAIListForRestart ::= SEQUENCE (SIZE(1..maxnoofRestartTAIs)) OF TAI
-- IJ
UEAggregateMaximumBitrate ::= SEQUENCE {
    uEaggregateMaximumBitRateDL
                                    BitRate,
    uEaggregateMaximumBitRateUL
                                    BitRate,
    iE-Extensions
                                    ProtocolExtensionContainer { {UEAggregate-MaximumBitrates-ExtIEs} } OPTIONAL,
    . . .
UEAggregate-MaximumBitrates-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
-- Extension for maximum bitrate > 10G bps --
     ID id-extended-uEaggregateMaximumBitRateDL
                                                   CRITICALITY ignore EXTENSION ExtendedBitRate PRESENCE optional |
    { ID id-extended-uEaggregateMaximumBitRateUL
                                                        CRITICALITY ignore EXTENSION ExtendedBitRate PRESENCE optional },
    . . .
UEAppLayerMeasConfig ::= SEQUENCE {
    containerForAppLayerMeasConfig
                                            OCTET STRING (SIZE(1..1000)),
    areaScopeOfQMC
                      AreaScopeOfQMC,
   iE-Extensions
                       ProtocolExtensionContainer { {UEAppLayerMeasConfig-ExtIEs} } OPTIONAL,
UEAppLayerMeasConfig-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    {ID id-serviceType CRITICALITY ignore EXTENSION ServiceType PRESENCE optional},
```

```
UECapabilityInfoRequest ::= ENUMERATED {
    requested,
UE-RetentionInformation ::= ENUMERATED {
    ues-retained,
    ...}
UE-S1AP-IDs ::= CHOICE{
    uE-S1AP-ID-pair
                        UE-S1AP-ID-pair,
    mME-UE-S1AP-ID
                       MME-UE-S1AP-ID,
UE-S1AP-ID-pair ::= SEOUENCE {
    mME-UE-S1AP-ID
                       MME-UE-S1AP-ID,
    eNB-UE-S1AP-ID
                        ENB-UE-S1AP-ID,
                        ProtocolExtensionContainer { {UE-SlAP-ID-pair-ExtIEs} } OPTIONAL,
    iE-Extensions
UE-S1AP-ID-pair-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
UE-associatedLogicalS1-ConnectionItem ::= SEQUENCE {
    mME-UE-S1AP-ID
                       MME-UE-S1AP-ID OPTIONAL,
    eNB-UE-S1AP-ID
                        ENB-UE-S1AP-ID OPTIONAL,
    iE-Extensions
                        ProtocolExtensionContainer { { UE-associatedLogicalS1-ConnectionItemExtIEs} } OPTIONAL,
UE-associatedLogicalS1-ConnectionItemExtIEs S1AP-PROTOCOL-EXTENSION ::= {
UEIdentityIndexValue
                      ::= BIT STRING (SIZE (10))
UE-HistoryInformation ::= SEQUENCE (SIZE(1..maxnoofCellsinUEHistoryInfo)) OF LastVisitedCell-Item
UE-HistoryInformationFromTheUE ::= OCTET STRING
-- This IE is a transparent container and shall be encoded as the VisitedCellInfoList field contained in the UEInformationResponse message as
defined in TS 36.331 [16]
UEPagingID ::= CHOICE {
    s-TMSI
                S-TMSI,
    iMSI
                IMSI,
UERadioCapability ::= OCTET STRING
```

```
UERadioCapabilityForPaging ::= OCTET STRING
UERadioCapabilityID ::= OCTET STRING
UE-RLF-Report-Container ::= OCTET STRING
-- This IE is a transparent container and shall be encoded as the rlf-Report-r9 field contained in the UEInformationResponse message as defined in
TS 36.331 [16]
UE-RLF-Report-Container-for-extended-bands ::= OCTET STRING
-- This IE is a transparent container and shall be encoded as the rlf-Report-v9e0 contained in the UEInformationResponse message as defined in TS
36.331 [16]
UESecurityCapabilities ::= SEQUENCE {
    encryptionAlgorithms
                                    EncryptionAlgorithms,
    integrityProtectionAlgorithms IntegrityProtectionAlgorithms,
                                    ProtocolExtensionContainer { { UESecurityCapabilities-ExtIEs} } OPTIONAL,
    iE-Extensions
}
UESecurityCapabilities-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
UESidelinkAggregateMaximumBitrate ::= SEQUENCE {
    uESidelinkAggregateMaximumBitRate
                                            BitRate,
    iE-Extensions
                                    ProtocolExtensionContainer { {UE-Sidelink-Aggregate-MaximumBitrates-ExtIEs} } OPTIONAL,
    . . .
UE-Sidelink-Aggregate-MaximumBitrates-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
UE-Usage-Type ::= INTEGER (0..255)
UL-CP-SecurityInformation ::= SEQUENCE {
    ul-NAS-MAC
                            UL-NAS-MAC,
    ul-NAS-Count
                            UL-NAS-Count,
    iE-Extensions
                            ProtocolExtensionContainer { { UL-CP-SecurityInformation-ExtIEs} } OPTIONAL,
UL-CP-SecurityInformation-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    . . .
UL-NAS-MAC ::= BIT STRING (SIZE (16))
UL-NAS-Count ::= BIT STRING (SIZE (5))
UnlicensedSpectrumRestriction ::= ENUMERATED {
    unlicensed-restricted,
    . . .
```

```
UserLocationInformation ::= SEQUENCE {
    eutran-cqi
                          EUTRAN-CGI,
    tai
    iE-Extensions
                          ProtocolExtensionContainer { { UserLocationInformation-ExtIEs} }
                                                                                          OPTIONAL,
UserLocationInformation-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
    PRESENCE optional },
UEUserPlaneCIoTSupportIndicator ::= ENUMERATED {
    supported,
UE-Application-Layer-Measurement-Capability ::= BIT STRING (SIZE (8))
-- First bit: QoE Measurement for streaming service
-- Second bit: OoE Measurement for MTSI service
-- Note that undefined bits are considered as a spare bit and spare bits shall be set to 0 by the transmitter and shall be ignored by the receiver.
-- V
VoiceSupportMatchIndicator ::= ENUMERATED {
    supported,
   not-supported,
    . . .
V2XServicesAuthorized ::= SEQUENCE {
    vehicleUE
                      VehicleUE
                                                                        OPTIONAL,
    pedestrianUE
                      PedestrianUE
                                                         OPTIONAL,
                      ProtocolExtensionContainer { {V2XServicesAuthorized-ExtIEs} }
    iE-Extensions
                                                                                   OPTIONAL,
V2XServicesAuthorized-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
VehicleUE ::= ENUMERATED {
    authorized,
   not-authorized,
PedestrianUE ::= ENUMERATED {
   authorized,
```

```
not-authorized,
WarningAreaCoordinates ::= OCTET STRING (SIZE(1..1024))
WarningAreaList ::= CHOICE {
                                    ECGIList,
    cellIDList
    trackingAreaListforWarning
                                    TAIListforWarning,
                                    EmergencyAreaIDList,
    emergencyAreaIDList
WarningType ::= OCTET STRING (SIZE (2))
WarningSecurityInfo ::= OCTET STRING (SIZE (50))
WarningMessageContents ::= OCTET STRING (SIZE(1..9600))
WLANMeasurementConfiguration ::= SEQUENCE {
    wlanMeasConfig
                               WLANMeasConfig,
    wlanMeasConfigNameList
                               WLANMeasConfigNameList
                                                                  OPTIONAL,
                               ENUMERATED {true, ...}
    wlan-rssi
                                                                 OPTIONAL,
    wlan-rtt
                               ENUMERATED {true, ...}
                                                                 OPTIONAL,
    iE-Extensions
                       ProtocolExtensionContainer { { WLANMeasurementConfiguration-ExtIEs } } OPTIONAL,
WLANMeasurementConfiguration-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
WLANMeasConfigNameList ::= SEQUENCE (SIZE(1..maxnoofWLANName)) OF WLANName
WLANMeasConfig::= ENUMERATED {setup,...}
WLANName ::= OCTET STRING (SIZE (1..32))
WUS-Assistance-Information ::= SEQUENCE {
    pagingProbabilityInformation
                                             PagingProbabilityInformation,
   iE-Extensions
                        ProtocolExtensionContainer { { WUS-Assistance-Information-ExtIEs } } OPTIONAL,
WUS-Assistance-Information-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
-- X
```

```
X2TNLConfigurationInfo ::= SEQUENCE {
    eNBX2TransportLayerAddresses
                                   ENBX2TLAs.
    iE-Extensions
                                    ProtocolExtensionContainer { { X2TNLConfigurationInfo-ExtIEs} } OPTIONAL,
    . . .
X2TNLConfigurationInfo-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
-- Extension for Release 10 to transfer the IPsec and U-plane addresses during ANR action --
    {ID id-eNBX2ExtendedTransportLayerAddresses
                                                   CRITICALITY ignore EXTENSION ENBX2ExtTLAS PRESENCE optional |
-- Extension for Release 12 to transfer the IP addresses of the X2 GW --
    {ID id-eNBIndirectX2TransportLayerAddresses CRITICALITY ignore EXTENSION ENBIndirectX2TransportLayerAddresses PRESENCE optional},
    . . .
ENBX2ExtTLAs ::= SEQUENCE (SIZE(1.. maxnoofeNBX2ExtTLAs)) OF ENBX2ExtTLA
ENBX2ExtTLA ::= SEQUENCE {
    iPsecTLA
                                TransportLayerAddress
                                                            OPTIONAL,
    gTPTLAa
                                ENBX2GTPTLAs
                                                            OPTIONAL,
    iE-Extensions
                                ProtocolExtensionContainer { { ENBX2ExtTLA-ExtIEs} } OPTIONAL,
ENBX2ExtTLA-ExtIEs S1AP-PROTOCOL-EXTENSION ::= {
ENBX2GTPTLAs ::= SEOUENCE (SIZE(1.. maxnoofeNBX2GTPTLAs)) OF TransportLayerAddress
ENBIndirectX2TransportLayerAddresses ::= SEQUENCE (SIZE(1..maxnoofeNBX2TLAs)) OF TransportLayerAddress
-- Y
-- Z
END
```

9.3.5 Common Definitions

```
-- Common definitions
S1AP-CommonDataTypes {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
eps-Access (21) modules (3) slap (1) version1 (1) slap-CommonDataTypes (3) }
DEFINITIONS AUTOMATIC TAGS ::=
BEGIN
              ::= ENUMERATED { reject, ignore, notify }
Criticality
              ::= ENUMERATED { optional, conditional, mandatory }
Presence
PrivateIE-ID ::= CHOICE {
   local
                     INTEGER (0..65535),
   qlobal
                     OBJECT IDENTIFIER
ProcedureCode
                ::= INTEGER (0..255)
ProtocolExtensionID ::= INTEGER (0..65535)
              ::= INTEGER (0..65535)
ProtocolIE-ID
TriggeringMessage ::= ENUMERATED { initiating-message, successful-outcome, unsuccessfull-outcome }
END
```

9.3.6 Constant Definitions

```
-- IE parameter types from other modules.
__ *******************
IMPORTS
   ProcedureCode,
   ProtocolIE-ID
FROM S1AP-CommonDataTypes;
    *****************
-- Elementary Procedures
id-HandoverPreparation
                                          ProcedureCode ::= 0
id-HandoverResourceAllocation
                                          ProcedureCode ::= 1
id-HandoverNotification
                                          ProcedureCode ::= 2
                                          ProcedureCode ::= 3
id-PathSwitchRequest
id-HandoverCancel
                                          ProcedureCode ::= 4
id-E-RABSetup
                                          ProcedureCode ::= 5
id-E-RABModify
                                          ProcedureCode ::= 6
id-E-RABRelease
                                          ProcedureCode ::= 7
id-E-RABReleaseIndication
                                          ProcedureCode ::= 8
id-InitialContextSetup
                                          ProcedureCode ::= 9
                                          ProcedureCode ::= 10
id-Paging
id-downlinkNASTransport
                                          ProcedureCode ::= 11
id-initialUEMessage
                                          ProcedureCode ::= 12
id-uplinkNASTransport
                                          ProcedureCode ::= 13
id-Reset
                                          ProcedureCode ::= 14
id-ErrorIndication
                                          ProcedureCode ::= 15
id-NASNonDelivervIndication
                                          ProcedureCode ::= 16
id-S1Setup
                                          ProcedureCode ::= 17
                                          ProcedureCode ::= 18
id-UEContextReleaseRequest
                                          ProcedureCode ::= 19
id-DownlinkS1cdma2000tunnelling
id-UplinkS1cdma2000tunnelling
                                          ProcedureCode ::= 20
id-UEContextModification
                                          ProcedureCode ::= 21
id-UECapabilityInfoIndication
                                          ProcedureCode ::= 22
id-UEContextRelease
                                          ProcedureCode ::= 23
id-eNBStatusTransfer
                                          ProcedureCode ::= 24
id-MMEStatusTransfer
                                          ProcedureCode ::= 25
id-DeactivateTrace
                                          ProcedureCode ::= 26
                                          ProcedureCode ::= 27
id-TraceStart
id-TraceFailureIndication
                                          ProcedureCode ::= 28
id-ENBConfigurationUpdate
                                          ProcedureCode ::= 29
id-MMEConfigurationUpdate
                                          ProcedureCode ::= 30
id-LocationReportingControl
                                          ProcedureCode ::= 31
id-LocationReportingFailureIndication
                                          ProcedureCode ::= 32
id-LocationReport
                                          ProcedureCode ::= 33
id-OverloadStart
                                          ProcedureCode ::= 34
id-OverloadStop
                                          ProcedureCode ::= 35
```

id-WriteReplaceWarning id-eNBDirectInformationTransfer id-MMEDirectInformationTransfer id-PrivateMessage id-eNBConfigurationTransfer id-MMEConfigurationTransfer id-CellTrafficTrace id-Kill id-downlinkUEAssociatedLPPaTransport id-uplinkUEAssociatedLPPaTransport id-downlinkNonUEAssociatedLPPaTransport id-uplinkNonUEAssociatedLPPaTransport id-UERadioCapabilityMatch id-PWSRestartIndication id-E-RABModificationIndication	ProcedureCode ::= 36 ProcedureCode ::= 37 ProcedureCode ::= 38 ProcedureCode ::= 39 ProcedureCode ::= 40 ProcedureCode ::= 41 ProcedureCode ::= 42 ProcedureCode ::= 43 ProcedureCode ::= 44 ProcedureCode ::= 45 ProcedureCode ::= 46 ProcedureCode ::= 46 ProcedureCode ::= 47 ProcedureCode ::= 48 ProcedureCode ::= 49 ProcedureCode ::= 50
<pre>id-PWSFailureIndication id-RerouteNASRequest id-UEContextModificationIndication</pre>	ProcedureCode ::= 51 ProcedureCode ::= 52 ProcedureCode ::= 53
<pre>id-ConnectionEstablishmentIndication id-UEContextSuspend id-UEContextResume id-NASDeliveryIndication id-RetrieveUEInformation id-UEInformationTransfer</pre>	ProcedureCode ::= 54 ProcedureCode ::= 55 ProcedureCode ::= 56 ProcedureCode ::= 57 ProcedureCode ::= 58 ProcedureCode ::= 59
<pre>id-eNBCPRelocationIndication id-MMECPRelocationIndication id-SecondaryRATDataUsageReport id-UERadioCapabilityIDMapping id-HandoverSuccess</pre>	ProcedureCode ::= 60 ProcedureCode ::= 61 ProcedureCode ::= 62 ProcedureCode ::= 63 ProcedureCode ::= 64
id-eNBEarlyStatusTransfer id-MMEEarlyStatusTransfer	ProcedureCode ::= 65 ProcedureCode ::= 66
***********************************	*********
********************	********
maxProtocolExtensions	INTEGER ::= 65535 INTEGER ::= 65535 INTEGER ::= 65535 **********************************
 Lists ****************************	*******
maxnoofE-RABs maxnoofTAIs maxnoofTACs maxnoofErrors maxnoofBPLMNs	INTEGER ::= 256 INTEGER ::= 256 INTEGER ::= 256 INTEGER ::= 256 INTEGER ::= 256 INTEGER ::= 6 INTEGER ::= 32

```
INTEGER ::= 15
maxnoofEPLMNs
maxnoofEPLMNsPlusOne
                                       INTEGER ::= 16
maxnoofForbLACs
                                       INTEGER ::= 4096
maxnoofForbTACs
                                       INTEGER ::= 4096
maxnoofIndividualS1ConnectionsToReset
                                       INTEGER ::= 256
maxnoofCellsinUEHistoryInfo
                                       INTEGER ::= 16
maxnoofCellsineNB
                                       INTEGER ::= 256
maxnoofTAIforWarning
                                       INTEGER ::= 65535
maxnoofCellID
                                       INTEGER ::= 65535
                                       INTEGER ::= 32
maxnoofDCNs
maxnoofEmergencyAreaID
                                       INTEGER ::= 65535
maxnoofCellinTAI
                                       INTEGER ::= 65535
maxnoofCellinEAI
                                       INTEGER ::= 65535
maxnoofeNBX2TLAs
                                       INTEGER ::= 2
maxnoofeNBX2ExtTLAs
                                       INTEGER ::= 16
maxnoofeNBX2GTPTLAs
                                       INTEGER ::= 16
                                       INTEGER ::= 8
maxnoofRATs
maxnoofGroupIDs
                                       INTEGER ::= 65535
maxnoofMMECs
                                       INTEGER ::= 256
maxnoofCellIDforMDT
                                       INTEGER ::= 32
maxnoofTAforMDT
                                       INTEGER ::= 8
maxnoofMDTPLMNs
                                       INTEGER ::= 16
maxnoofCellsforRestart
                                       INTEGER ::= 256
maxnoofRestartTAIs
                                       INTEGER ::= 2048
                                       INTEGER ::= 256
maxnoofRestartEmergencyAreaIDs
maxEARFCN
                                       INTEGER ::= 262143
maxnoofMBSFNAreaMDT
                                       INTEGER ::= 8
maxnoofRecommendedCells
                                       INTEGER ::= 16
maxnoofRecommendedENBs
                                       INTEGER ::= 16
maxnooftimeperiods
                                       INTEGER ::= 2
maxnoofCellIDforOMC
                                       INTEGER ::= 32
maxnoofTAforQMC
                                       INTEGER ::= 8
maxnoofPLMNforOMC
                                       INTEGER ::= 16
maxnoofBluetoothName
                                       INTEGER ::= 4
maxnoofWLANName
                                       INTEGER ::= 4
maxnoofConnectedengNBs
                                       INTEGER ::= 256
maxnoofPC5QoSFlows
                                       INTEGER ::= 2048
                                       INTEGER ::= 64
maxnooffrequencies
maxNARFCN
                                       INTEGER ::= 32
maxRS-IndexCellOual
                                       INTEGER ::= 16
  -- IEs
id-MME-UE-S1AP-ID
                                                   ProtocolIE-ID ::= 0
id-HandoverType
                                                  ProtocolIE-ID ::= 1
id-Cause
                                                  ProtocolIE-ID ::= 2
id-SourceID
                                                  ProtocolIE-ID ::= 3
id-TargetID
                                                  ProtocolIE-ID ::= 4
id-eNB-UE-S1AP-ID
                                                  ProtocolIE-ID ::= 8
```

id-E-RABSubjecttoDataForwardingList	ProtocolIE-ID ::= 12
id-E-RABtoReleaseListHOCmd	ProtocolIE-ID ::= 13
id-E-RABDataForwardingItem	ProtocolIE-ID ::= 14
id-E-RABReleaseItemBearerRelComp	ProtocolIE-ID ::= 15
id-E-RABToBeSetupListBearerSUReq	ProtocolIE-ID ::= 16
id-E-RABToBeSetupItemBearerSUReq	ProtocolIE-ID ::= 17
id-E-RABAdmittedList	ProtocolIE-ID ::= 18
id-E-RABFailedToSetupListHOReqAck	ProtocolIE-ID ::= 19
id-E-RABAdmittedItem	ProtocolIE-ID ::= 20
id-E-RABFailedtoSetupItemHOReqAck	ProtocolIE-ID ::= 21
id-E-RABToBeSwitchedDLList	ProtocolIE-ID ::= 22
id-E-RABToBeSwitchedDLItem	ProtocolIE-ID ::= 23
id-E-RABToBeSetupListCtxtSUReq	ProtocolIE-ID ::= 24
id-TraceActivation	ProtocolIE-ID ::= 25
id-NAS-PDU	ProtocolIE-ID ::= 26
id-E-RABToBeSetupItemHOReq	ProtocolIE-ID ::= 27
id-E-RABSetupListBearerSURes	ProtocolIE-ID ::= 28
id-E-RABFailedToSetupListBearerSURes	ProtocolIE-ID ::= 29
id-E-RABToBeModifiedListBearerModReg	ProtocolIE-ID ::= 30
id-E-RABModifyListBearerModRes	ProtocolIE-ID ::= 31
id-E-RABFailedToModifyList	ProtocolIE-ID ::= 32
id-E-RABToBeReleasedList	ProtocolIE-ID ::= 33
id-E-RABFailedToReleaseList	ProtocolIE-ID ::= 34
id-E-RABItem	
	ProtocolIE-ID ::= 35
id-E-RABToBeModifiedItemBearerModReq	ProtocolIE-ID ::= 36
id-E-RABModifyItemBearerModRes	ProtocolIE-ID ::= 37
id-E-RABReleaseItem	ProtocolIE-ID ::= 38
id-E-RABSetupItemBearerSURes	ProtocolIE-ID ::= 39
id-SecurityContext	ProtocolIE-ID ::= 40
id-HandoverRestrictionList	ProtocolIE-ID ::= 41
id-UEPagingID	ProtocolIE-ID ::= 43
id-pagingDRX	ProtocolIE-ID ::= 44
id-TAIList	ProtocolIE-ID ::= 46
id-TAIItem	ProtocolIE-ID ::= 47
id-E-RABFailedToSetupListCtxtSURes	ProtocolIE-ID ::= 48
id-E-RABReleaseItemHOCmd	ProtocolIE-ID ::= 49
id-E-RABSetupItemCtxtSURes	ProtocolIE-ID ::= 50
id-E-RABSetupListCtxtSURes	ProtocolIE-ID ::= 51
id-E-RABToBeSetupItemCtxtSUReq	ProtocolIE-ID ::= 52
id-E-RABToBeSetupListHOReg	ProtocolIE-ID ::= 53
id-GERANtoLTEHOInformationRes	ProtocolIE-ID ::= 55
id-UTRANtoLTEHOInformationRes	ProtocolIE-ID ::= 57
id-CriticalityDiagnostics	ProtocolIE-ID ::= 58
id-Global-ENB-ID	ProtocolIE-ID ::= 59
id-eNBname	ProtocolIE-ID ::= 60
id-MMEname	ProtocolIE-ID ::= 61
id-ServedPLMNs	ProtocolIE-ID ::= 63
id-SupportedTAs	ProtocolIE-ID ::= 64
id-TimeToWait	ProtocolIE-ID ::= 65
id-uEaggregateMaximumBitrate	ProtocolIE-ID ::= 66
id-TAI	ProtocolIE-ID ::= 67
id-E-RABReleaseListBearerRelComp	ProtocolIE-ID ::= 69
id-cdma2000PDU	ProtocolIE-ID ::= 70
id-cdma2000RATType	ProtocolIE-ID ::= 71
7 L	·

id-cdma2000SectorID	ProtocolIE-ID ::= 72
id-SecurityKey	ProtocolIE-ID ::= 73
id-UERadioCapability	ProtocolIE-ID ::= 74
id-GUMMEI-ID	ProtocolIE-ID ::= 75
id-E-RABInformationListItem	ProtocolIE-ID ::= 78
id-Direct-Forwarding-Path-Availability	ProtocolIE-ID ::= 79
id-UEIdentityIndexValue	ProtocolIE-ID ::= 80
id-cdma2000HOStatus	ProtocolIE-ID ::= 83
id-cdma2000HORequiredIndication	ProtocolIE-ID ::= 84
id-E-UTRAN-Trace-ID	ProtocolIE-ID ::= 86
id-RelativeMMECapacity	ProtocolIE-ID ::= 87
id-SourceMME-UE-S1AP-ID	ProtocolIE-ID ::= 88
id-Bearers-SubjectToStatusTransfer-Item	ProtocolIE-ID ::= 89
id-eNB-StatusTransfer-TransparentContainer	ProtocolIE-ID ::= 90
id-UE-associatedLogicalS1-ConnectionItem	ProtocolIE-ID ::= 91
id-ResetType	ProtocolIE-ID ::= 92
id-UE-associatedLogicalS1-ConnectionListResAck	ProtocolIE-ID ::= 93
id-E-RABToBeSwitchedULItem	ProtocolIE-ID ::= 94
id-E-RABToBeSwitchedULList	ProtocolIE-ID ::= 95
id-S-TMSI	ProtocolIE-ID ::= 96
id-cdma20000neXRAND	ProtocolIE-ID ::= 97
id-RequestType	ProtocolIE-ID ::= 98
id-UE-S1AP-IDs	ProtocolIE-ID ::= 99
id-EUTRAN-CGI	ProtocolIE-ID ::= 100
id-OverloadResponse id-cdma20000neXSRVCCInfo	ProtocolIE-ID ::= 101 ProtocolIE-ID ::= 102
id-E-RABFailedToBeReleasedList	ProtocolIE-ID ::= 102 ProtocolIE-ID ::= 103
id-Source-ToTarget-TransparentContainer	ProtocolIE-ID ::= 103
id-ServedGUMMEIs	ProtocolIE-ID ::= 104 ProtocolIE-ID ::= 105
id-SubscriberProfileIDforRFP	ProtocolIE-ID ::= 106
id-UESecurityCapabilities	ProtocolIE-ID ::= 107
id-CSFallbackIndicator	ProtocolIE-ID ::= 108
id-CNDomain	ProtocolIE-ID ::= 109
id-E-RABReleasedList	ProtocolIE-ID ::= 110
id-MessageIdentifier	ProtocolIE-ID ::= 111
id-SerialNumber	ProtocolIE-ID ::= 112
id-WarningAreaList	ProtocolIE-ID ::= 113
id-RepetitionPeriod	ProtocolIE-ID ::= 114
id-NumberofBroadcastRequest	ProtocolIE-ID ::= 115
id-WarningType	ProtocolIE-ID ::= 116
id-WarningSecurityInfo	ProtocolIE-ID ::= 117
id-DataCodingScheme	ProtocolIE-ID ::= 118
id-WarningMessageContents	ProtocolIE-ID ::= 119
id-BroadcastCompletedAreaList	ProtocolIE-ID ::= 120
id-Inter-SystemInformationTransferTypeEDT	ProtocolIE-ID ::= 121
id-Inter-SystemInformationTransferTypeMDT	ProtocolIE-ID ::= 122
id-Target-ToSource-TransparentContainer	ProtocolIE-ID ::= 123
id-SRVCCOperationPossible	ProtocolIE-ID ::= 124
id-SRVCCHOIndication	ProtocolIE-ID ::= 125
id-NAS-DownlinkCount	ProtocolIE-ID ::= 126
id-CSG-Id	ProtocolIE-ID ::= 127
id-CSG-IdList	ProtocolIE-ID ::= 128
id-SONConfigurationTransferECT	ProtocolIE-ID ::= 129
id-SONConfigurationTransferMCT	ProtocolIE-ID ::= 130

id-TraceCollectionEntityIPAddress	ProtocolIE-ID ::= 131
id-MSClassmark2	ProtocolIE-ID ::= 132
id-MSClassmark3	ProtocolIE-ID ::= 133
id-RRC-Establishment-Cause	ProtocolIE-ID ::= 134
id-NASSecurityParametersfromE-UTRAN	ProtocolIE-ID ::= 135
id-NASSecurityParameterstoE-UTRAN	ProtocolIE-ID ::= 136
id-DefaultPagingDRX	ProtocolIE-ID ::= 137
id-Source-ToTarget-TransparentContainer-Secondary	ProtocolIE-ID ::= 138
id-Target-ToSource-TransparentContainer-Secondary	ProtocolIE-ID ::= 139
id-EUTRANRoundTripDelayEstimationInfo	ProtocolIE-ID ::= 140
id-BroadcastCancelledAreaList	ProtocolIE-ID ::= 141
id-ConcurrentWarningMessageIndicator	ProtocolIE-ID ::= 142
id-Data-Forwarding-Not-Possible	ProtocolIE-ID ::= 143
id-ExtendedRepetitionPeriod	ProtocolIE-ID ::= 144
id-CellAccessMode	ProtocolIE-ID ::= 145
id-CSGMembershipStatus	ProtocolIE-ID ::= 146
id-LPPa-PDU	ProtocolIE-ID ::= 147
id-Routing-ID	ProtocoliE-ID ::= 147
	ProtocoliE-ID ::= 148
id-Time-Synchronisation-Info	
id-PS-ServiceNotAvailable	ProtocolIE-ID ::= 150
id-PagingPriority	ProtocolIE-ID ::= 151
id-x2TNLConfigurationInfo	ProtocolIE-ID ::= 152
id-eNBX2ExtendedTransportLayerAddresses	ProtocolIE-ID ::= 153
id-GUMMEIList	ProtocolIE-ID ::= 154
id-GW-TransportLayerAddress	ProtocolIE-ID ::= 155
id-Correlation-ID	ProtocolIE-ID ::= 156
id-SourceMME-GUMMEI	ProtocolIE-ID ::= 157
id-MME-UE-S1AP-ID-2	ProtocolIE-ID ::= 158
id-RegisteredLAI	ProtocolIE-ID ::= 159
id-RelayNode-Indicator	ProtocolIE-ID ::= 160
id-TrafficLoadReductionIndication	ProtocolIE-ID ::= 161
id-MDTConfiguration	ProtocolIE-ID ::= 162
id-MMERelaySupportIndicator	ProtocolIE-ID ::= 163
id-GWContextReleaseIndication	ProtocolIE-ID ::= 164
id-ManagementBasedMDTAllowed	ProtocolIE-ID ::= 165
id-PrivacyIndicator	ProtocolIE-ID ::= 166
id-Time-UE-StayedInCell-EnhancedGranularity	ProtocolIE-ID ::= 167
id-HO-Cause	ProtocolIE-ID ::= 168
id-VoiceSupportMatchIndicator	ProtocolIE-ID ::= 169
id-GUMMEIType	ProtocolIE-ID ::= 170
id-M3Configuration	ProtocolIE-ID ::= 171
id-M4Configuration	ProtocolIE-ID ::= 172
id-M5Configuration	ProtocolIE-ID ::= 173
id-MDT-Location-Info	ProtocoliE-ID ::= 173
id-MobilityInformation	ProtocolIE-ID ::= 175
id-Tunnel-Information-for-BBF	ProtocolIE-ID ::= 176
id-ManagementBasedMDTPLMNList	ProtocolIE-ID ::= 177
id-SignallingBasedMDTPLMNList	ProtocolIE-ID ::= 178
id-ULCOUNTValueExtended	ProtocolIE-ID ::= 179
id-DLCOUNTValueExtended	ProtocolIE-ID ::= 180
id-ReceiveStatusOfULPDCPSDUsExtended	ProtocolIE-ID ::= 181
id-ECGIListForRestart	ProtocolIE-ID ::= 182
id-SIPTO-Correlation-ID	ProtocolIE-ID ::= 183
id-SIPTO-L-GW-TransportLayerAddress	ProtocolIE-ID ::= 184

id There are not Indianaction	D
id-TransportInformation	ProtocolIE-ID ::= 185
id-LHN-ID	ProtocolIE-ID ::= 186
id-AdditionalCSFallbackIndicator	ProtocolIE-ID ::= 187
id-TAIListForRestart	ProtocolIE-ID ::= 188
id-UserLocationInformation	ProtocolIE-ID ::= 189
id-EmergencyAreaIDListForRestart	ProtocolIE-ID ::= 190
id-KillAllWarningMessages	ProtocolIE-ID ::= 191
id-Masked-IMEISV	ProtocolIE-ID ::= 192
id-eNBIndirectX2TransportLayerAddresses	ProtocolIE-ID ::= 193
id-uE-HistoryInformationFromTheUE	ProtocolIE-ID ::= 194
id-ProSeAuthorized	ProtocolIE-ID ::= 195
id-ExpectedUEBehaviour	ProtocolIE-ID ::= 196
id-LoggedMBSFNMDT	ProtocolIE-ID ::= 197
id-UERadioCapabilityForPaging	ProtocolIE-ID ::= 198
id-E-RABToBeModifiedListBearerModInd	ProtocolIE-ID ::= 199
id-E-RABToBeModifiedItemBearerModInd	ProtocolIE-ID ::= 200
id-E-RABNotToBeModifiedListBearerModInd	ProtocolIE-ID ::= 201
id-E-RABNotToBeModifiedItemBearerModInd	ProtocolIE-ID ::= 202
id-E-RABModifyListBearerModConf	ProtocolIE-ID ::= 203
id-E-RABModifyItemBearerModConf	ProtocolIE-ID ::= 204
id-E-RABFailedToModifyListBearerModConf	ProtocolIE-ID ::= 205
id-SON-Information-Report	ProtocolIE-ID ::= 206
id-Muting-Availability-Indication	ProtocolIE-ID ::= 207
id-Muting-Pattern-Information	ProtocolIE-ID ::= 208
id-Synchronisation-Information	ProtocolIE-ID ::= 209
id-E-RABToBeReleasedListBearerModConf	ProtocolIE-ID ::= 210
id-AssistanceDataForPaging	ProtocoliE-ID ::= 210
id-CellIdentifierAndCELevelForCECapableUEs	
	ProtocolIE-ID ::= 212 ProtocolIE-ID ::= 213
id-InformationOnRecommendedCellsAndENBsForPaging	
id-RecommendedCellItem id-RecommendedENBItem	ProtocolIE-ID ::= 214
	ProtocolIE-ID ::= 215
id-ProSeUEtoNetworkRelaying	ProtocolIE-ID ::= 216
id-ULCOUNTValuePDCP-SNlength18	ProtocolIE-ID ::= 217
id-DLCOUNTValuePDCP-SNlength18	ProtocolIE-ID ::= 218
id-ReceiveStatusOfULPDCPSDUsPDCP-SNlength18	ProtocolIE-ID ::= 219
id-M6Configuration	ProtocolIE-ID ::= 220
id-M7Configuration	ProtocolIE-ID ::= 221
id-PWSfailedECGIList	ProtocolIE-ID ::= 222
id-MME-Group-ID	ProtocolIE-ID ::= 223
id-Additional-GUTI	ProtocolIE-ID ::= 224
id-S1-Message	ProtocolIE-ID ::= 225
id-CSGMembershipInfo	ProtocolIE-ID ::= 226
id-Paging-eDRXInformation	ProtocolIE-ID ::= 227
id-UE-RetentionInformation	ProtocolIE-ID ::= 228
id-UE-Usage-Type	ProtocolIE-ID ::= 230
id-extended-UEIdentityIndexValue	ProtocolIE-ID ::= 231
id-RAT-Type	ProtocolIE-ID ::= 232
id-BearerType	ProtocolIE-ID ::= 233
id-NB-IoT-DefaultPagingDRX	ProtocolIE-ID ::= 234
id-E-RABFailedToResumeListResumeReq	ProtocolIE-ID ::= 235
id-E-RABFailedToResumeItemResumeReq	ProtocolIE-ID ::= 236
id-E-RABFailedToResumeListResumeRes	ProtocolIE-ID ::= 237
id-E-RABFailedToResumeItemResumeRes	ProtocolIE-ID ::= 238
id-NB-IoT-Paging-eDRXInformation	ProtocolIE-ID ::= 239
5 5	

id-V2XServicesAuthorized	D
	ProtocolIE-ID ::= 240
id-UEUserPlaneCIoTSupportIndicator	ProtocolIE-ID ::= 241
id-CE-mode-B-SupportIndicator	ProtocolIE-ID ::= 242
id-SRVCCOperationNotPossible	ProtocolIE-ID ::= 243
id-NB-IoT-UEIdentityIndexValue	ProtocolIE-ID ::= 244
id-RRC-Resume-Cause	ProtocolIE-ID ::= 245
id-DCN-ID	ProtocolIE-ID ::= 246
id-ServedDCNs	ProtocolIE-ID ::= 247
id-UESidelinkAggregateMaximumBitrate	ProtocolIE-ID ::= 248
id-DLNASPDUDeliveryAckRequest	ProtocolIE-ID ::= 249
id-Coverage-Level	ProtocolIE-ID ::= 250
id-EnhancedCoverageRestricted	ProtocolIE-ID ::= 251
id-UE-Level-QoS-Parameters	ProtocolIE-ID ::= 252
id-DL-CP-SecurityInformation	ProtocolIE-ID ::= 253
id-UL-CP-SecurityInformation	ProtocolIE-ID ::= 254
id-extended-e-RAB-MaximumBitrateDL	ProtocolIE-ID ::= 255
id-extended-e-RAB-MaximumBitrateUL	ProtocolIE-ID ::= 256
id-extended-e-RAB-GuaranteedBitrateDL	ProtocolIE-ID ::= 257
id-extended-e-RAB-GuaranteedBitrateUL	ProtocolIE-ID ::= 258
id-extended-uEaggregateMaximumBitRateDL	ProtocolIE-ID ::= 259
id-extended-uEaggregateMaximumBitRateUL	ProtocolIE-ID ::= 260
id-NRrestrictioninEPSasSecondaryRAT	ProtocoliE-ID ::= 261
_	ProtocoliE-ID ::= 262
id-UEAppLayerMeasConfig	
id-UE-Application-Layer-Measurement-Capability	ProtocolIE-ID ::= 263
id-SecondaryRATDataUsageReportList	ProtocolIE-ID ::= 264
id-SecondaryRATDataUsageReportItem	ProtocolIE-ID ::= 265
id-HandoverFlag	ProtocolIE-ID ::= 266
id-E-RABUsageReportItem	ProtocolIE-ID ::= 267
id-SecondaryRATDataUsageRequest	ProtocolIE-ID ::= 268
id-NRUESecurityCapabilities	ProtocolIE-ID ::= 269
id-UnlicensedSpectrumRestriction	ProtocolIE-ID ::= 270
id-CE-ModeBRestricted	ProtocolIE-ID ::= 271
id-LTE-M-Indication	ProtocolIE-ID ::= 272
id-DownlinkPacketLossRate	ProtocolIE-ID ::= 273
id-UplinkPacketLossRate	ProtocolIE-ID ::= 274
id-UECapabilityInfoRequest	ProtocolIE-ID ::= 275
id-serviceType	ProtocolIE-ID ::= 276
id-AerialUEsubscriptionInformation	ProtocolIE-ID ::= 277
id-Subscription-Based-UE-DifferentiationInfo	ProtocolIE-ID ::= 278
id-EndIndication	ProtocolIE-ID ::= 280
id-EDT-Session	ProtocolIE-ID ::= 281
id-CNTypeRestrictions	ProtocolIE-ID ::= 282
id-PendingDataIndication	ProtocolIE-ID ::= 283
id-BluetoothMeasurementConfiguration	ProtocolIE-ID ::= 284
id-WLANMeasurementConfiguration	ProtocolIE-ID ::= 285
id-WarningAreaCoordinates	ProtocolIE-ID ::= 286
id-NRrestrictionin5GS	ProtocolIE-ID ::= 287
id-PSCellInformation	ProtocolIE-ID ::= 288
id-LastNG-RANPLMNIdentity	ProtocolIE-ID ::= 290
id-ConnectedengNBList	ProtocolIE-ID ::= 291
id-ConnectedengNBToAddList	ProtocolIE-ID ::= 292
id-ConnectedengNBToRemoveList	ProtocolIE-ID ::= 293
id-EN-DCSONConfigurationTransfer-ECT	ProtocolIE-ID ::= 294
id-EN-DCSONConfigurationTransfer-MCT	ProtocolIE-ID ::= 295

```
id-IMSvoiceEPSfallbackfrom5G
                                                     ProtocolIE-ID ::= 296
id-TimeSinceSecondaryNodeRelease
                                                     ProtocolIE-ID ::= 297
id-RequestTypeAdditionalInfo
                                                     ProtocolIE-ID ::= 298
id-AdditionalRRMPriorityIndex
                                                     ProtocolIE-ID ::= 299
id-ContextatSource
                                                     ProtocolIE-ID ::= 300
id-IAB-Authorized
                                                     ProtocolIE-ID ::= 301
id-IAB-Node-Indication
                                                     ProtocolIE-ID ::= 302
id-IAB-Supported
                                                     ProtocolIE-ID ::= 303
id-DataSize
                                                     ProtocolIE-ID ::= 304
id-Ethernet-Type
                                                     ProtocolIE-ID ::= 305
id-NRV2XServicesAuthorized
                                                     ProtocolIE-ID ::= 306
id-NRUESidelinkAggregateMaximumBitrate
                                                     ProtocolIE-ID ::= 307
id-PC50oSParameters
                                                     ProtocolIE-ID ::= 308
\verb|id-IntersystemSONConfigurationTransferMCT|\\
                                                     ProtocolIE-ID ::= 309
id-IntersystemSONConfigurationTransferECT
                                                     ProtocolIE-ID ::= 310
id-IntersystemMeasurementConfiguration
                                                     ProtocolIE-ID ::= 311
id-SourceNodeID
                                                     ProtocolIE-ID ::= 312
id-NB-IoT-RLF-Report-Container
                                                     ProtocolIE-ID ::= 313
id-UERadioCapabilityID
                                                     ProtocolIE-ID ::= 314
id-UERadioCapability-NR-Format
                                                     ProtocolIE-ID ::= 315
id-MDTConfigurationNR
                                                     ProtocolIE-ID ::= 316
id-DAPSRequestInfo
                                                     ProtocolIE-ID ::= 317
id-DAPSResponseInfoList
                                                     ProtocolIE-ID ::= 318
id-DAPSResponseInfoItem
                                                     ProtocolIE-ID ::= 319
id-NotifySourceeNB
                                                     ProtocolIE-ID ::= 320
id-eNB-EarlyStatusTransfer-TransparentContainer
                                                     ProtocolIE-ID ::= 321
id-Bearers-SubjectToEarlyStatusTransfer-Item
                                                     ProtocolIE-ID ::= 322
id-WUS-Assistance-Information
                                                     ProtocolIE-ID ::= 323
id-NB-IoT-PagingDRX
                                                     ProtocolIE-ID ::= 324
```

END

9.3.7 Container Definitions

```
IMPORTS
   Criticality,
   Presence,
   PrivateIE-ID,
   ProtocolExtensionID,
   ProtocolIE-ID
FROM S1AP-CommonDataTypes
   maxPrivateIEs,
   maxProtocolExtensions,
   maxProtocolIEs
FROM S1AP-Constants;
__ *********************
-- Class Definition for Protocol IEs
__ ********************
S1AP-PROTOCOL-IES ::= CLASS {
   &id
                  ProtocolIE-ID
                                                UNIQUE,
   &criticality
                  Criticality,
   &Value,
   &presence
                  Presence
WITH SYNTAX {
   ID
                  &id
   CRITICALITY
                  &criticality
   TYPE
                  &Value
   PRESENCE
                  &presence
-- Class Definition for Protocol IEs
S1AP-PROTOCOL-IES-PAIR ::= CLASS {
   &id
                      ProtocolIE-ID
                                                UNIQUE,
   &firstCriticality Criticality,
   &FirstValue,
   &secondCriticality Criticality,
   &SecondValue,
   &presence
                      Presence
WITH SYNTAX {
                  &id
                          &firstCriticality
   FIRST CRITICALITY
                          &FirstValue
   FIRST TYPE
   SECOND CRITICALITY
                          &secondCriticality
   SECOND TYPE
                          &SecondValue
                          &presence
   PRESENCE
```

```
-- Class Definition for Protocol Extensions
S1AP-PROTOCOL-EXTENSION ::= CLASS {
                 ProtocolExtensionID
                                         UNIQUE,
   &criticality Criticality,
   &Extension,
   &presence
                 Presence
WITH SYNTAX {
   ID
                 &id
                 &criticality
   CRITICALITY
                 &Extension
   EXTENSION
   PRESENCE
                 &presence
  ******************
-- Class Definition for Private IEs
  *****************
S1AP-PRIVATE-IES ::= CLASS {
   &id
                 PrivateIE-ID,
   &criticality Criticality,
   &Value,
   &presence
                 Presence
WITH SYNTAX {
                 &id
   CRITICALITY
                 &criticality
   TYPE
                 &Value
   PRESENCE
                 &presence
-- Container for Protocol IEs
__ ********************
ProtocolIE-Container {S1AP-PROTOCOL-IES : IEsSetParam} ::=
   SEQUENCE (SIZE (0..maxProtocolIEs)) OF
   ProtocolIE-Field {{IEsSetParam}}
ProtocolIE-SingleContainer {S1AP-PROTOCOL-IES : IEsSetParam} ::=
   ProtocolIE-Field {{IEsSetParam}}
ProtocolIE-Field {S1AP-PROTOCOL-IES : IESSetParam} ::= SEQUENCE {
```

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```
({IEsSetParam}),
                 S1AP-PROTOCOL-IES.&id
   criticality
                 S1AP-PROTOCOL-IES.&criticality
                                                 ({IEsSetParam}{@id}),
                                                 ({IEsSetParam}{@id})
   value
                 S1AP-PROTOCOL-IES.&Value
    ****************
  Container for Protocol IE Pairs
  *****************
ProtocolIE-ContainerPair {S1AP-PROTOCOL-IES-PAIR : IEsSetParam} ::=
   SEQUENCE (SIZE (0..maxProtocolIEs)) OF
   ProtocolIE-FieldPair {{IEsSetParam}}
ProtocolIE-FieldPair {S1AP-PROTOCOL-IES-PAIR : IESSetParam} ::= SEOUENCE {
                                                            ({IEsSetParam}),
                    S1AP-PROTOCOL-IES-PAIR.&id
                                                            ({IEsSetParam}{@id}),
   firstCriticality S1AP-PROTOCOL-IES-PAIR.&firstCriticality
                                                            ({IEsSetParam}{@id}),
   firstValue S1AP-PROTOCOL-IES-PAIR.&FirstValue
   secondCriticality S1AP-PROTOCOL-IES-PAIR.&secondCriticality ({IEsSetParam}{@id}),
   secondValue
                     S1AP-PROTOCOL-IES-PAIR.&SecondValue
                                                        ({IEsSetParam}{@id})
    *****************
  Container Lists for Protocol IE Containers
ProtocolIE-ContainerList {INTEGER : lowerBound, INTEGER : upperBound, S1AP-PROTOCOL-IES : IESSetParam} ::=
   SEQUENCE (SIZE (lowerBound..upperBound)) OF
   ProtocolIE-SingleContainer {{IEsSetParam}}
ProtocolIE-ContainerPairList {INTEGER : lowerBound, INTEGER : upperBound, S1AP-PROTOCOL-IES-PAIR : IESSetParam} ::=
   SEOUENCE (SIZE (lowerBound..upperBound)) OF
   ProtocolIE-ContainerPair {{IEsSetParam}}
    *****************
  Container for Protocol Extensions
ProtocolExtensionContainer {S1AP-PROTOCOL-EXTENSION : ExtensionSetParam} ::=
   SEQUENCE (SIZE (1..maxProtocolExtensions)) OF
   ProtocolExtensionField {{ExtensionSetParam}}
ProtocolExtensionField {S1AP-PROTOCOL-EXTENSION : ExtensionSetParam} ::= SEQUENCE
   iд
                     S1AP-PROTOCOL-EXTENSION.&id
                                                        ({ExtensionSetParam}),
   criticality
                                                        ({ExtensionSetParam}{@id}),
                     S1AP-PROTOCOL-EXTENSION.&criticality
   extensionValue
                                                        ({ExtensionSetParam}{@id})
                     S1AP-PROTOCOL-EXTENSION. & Extension
  ******************
```

9.4 Message Transfer Syntax

S1AP shall use the ASN.1 Basic Packed Encoding Rules (BASIC-PER) Aligned Variant as transfer syntax as specified in ITU-T Rec. X.691 [4].

9.5 Timers

$TS1_{RELOCprep}$

- Specifies the maximum time for the Handover Preparation procedure in the source eNB.

$TS1_{RELOCoverall} \\$

- Specifies the maximum time for the protection of the overall handover procedure in the source eNB.

$TX2_{RELOCOverall}$

- it is specified in reference TS 36.423 [22].

Handling of Unknown, Unforeseen and Erroneous Protocol Data

10.1 General

Protocol Error cases can be divided into three classes:

- Transfer Syntax Error.
- Abstract Syntax Error.
- Logical Error.

Protocol errors can occur in the following functions within a receiving node:

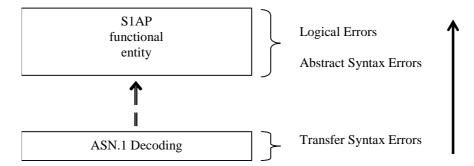


Figure 10.1-1: Protocol Errors in S1AP.

The information stated in subclauses 10.2, 10.3 and 10.4, to be included in the message used when reporting an error, is what at minimum shall be included. Other optional information elements within the message may also be included, if available. This is also valid for the case when the reporting is done with a response message. The latter is an exception to what is stated in subclause 4.1.

10.2 Transfer Syntax Error

A Transfer Syntax Error occurs when the receiver is not able to decode the received physical message. Transfer syntax errors are always detected in the process of ASN.1 decoding. If a Transfer Syntax Error occurs, the receiver should initiate Error Indication procedure with appropriate cause value for the Transfer Syntax protocol error.

Examples for Transfer Syntax Errors are:

- Violation of value ranges in ASN.1 definition of messages. E.g., if an IE has a defined value range of 0 to 10 (ASN.1: INTEGER (0..10)), and 12 will be received, then this will be treated as a transfer syntax error.
- Violation in list element constraints. E.g., if a list is defined as containing 1 to 10 elements, and 12 elements will be received, than this case will be handled as a transfer syntax error.
- Missing mandatory elements in ASN.1 SEQUENCE definitions (as sent by the originator of the message).
- Wrong order of elements in ASN.1 SEQUENCE definitions (as sent by the originator of the message).

10.3 Abstract Syntax Error

10.3.1 General

An Abstract Syntax Error occurs when the receiving functional S1AP entity:

1. receives IEs or IE groups that cannot be understood (unknown IE ID);

- 2. receives IEs for which the logical range is violated (e.g., ASN.1 definition: 0 to 15, the logical range is 0 to 10, while values 11 to 15 are undefined), and 12 will be received; this case will be handled as an abstract syntax error using criticality information sent by the originator of the message);
- 3. does not receive IEs or IE groups but according to the specified presence of the concerning object, the IEs or IE groups should have been present in the received message.
- 4. receives IEs or IE groups that are defined to be part of that message in wrong order or with too many occurrences of the same IE or IE group;
- 5. receives IEs or IE groups but according to the conditional presence of the concerning object and the specified condition, the IEs or IE groups should not have been present in the received message.

Cases 1 and 2 (not comprehended IE/IE group) are handled based on received Criticality information. Case 3 (missing IE/IE group) is handled based on Criticality information and Presence information for the missing IE/IE group specified in the version of the specification used by the receiver. Case 4 (IEs or IE groups in wrong order or with too many occurrences) and Case 5 (erroneously present conditional IEs or IE groups) result in rejecting the procedure.

If an Abstract Syntax Error occurs, the receiver shall read the remaining message and shall then for each detected Abstract Syntax Error that belong to cases 1-3 act according to the Criticality Information and Presence Information for the IE/IE group due to which Abstract Syntax Error occurred in accordance with subclauses 10.3.4 and 10.3.5. The handling of cases 4 and 5 is specified in subclause 10.3.6.

10.3.2 Criticality Information

In the S1AP messages there is criticality information set for individual IEs and/or IE groups. This criticality information instructs the receiver how to act when receiving an IE or an IE group that is not comprehended, i.e., the entire item (IE or IE group) which is not (fully or partially) comprehended shall be treated in accordance with its own criticality information as specified in subclause 10.3.4.

In addition, the criticality information is used in case of the missing IE/IE group abstract syntax error (see subclause 10.3.5).

The receiving node shall take different actions depending on the value of the Criticality Information. The three possible values of the Criticality Information for an IE/IE group are:

- Reject IE.
- Ignore IE and Notify Sender.
- Ignore IE.

The following rules restrict when a receiving entity may consider an IE, an IE group, or an EP not comprehended (not implemented), and when action based on criticality information is applicable:

- 1. IE or IE group: When one new or modified IE or IE group is implemented for one EP from a standard version, then other new or modified IEs or IE groups specified for that EP in that standard version shall be considered comprehended by a receiving entity (some may still remain unsupported).
- 2. EP: The comprehension of different EPs within a standard version or between different standard versions is not mandated. Any EP that is not supported may be considered not comprehended, even if another EP from that standard version is comprehended, and action based on criticality shall be applied.

10.3.3 Presence Information

For many IEs/IE groups which are optional according to the ASN.1 transfer syntax, S1AP specifies separately if the presence of these IEs/IE groups is optional or mandatory with respect to RNS application by means of the presence field of the concerning object of class S1AP-PROTOCOL-IES, S1AP-PROTOCOL-IES-PAIR, S1AP-PROTOCOL-EXTENSION or S1AP-PRIVATE-IES.

The presence field of the indicated classes supports three values:

1. Optional;

- 2. Conditional;
- 3. Mandatory.

If an IE/IE group is not included in a received message and the presence of the IE/IE group is mandatory or the presence is conditional and the condition is true according to the version of the specification used by the receiver, an abstract syntax error occurs due to a missing IE/IE group.

If an IE/IE group is included in a received message and the presence of the IE/IE group is conditional and the condition is false according to the version of the specification used by the receiver, an abstract syntax error occurs due to this erroneously present conditional IE/IE group.

10.3.4 Not comprehended IE/IE group

10.3.4.1 Procedure Code

The receiving node shall treat the different types of received criticality information of the *Procedure Code* IE according to the following:

Reject IE:

- If a message is received with a *Procedure Code* IE marked with "*Reject IE*" which the receiving node does not comprehend, the receiving node shall reject the procedure using the Error Indication procedure.

Ignore IE and Notify Sender:

- If a message is received with a *Procedure Code* IE marked with "*Ignore IE and Notify Sender*" which the receiving node does not comprehend, the receiving node shall ignore the procedure and initiate the Error Indication procedure.

Ignore IE:

- If a message is received with a *Procedure Code* IE marked with "*Ignore IE*" which the receiving node does not comprehend, the receiving node shall ignore the procedure.

When using the Error Indication procedure to reject a procedure or to report an ignored procedure it shall include the *Procedure Code* IE, the *Triggering Message* IE, and the *Procedure Criticality* IE in the *Criticality Diagnostics* IE.

10.3.4.1A Type of Message

When the receiving node cannot decode the *Type of Message* IE, the Error Indication procedure shall be initiated with an appropriate cause value.

10.3.4.2 IEs other than the Procedure Code and Type of Message

The receiving node shall treat the different types of received criticality information of an IE/IE group other than the *Procedure Code* IE and *Type of Message* IE according to the following:

Reject IE:

- If a message *initiating* a procedure is received containing one or more IEs/IE group marked with "*Reject IE*" which the receiving node does not comprehend; none of the functional requests of the message shall be executed. The receiving node shall reject the procedure and report the rejection of one or more IEs/IE group using the message normally used to report unsuccessful outcome of the procedure. In case the information received in the initiating message was insufficient to determine a value for all IEs that are required to be present in the message used to report the unsuccessful outcome of the procedure, the receiving node shall instead terminate the procedure and initiate the Error Indication procedure.
- If a message *initiating* a procedure that does not have a message to report unsuccessful outcome is received containing one or more IEs/IE groups marked with "*Reject IE*" which the receiving node does not comprehend, the receiving node shall terminate the procedure and initiate the Error Indication procedure.

- If a *response* message is received containing one or more IEs marked with "*Reject IE*", that the receiving node does not comprehend, the receiving node shall consider the procedure as unsuccessfully terminated and initiate local error handling.

Ignore IE and Notify Sender:

- If a message *initiating* a procedure is received containing one or more IEs/IE groups marked with "*Ignore IE and Notify Sender*" which the receiving node does not comprehend, the receiving node shall ignore the content of the not comprehended IEs/IE groups, continue with the procedure as if the not comprehended IEs/IE groups were not received (except for the reporting) using the understood IEs/IE groups, and report in the response message of the procedure that one or more IEs/IE groups have been ignored. In case the information received in the initiating message was insufficient to determine a value for all IEs that are required to be present in the response message, the receiving node shall instead terminate the procedure and initiate the Error Indication procedure.
- if a message *initiating* a procedure that does not have a message to report the outcome of the procedure is received containing one or more IEs/IE groups marked with "*Ignore IE and Notify Sender*" which the receiving node does not comprehend, the receiving node shall ignore the content of the not comprehended IEs/IE groups, continue with the procedure as if the not comprehended IEs/IE groups were not received (except for the reporting) using the understood IEs/IE groups, and initiate the Error Indication procedure to report that one or more IEs/IE groups have been ignored.
- If a response message is received containing one or more IEs/IE groups marked with "Ignore IE and Notify Sender" which the receiving node does not comprehend, the receiving node shall ignore the content of the not comprehended IEs/IE groups, continue with the procedure as if the not comprehended IEs/IE groups were not received (except for the reporting) using the understood IEs/IE groups and initiate the Error Indication procedure.

Ignore IE:

- If a message *initiating* a procedure is received containing one or more IEs/IE groups marked with "*Ignore IE*" which the receiving node does not comprehend, the receiving node shall ignore the content of the not comprehended IEs/IE groups and continue with the procedure as if the not comprehended IEs/IE groups were not received using the understood IEs/IE groups.
- If a *response* message is received containing one or more IEs/IE groups marked with "*Ignore IE*" which the receiving node does not comprehend, the receiving node shall ignore the content of the not comprehended IEs/IE groups and continue with the procedure as if the not comprehended IEs/IE groups were not received using the understood IEs/IE groups.

When reporting not comprehended IEs/IE groups marked with "Reject IE" or "Ignore IE and Notify Sender" using a response message defined for the procedure, the Information Element Criticality Diagnostics IE shall be included in the Criticality Diagnostics IE for each reported IE/IE group.

When reporting not comprehended IEs/IE groups marked with "Reject IE" or "Ignore IE and Notify Sender" using the Error Indication procedure, the Procedure Code IE, the Triggering Message IE, Procedure Criticality IE, and the Information Element Criticality Diagnostics IE shall be included in the Criticality Diagnostics IE for each reported IE/IE group.

10.3.5 Missing IE or IE group

The receiving node shall treat the missing IE/IE group according to the criticality information for the missing IE/IE group in the received message specified in the version of this specification used by the receiver:

Reject IE:

- if a received message *initiating* a procedure is missing one or more IEs/IE groups with specified criticality "Reject IE"; none of the functional requests of the message shall be executed. The receiving node shall reject the procedure and report the missing IEs/IE groups using the message normally used to report unsuccessful outcome of the procedure. In case the information received in the initiating message was insufficient to determine a value for all IEs that are required to be present in the message used to report the unsuccessful outcome of the procedure, the receiving node shall instead terminate the procedure and initiate the Error Indication procedure.

- if a received message *initiating* a procedure that does not have a message to report unsuccessful outcome is missing one or more IEs/IE groups with specified criticality "*Reject IE*", the receiving node shall terminate the procedure and initiate the Error Indication procedure.
- if a received *response* message is missing one or more IEs/IE groups with specified criticality "*Reject IE*, the receiving node shall consider the procedure as unsuccessfully terminated and initiate local error handling.

Ignore IE and Notify Sender:

- if a received message *initiating* a procedure is missing one or more IEs/IE groups with specified criticality "Ignore IE and Notify Sender", the receiving node shall ignore that those IEs are missing and continue with the procedure based on the other IEs/IE groups present in the message and report in the response message of the procedure that one or more IEs/IE groups were missing. In case the information received in the initiating message was insufficient to determine a value for all IEs that are required to be present in the response message, the receiving node shall instead terminate the procedure and initiate the Error Indication procedure.
- if a received message *initiating* a procedure that does not have a message to report the outcome of the procedure is missing one or more IEs/IE groups with specified criticality "*Ignore IE and Notify Sender*", the receiving node shall ignore that those IEs are missing and continue with the procedure based on the other IEs/IE groups present in the message and initiate the Error Indication procedure to report that one or more IEs/IE groups were missing.
- if a received *response* message is missing one or more IEs/IE groups with specified criticality "*Ignore IE and Notify Sender*", the receiving node shall ignore that those IEs are missing and continue with the procedure based on the other IEs/IE groups present in the message and initiate the Error Indication procedure to report that one or more IEs/IE groups were missing.

Ignore IE:

- if a received message *initiating* a procedure is missing one or more IEs/IE groups with specified criticality "*Ignore IE*", the receiving node shall ignore that those IEs are missing and continue with the procedure based on the other IEs/IE groups present in the message.
- if a received *response* message is missing one or more IEs/IE groups with specified criticality "*Ignore IE*", the receiving node shall ignore that those IEs/IE groups are missing and continue with the procedure based on the other IEs/IE groups present in the message.

When reporting missing IEs/IE groups with specified criticality "Reject IE" or "Ignore IE and Notify Sender" using a response message defined for the procedure, the Information Element Criticality Diagnostics IE shall be included in the Criticality Diagnostics IE for each reported IE/IE group.

When reporting missing IEs/IE groups with specified criticality "Reject IE" or "Ignore IE and Notify Sender" using the Error Indication procedure, the Procedure Code IE, the Triggering Message IE, Procedure Criticality IE, and the Information Element Criticality Diagnostics IE shall be included in the Criticality Diagnostics IE for each reported IE/IE group.

10.3.6 IEs or IE groups received in wrong order or with too many occurrences or erroneously present

If a message with IEs or IE groups in wrong order or with too many occurrences is received or if IEs or IE groups with a conditional presence are present when the condition is not met (i.e., erroneously present), the receiving node shall behave according to the following:

- If a message *initiating* a procedure is received containing IEs or IE groups in wrong order or with too many occurrences or erroneously present, none of the functional requests of the message shall be executed. The receiving node shall reject the procedure and report the cause value "Abstract Syntax Error (Falsely Constructed Message)" using the message normally used to report unsuccessful outcome of the procedure. In case the information received in the initiating message was insufficient to determine a value for all IEs that are required to be present in the message used to report the unsuccessful outcome of the procedure, the receiving node shall instead terminate the procedure and initiate the Error Indication procedure.
- If a message *initiating* a procedure that does not have a message to report unsuccessful outcome is received containing IEs or IE groups in wrong order or with too many occurrences or erroneously present, the receiving

node shall terminate the procedure and initiate the Error Indication procedure, and use cause value "Abstract Syntax Error (Falsely Constructed Message)".

- If a *response* message is received containing IEs or IE groups in wrong order or with too many occurrences or erroneously present, the receiving node shall consider the procedure as unsuccessfully terminated and initiate local error handling.

When determining the correct order only the IEs specified in the specification version used by the receiver shall be considered.

10.4 Logical Error

Logical error situations occur when a message is comprehended correctly, but the information contained within the message is not valid (i.e., semantic error), or describes a procedure which is not compatible with the state of the receiver. In these conditions, the following behaviour shall be performed (unless otherwise specified) as defined by the class of the elementary procedure, irrespective of the criticality information of the IEs/IE groups containing the erroneous values.

Class 1:

Where the logical error occurs in a request message of a class 1 procedure, and the procedure has a message to report this unsuccessful outcome, this message shall be sent with an appropriate cause value. Typical cause values are:

- Semantic Error.
- Message not compatible with receiver state.

Where the logical error is contained in a request message of a class 1 procedure, and the procedure does not have a message to report this unsuccessful outcome, the procedure shall be terminated and the Error Indication procedure shall be initiated with an appropriate cause value. The *Procedure Code* IE and the *Triggering Message* IE within the *Criticality Diagnostics* IE shall then be included in order to identify the message containing the logical error.

Where the logical error exists in a response message of a class 1 procedure, the procedure shall be considered as unsuccessfully terminated and local error handling shall be initiated.

Class 2:

Where the logical error occurs in a message of a class 2 procedure, the procedure shall be terminated and the Error Indication procedure shall be initiated with an appropriate cause value. The *Procedure Code* IE and the *Triggering Message* IE within the *Criticality Diagnostics* IE shall then be included in order to identify the message containing the logical error.

10.5 Exceptions

The error handling for all the cases described hereafter shall take precedence over any other error handling described in the other subclauses of clause 10.

- If any type of error (Transfer Syntax Error, Abstract Syntax Error or Logical Error) is detected in the ERROR INDICATION message, it shall not trigger the Error Indication procedure in the receiving Node but local error handling.
- In case a response message or Error Indication message needs to be returned, but the information necessary to determine the receiver of that message is missing, the procedure shall be considered as unsuccessfully terminated and local error handling shall be initiated.
- If an error that terminates a procedure occurs, the returned cause value shall reflect the error that caused the termination of the procedure even if one or more abstract syntax errors with criticality "ignore and notify" have earlier occurred within the same procedure.
- If an AP ID error is detected, the error handling as described in subclause 10.6 shall be applied.

10.6 Handling of AP ID

NOTE:

The "first message", the "first returned message" and the "last message" as used below correspond to messages for a UE-associated logical connection. The "first message" has a new AP ID from the sending node and the "first returned message" is the first response message, which has a new APID from the node sending the "first returned message". Thereafter the two APIDs are included in all messages over the UE-associated logical connection unless otherwise allowed by the specification. The "last message" is a message sent by a node in order to complete the termination of a given UE-associated logical connection, such that no other messages for the same connection are expected in either direction.

If a node receives a first message that includes a remote AP ID which is erroneous, e.g., an AP ID which has been stored previously for another UE-associated logical connection for the same peer node, the receiving node shall initiate an Error Indication procedure with inclusion of only the previously received AP ID from the peer node and an appropriate cause value. In this case, both nodes shall initiate a local release of any established UE-associated logical connection having the erroneous AP ID as local or remote identifier.

If a node receives a first returned message that includes a remote AP ID which has been stored previously for another UE-associated logical connection for the same peer node, or that includes an AP ID pair which is inconsistent (e.g., the local AP ID is unknown or already allocated to another UE-associated logical connection), the receiving node shall initiate an Error Indication procedure with inclusion of the received AP IDs from the peer node and an appropriate cause value. Both nodes shall initiate a local release of any established UE-associated logical connection (for the same S1 interface) having these AP IDs as local or remote identifier.

If a node receives a message (other than the first or first returned messages) that includes AP ID(s) identifying a logical connection which is unknown to the node (for the same S1 interface):

- if this message is not the last message for this UE-associated logical connection, the node shall initiate an Error Indication procedure with inclusion of the received AP ID(s) from the peer node and an appropriate cause value. Both nodes shall initiate a local release of any established UE-associated logical connection (for the same S1 interface) having the erroneous AP ID(s) as local or remote identifier.
- if this message is the last message for this UE-associated logical connection, the receiving node shall initiate a local release of any established UE-associated logical connection (for the same S1 interface) that have either the local or remote AP ID(s) as identifiers.

Annex A (informative): S1AP Transparent containers content

Transparent containers are used in order to transfer information from one RAN node to another RAN node. Depending on the particular scenario the behaviour of both involved RAN nodes may be either specified according to the same radio system or according to different radio systems. During an inter-system handover the source RAN node has to adopt to the target RAN node and its requirements. Therefore the container content is encoded according to the rules which are specified for the target radio system.

In S1AP, there is a single transparent container defined for transporting information from the source to the target RAN node and a single transparent container for transporting information from the target to the source RAN node during handover preparation: the *Source to Target Transparent Container* IE and the *Target to Source Transparent Container* IE, which may carry either NG-RAN, E-UTRAN, UTRAN or GERAN specific information.

NOTE: The definition of generic transparent containers for handover purposes allows to transport them through the core network in a RAT-agnostic way.

In subclause 8.4.1.2, it is described how the transparent container shall be encoded with respect to the scenario in which it is used.

The table below is showing all possible scenarios and definitions according to which the content of the transparent container shall be encoded. Additionally the reference to the specification defining particular IE is given.

Table A.1. Specification of Transparent Containers referenced in S1AP.

Scenario	Source to Target Transparent IE in S1AP: HANDOVER REQU message		Target to Source Transparent Container IE in S1AP: HANDOVER COMMAND message	
	Name of the IE	Definition in specification	Name of the IE	Definition in specification
Intra E-UTRAN handover	Source eNB to Target eNB Transparent Container	36.413	Target eNB to Source eNB Transparent Container	36.413
Inter-system handover to UTRAN or SRVCC operation to UTRAN	Source RNC to Target RNC Transparent Container	25.413	Target RNC to Source RNC Transparent Container	25.413
Inter-system handover to GERAN (PS domain only)	Source BSS to Target BSS Transparent Container Contents of the Source BSS to Target BSS Transparent Container	48.018	Target BSS to Source BSS Transparent Container Contents of the Target BSS to Source BSS Transparent Container	48.018
SRVCC operation to GERAN without DTM support or SRVCC operation to GERAN with DTM but without DTM HO support	information elements field of	48.008	Layer 3 Information field of the Layer 3 Information	48.008
SRVCC operation to GERAN with DTM HO support	Source BSS to Target BSS Transparent Container Contents of the Source BSS to Target BSS Transparent Container (in the Source to	48.018	Layer 3 Information field of the Layer 3 Information (in the Target to Source Transparent Container IE);	48.008
	Target Transparent Container IE); Old BSS to New BSS information elements field of the Old BSS to New BSS information (in the Source to Target Transparent Container Secondary IE)	48.008	Target BSS to Source BSS Transparent Container Contents of the Target BSS to Source BSS Transparent Container (in the Target to Source Transparent Container Secondary IE)	48.018
Inter-system handover to NG-RAN	Source NG-RAN Node to Target NG-RAN Node Transparent Container	38.413	Target NG-RAN Node to Source NG-RAN Node Transparent Container	38.413

Annex B (normative): IEs for SON Transfer

This annex defines IEs used by the SON Transfer RIM application (TS 48.018 [18]).

B.1 Tabular definition

B.1.1 SON Transfer Application Identity

This IE indicates the application identity within the SON Transfer application.

IE/Group Name	Presence	Range	IE type and	Semantics description
			reference	
SON Transfer Application Identity	M		ENUMERATED (Cell Load Reporting,, Multi-Cell Load Reporting, Event- Triggered Cell Load Reporting, HO Reporting, E- UTRAN Cell Activation, Energy Savings Indication, Failure Event Reporting)	The receiving RAN node, including the eHRPD eAN, shall discard any RAN-INFORMATION-REQUEST/Multiple Report PDU containing this IE with value set to "Cell Load Reporting", "Multi-Cell Load Reporting", "GE-UTRAN Cell Activation", "Energy Savings Indication" or "Failure Event Reporting". The receiving eHRPD eAN shall discard any RAN-INFORMATION-REQUEST/Single Report PDU containing this IE with value set to "Cell Load Reporting", "HO Reporting", "HO Reporting", "E-UTRAN Cell Activation", "Energy Savings Indication" or
				"Failure Event Reporting".

B.1.2 SON Transfer Request Container

This container transfers request information for the SON Transfer application.

NOTE: The length of the SON Transfer Request Container IE shall remain compatible with the maximum message size on the Gb interface, this maximum size being determined depending on the lower layers used on the interface and on their configuration, a typical (default) limitation being 1600 octets for a Frame Relay sub-network as stated in TS 48.016 [30].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE SON Transfer	M			
Application				
>Cell Load Reporting			NULL	
>Multi-Cell Load Reporting				
>>Multi-Cell Load	M		B.1.7	
Reporting Request				
>Event-Triggered Cell				
Load Reporting				
>>Event-Triggered Cell	M		B.1.11	
Load Reporting Request				
>HO Reporting				
>>HO Report	M		B.1.13	
>E-UTRAN Cell Activation				
>>Cell Activation	M		B.1.14	
Request				
>Energy Savings Indication				
>>Cell State Indication	M		B.1.16	
>Failure Event Reporting				
>>Failure Event Report	M	·	B.1.17	

B.1.3 SON Transfer Response Container

This container transfers response information for the SON Transfer application.

NOTE: The length of the SON Transfer Response Container IE shall remain compatible with the maximum message size on the Gb interface, this maximum size being determined depending on the lower layers used on the interface and on their configuration, a typical (default) limitation being 1600 octets for a Frame Relay sub-network as stated in TS 48.016 [30].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE SON Transfer Application	М			
>Cell Load Reporting				
>>Cell Load Reporting Response	М		B.1.5	
>Multi-Cell Load Reporting				
>>Multi-Cell Load Reporting Response	М		B.1.9	
>Event-Triggered Cell Load Reporting				
>>Event-triggered Cell Load Reporting Response	M		B.1.12	
>HO Reporting			NULL	
>E-UTRAN Cell Activation			110==	
>>Cell Activation Response	М		B.1.15	
>Energy Savings Indication			NULL	The Reporting Cell Identifier field in the RAN-INFORMATION Application Container for SON Transfer (TS 48.018 [18]) shall be the same as received in the RAN-INFORMATION-REQUEST Application Container. The RAT Discriminator field shall be set to 'E-UTRAN'.
>Failure Event Reporting			NULL	The Reporting Cell Identifier field in the RAN-INFORMATION Application Container for SON Transfer (TS 48.018 [18]) shall be the same as received in the RAN-INFORMATION-REQUEST Application Container. The RAT Discriminator field shall be set to 'E-UTRAN'.

B.1.4 SON Transfer Cause

This container indicates the cause why the *Application Error Container* IE for the SON Transfer application defined in TS 48.018 [18] is sent.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE SON Transfer	M			
Application				
>Cell Load Reporting				
>>Cell Load Reporting	M		B.1.10	
Cause				
>Multi-Cell Load Reporting				
>>Cell Load Reporting	M		B.1.10	
Cause				
>Event-Triggered Cell				
Load Reporting				
>>Cell Load Reporting	M		B.1.10	
Cause				
>HO Reporting				
>>HO Reporting Cause	M		ENUMERATED	
			(Application Container Syntax Error,	
			Inconsistent Reporting Cell Identifier,	
			Unspecified,	
)	
>E-UTRAN Cell Activation				
>>Cell Activation Cause	М		ENUMERATED	
			(Application Container Syntax Error,	
			Inconsistent Reporting Cell Identifier,	
			Unspecified,	
Francis Cavinas Indiantian)	
>Energy Savings Indication	N.4		ENLINEDATED	
>>Cell State Indication	М		ENUMERATED	
Cause			(Application Container Syntax Error,	
			Inconsistent Reporting Cell Identifier,	
			Unspecified,	
> Failure Event Penerting)	
>Failure Event Reporting >>Failure Event	M		ENUMERATED	
Reporting Cause	IVI		(Application Container Syntax Error,	
Neporting Cause			Inconsistent Reporting Cell Identifier,	
			Unspecified,	
)	
			/	

HO Reporting Cause	Meaning
Application Container Syntax Error	The Application Container IE is syntactically incorrect.
Inconsistent Reporting Cell Identifier	- In case the reporting RAT is GERAN: the Reporting Cell Identifier in the <i>Application Container</i> IE does not match with the <i>Destination Cell Identifier</i> IE value (in the case of a RAN-INFORMATION-REQUEST PDU) or with the <i>Source Cell Identifier</i> IE value (in the case of a RAN-INFORMATION PDU) of the RIM header In case the reporting RAT is UTRAN or E-UTRAN: the cell identified by Reporting Cell Identifier in the <i>Application Container</i> IE is unknown in the RNC (UTRAN case) or in the eNodeB (E-UTRAN case) identified by the <i>Destination Cell Identifier</i> IE value in the RAN-INFORMATION-REQUEST PDU.
Unspecified	Sent when none of the above cause values applies.

Cell Activation Cause	Meaning
Application Container Syntax Error	The Application Container IE is syntactically incorrect.
Inconsistent Reporting Cell Identifier	- In case the reporting RAT is E-UTRAN: The Reporting Cell Identifier in the <i>Application Container</i> IE is unknown in the eNB identified by the <i>Destination Cell Identifier</i> IE value of the RIM header of a RAN-INFORMATION-REQUEST PDU or the reporting cell identifier in the <i>Application Container</i> IE does not match with the <i>Source Cell Identifier</i> IE value of the RIM header of a RAN-INFORMATION PDU.
Unspecified	Sent when none of the above cause values applies.

Cell State Indication Cause	Meaning
Application Container Syntax Error	The Application Container IE is syntactically incorrect.
Inconsistent Reporting Cell Identifier	- In case the reporting RAT is E-UTRAN: The Reporting Cell Identifier in the <i>Application Container</i> IE does not match with the <i>Source Cell Identifier</i> IE value of the RIM header of a RAN-INFORMATION-REQUEST PDU or the reporting cell identifier in the <i>Application Container</i> IE does not match with the <i>Destination Cell Identifier</i> IE value of the RIM header of a RAN-INFORMATION PDU.
Unspecified	Sent when none of the above cause values applies.

Failure Event Reporting Cause	Meaning
Application Container Syntax Error	The Application Container IE is syntactically incorrect.
Inconsistent Reporting Cell Identifier	- In case the reporting RAT is E-UTRAN: The Reporting Cell Identifier
	in the Application Container IE does not match with the Source Cell Identifier IE value of the RIM header of a RAN-INFORMATION-REQUEST PDU or the reporting cell identifier in the Application Container IE does not match with the Destination Cell Identifier IE value of the RIM header of a RAN-INFORMATION PDU.
Unspecified	Sent when none of the above cause values applies

B.1.5 Cell Load Reporting Response

This IE contains response information for inter-RAT cell load reporting.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE Reporting RAT	М			
>E-UTRAN				
>>E-UTRAN Response	M		E-UTRAN Cell Load Reporting Response B.1.6	
>UTRAN				
>>UTRAN Response	М		OCTET STRING	Contains the Cell Load Information Group IE as defined in TS 25.413. The receiver shall ignore the value of the Source Cell Identifier IE within the Cell Load Information Group IE.
>GERAN				
>>GERAN Response	М		OCTET STRING	Contains the Cell Load Information Group IE as defined in TS 48.008. The receiver shall ignore the value of the Cell Identifier IE within the Cell Load Information Group IE.
>eHRPD				
>>eHRPD Response	M		eHRPD Sector Load Reporting Response B.1.19	

B.1.6 E-UTRAN Cell Load Reporting Response

This IE contains response information for inter-RAT cell load reporting.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Composite Available Capacity Group	М		OCTET STRING	Contains the Composite Available Capacity Group IE as defined in TS 36.423.

B.1.7 Multi-Cell Load Reporting Request

This IE contains request information for inter-RAT multi-cell load reporting.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Requested Cell List		1 <maxnoofiratr eportingCells></maxnoofiratr 		One of the IRAT Cell IDs contained in this list shall be carried in the <i>Reporting Cell Identifier</i> field in the RAN-INFORMATION-REQUEST Application Container for SON Transfer (TS 48.018).
>IRAT Cell ID	M		B.1.8	

Range bound	Explanation
maxnoofIRATReportingCells	Maximum no. cells to be included. Value is 128.

B.1.8 IRAT Cell ID

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE Reporting RAT	M			
>E-UTRAN				
>>Cell Identifier	M		OCTET STRING	Contains the E-UTRAN CGI IE as defined in 9.2.1.38.
>UTRAN				
>>Cell Identifier	М		OCTET STRING	Contains the Source Cell Identifier IE as defined in TS 25.413.
>GERAN				
>>Cell Identifier	М		OCTET STRING	Contains the <i>Cell Identifier</i> IE as defined in TS 48.018.
>eHRPD				
>>eHRPD Sector ID	M		B.1.18	

B.1.9 Multi-Cell Load Reporting Response

This IE contains response information for inter-RAT multi-cell load reporting.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Reporting Cell List		1 <maxnoofirat reportingcells=""></maxnoofirat>		
>CHOICE Reporting RAT	М			
>>E-UTRAN				
>>>E-UTRAN Response	М			
>>>Cell Identifier	М		OCTET STRING	Contains the E-UTRAN CGI IE as defined in 9.2.1.38.
>>>>E-UTRAN Cell Load Reporting Response	M		B.1.6	
>>UTRAN				
>>>UTRAN Response	М		OCTET STRING	Contains the Cell Load Information Group IE as defined in TS 25.413.
>>GERAN				
>>>GERAN Response	М		OCTET STRING	Contains the Cell Load Information Group IE as defined in TS 48.008.
>>eHRPD				
>>>eHRPD Sector ID	М		B.1.18	
>>>eHRPD Sector Load Reporting Response	М		B.1.19	

B.1.10 Cell Load Reporting Cause

This IE contains request information for inter-RAT cell load reporting.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Cell Load Reporting Cause	М		ENUMERATED (Application Container Syntax Error, Inconsistent Reporting Cell Identifier, Unspecified,)	

The meaning of the different cause values is described in the following table.

Cell Load Reporting Cause	Meaning
Application Container Syntax Error Inconsistent Reporting Cell Identifier	The Application Container IE is syntactically incorrect. - In case the reporting RAT is GERAN or eHRPD: the Reporting Cell Identifier in the Application Container IE does not match with the Destination Cell Identifier IE value (in the case of a RAN-INFORMATION-REQUEST PDU) or with the Source Cell Identifier IE value (in the case of a RAN-INFORMATION PDU) of the RIM header. - In case the reporting RAT is UTRAN or E-UTRAN: the cell identified by Reporting Cell Identifier in the Application Container IE is unknown in the RNC (UTRAN case) or in the eNodeB (E-UTRAN case) identified by the Destination Cell Identifier IE value in the
Unspecified	RAN-INFORMATION-REQUEST PDU. Sent when none of the above cause values applies

B.1.11 Event-Triggered Cell Load Reporting Request

This IE contains request information for inter-RAT cell load reporting.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Number Of Measurement Reporting Levels	M		ENUMERATED (2, 3, 4, 5, 10,)	The reporting node divides the cell load scale into the indicated number of reporting levels, evenly distributed on a linear scale below the reporting node's threshold for overload. The reporting node sends a report each time the cell load changes from one reporting level to another, and when the cell load enters and exits overload state. If the reporting RAT is eHRPD, triggering is based on sector load.

B.1.12 Event-triggered Cell Load Reporting Response

This IE contains response information for event-triggered inter-RAT cell load reporting.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Cell Load	M		Cell Load Reporting Response B.1.5	
Overload Flag	0		ENUMERATED (Overload,)	If the reporting RAT is eHRPD, when this IE is present the sector load exceeds the threshold for overload. For other reporting RATs, when this IE is present the cell load exceeds the threshold for overload.

B.1.13 HO Report

This IE contains information for too early inter-RAT HO without connection failure.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
НО Туре	М		ENUMERATED (LTE to UTRAN, LTE to GERAN,)	
HO Report Type	M		ENUMERATED (Unnecessary HO to another RAT,, Early IRAT Handover)	The "Early IRAT Handover" code-point shall be used by the RNC according to TS 25.413 [19].
HO Source ID	M		IRAT Cell ID B.1.8	Contains the cell ID of the source cell for the HO. This IE shall contain an E-UTRAN CGI, and shall be set to the same value as the Reporting Cell Identifier IE in TS 48.018 [18]
HO Target ID	M		IRAT Cell ID B.1.8	Contains the cell ID of the target cell for the HO. This IE shall contain either a UTRAN Cell ID or a GERAN Cell ID.
Candidate Cell List		1 <maxnoofcandid ateCells></maxnoofcandid 		
>Candidate Cell ID	М		IRAT Cell ID B.1.8	This IE contains an E-UTRAN CGI.
Candidate PCI List		01		
>Candidate PCIs		1 <maxnoofcandid ateCells></maxnoofcandid 		
>>Candidate PCI	M		B.1.23	This IE includes the Primary Cell Identifier and the EARFCN of detected cells not included in the Candidate Cell List IE and for which an E-UTRAN CGI could not be derived.

Range bound	Explanation
maxnoofCandidateCells	Maximum no. of candidate cells.

B.1.14 Cell Activation Request

This IE contains request information for inter-RAT Cell Activation.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Cells to Activate List		1 <maxnoofcelline NB></maxnoofcelline 		One of the cell IDs contained in this list shall be carried in the <i>Reporting Cell Identifier</i> field in the RAN-INFORMATION-REQUEST Application Container for SON Transfer (TS 48.018 [18]).
>Cell Identifier	М		OCTET STRING	Contains the <i>E-UTRAN CGI</i> IE as defined in 9.2.1.38.
Minimum Activation Time	0		INTEGER (160)	Seconds

Range bound	Explanation
maxnoofCellineNB	Maximum no, cells that can be served by an eNB. Value is 256.

B.1.15 Cell Activation Response

This IE contains response information for inter-RAT Cell Activation.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Activated Cells List		0 <maxnoofcelline NB></maxnoofcelline 		
>Cell Identifier	M		OCTET STRING	Contains the <i>E-UTRAN CGI</i> IE as defined in 9.2.1.38.

Range bound	Explanation
maxnoofCellineNB	Maximum no. cells that can be served by an eNB. Value is 256.

B.1.16 Cell State Indication

This IE contains notification information for inter-RAT Cell Activation and Deactivation

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Notification Cell List		1 <maxnoofcelline NB></maxnoofcelline 		One of the cell IDs contained in this list shall be carried in the Reporting Cell Identifier field in the RAN-INFORMATION-REQUEST Application Container for SON Transfer (TS 48.018 [18]).
>Cell Identifier	М		OCTET STRING	Contains the <i>E-UTRAN CGI</i> IE as defined in 9.2.1.38.
>Notify Flag	М		ENUMERATE D (Activated, Deactivated,)	

Range bound	Explanation
maxnoofCellineNB	Maximum no. cells that can be served by an eNB. Value is 256.

B.1.17 Failure Event Report

This IE contains information for inter-RAT handover with connection failure.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE Failure Event Report Type	М			
>Too Early inter-RAT HO report from E- UTRAN				The Reporting Cell Identifier field in the RAN-INFORMATION Application Container for SON Transfer (TS 48.018 [18]) shall be the same as the Last Serving Cell Identity in the UE RLF Report.
>>UE RLF Report Container	M		OCTET STRING	RLF Report contained in the UEInformationResponse message (TS 36.331 [16])
>>Mobility Information	0		BIT STRING (SIZE (32))	Information related to the handover; the external handover source provides it in the Source eNB to target eNB Transparent Container in order to enable later analysis of the conditions that led to a wrong HO.

B.1.18 eHRPD Sector ID

This IE contains the eHRPD Sector ID.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
eHRPD Sector ID	М		OCTET STRING (SIZE(16))	Defined in 3GPP2 C.S0024-B [27] subsection 13.9

B.1.19 eHRPD Sector Load Reporting Response

This IE indicates the overall available resource level in the eHRPD sector in downlink and uplink.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
eHRPD Composite Available Capacity Downlink	M		eHRPD Composite Available Capacity B.1.20	For the downlink
eHRPD Composite Available Capacity Uplink	M		eHRPD Composite Available Capacity B.1.20	For the uplink

B.1.20 eHRPD Composite Available Capacity

This IE indicates the overall available resource level in the eHRPD sector in either Downlink or Uplink.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
eHRPD Sector Capacity Class Value	М		B.1.21	
eHRPD Capacity Value	М		B.1.22	'0' indicates no resource is available, Measured on a linear scale.

B.1.21 eHRPD Sector Capacity Class Value

This IE indicates the value that classifies the eHRPD sector capacity with regards to cells in other RATs. The IE only indicates resources that are configured for traffic purposes.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
eHRPD Sector Capacity Class Value	M		INTEGER (1100,)	Value 1 indicates the minimum sector capacity, and 100 indicates the maximum sector capacity. There should be a linear relation between sector capacity and eHRPD Sector Capacity Class Value.

B.1.22 eHRPD Capacity Value

This IE indicates the amount of resources that are available for load balancing relative to the total eHRPD resources. A sector is expected to accept traffic corresponding to the indicated available capacity.

Presence	Range	IE type and reference	Semantics description
М		INTEGER	Value 0 indicates no available capacity, and 100
		(0100)	indicates maximum available capacity . Capacity Value should be measured on a linear scale.
		J. J	reference

B.1.23 Candidate PCI

This IE contains the Primary Cell Identity and the frequency of a detected LTE cell.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PCI	М		INTEGER (0503)	Physical Cell Identifier of the detected cell
EARFCN	М		OCTET STRING	Contains the EARFCN IE as defined in 9.2.1.95.

B.2 ASN.1 definition

```
}
SONtransferRequestContainer ::= CHOICE{
    {\tt cellLoadReporting}
                                         NULL,
    multiCellLoadReporting
                                        MultiCellLoadReportingRequest,
    eventTriggeredCellLoadReporting
                                        EventTriggeredCellLoadReportingRequest,
                                        HOReport,
   hOReporting
    eutranCellActivation
                                        CellActivationRequest,
    energySavingsIndication
                                        CellStateIndication,
    failureEventReporting
                                        FailureEventReport
}
SONtransferResponseContainer ::= CHOICE{
    cellLoadReporting
                                        CellLoadReportingResponse,
    multiCellLoadReporting
                                        MultiCellLoadReportingResponse,
    event Triggered Cell Load Reporting \ Event Triggered Cell Load Reporting Response, \\
                                       NULL,
    eutranCellActivation
                                        CellActivationResponse,
    energySavingsIndication
                                        NULL,
    failureEventReporting
                                        NULL
SONtransferCause ::= CHOICE {
                                        CellLoadReportingCause,
    cellLoadReporting
    multiCellLoadReporting
                                        CellLoadReportingCause,
    eventTriggeredCellLoadReporting
                                       CellLoadReportingCause,
   hOReporting
                                        HOReportingCause,
    eutranCellActivation
                                        CellActivationCause,
    energySavingsIndication
                                        CellStateIndicationCause,
    failureEventReporting
                                        FailureEventReportingCause
}
CellLoadReportingCause ::= ENUMERATED {
    application-container-syntax-error
    inconsistent-reporting-cell-identifier,
    unspecified,
}
HOReportingCause ::= ENUMERATED {
    application-container-syntax-error,
    inconsistent-reporting-cell-identifier,
    unspecified,
CellActivationCause ::= ENUMERATED {
    application-container-syntax-error,
    inconsistent-reporting-cell-identifier,
    unspecified,
    . . .
}
CellStateIndicationCause ::= ENUMERATED {
    application-container-syntax-error,
    inconsistent-reporting-cell-identifier,
    unspecified,
}
FailureEventReportingCause ::= ENUMERATED {
    application-container-syntax-error,
    inconsistent-reporting-cell-identifier,
   unspecified,
}
-- IEs for Cell Load Reporting application
CellLoadReportingResponse::= CHOICE{
    eUTRAN
                   EUTRANcellLoadReportingResponse,
                    OCTET STRING,
    uTRAN
```

```
gERAN
                   OCTET STRING,
    eHRPD
                   EHRPDSectorLoadReportingResponse
}
CompositeAvailableCapacityGroup ::= OCTET STRING
EUTRANcellLoadReportingResponse ::= SEQUENCE {
    compositeAvailableCapacityGroup
                                     CompositeAvailableCapacityGroup,
}
-- IEs for Multi-Cell Load Reporting application
EUTRANResponse::= SEQUENCE {
    cell-ID
                   OCTET STRING,
    eUTRANcellLoadReportingResponse
                                       EUTRANcellLoadReportingResponse,
}
EHRPD-Sector-ID ::= OCTET STRING (SIZE (16))
IRAT-Cell-ID ::= CHOICE{
   eUTRAN
             OCTET STRING,
    uTRAN
                   OCTET STRING,
                   OCTET STRING,
   gERAN
    eHRPD
                   EHRPD-Sector-ID
}
RequestedCellList ::= SEQUENCE (SIZE(1.. maxnoofIRATReportingCells)) OF IRAT-Cell-ID
MultiCellLoadReportingRequest::= SEQUENCE {
   requestedCellList
                                            RequestedCellList,
}
ReportingCellList-Item ::= SEQUENCE {
   cell-ID
                                            IRAT-Cell-ID,
    . . .
}
ReportingCellList ::= SEQUENCE (SIZE(1.. maxnoofIRATReportingCells)) OF ReportingCellList-Item
MultiCellLoadReportingResponse ::= SEQUENCE (SIZE(1.. maxnoofIRATReportingCells)) OF
MultiCellLoadReportingResponse-Item
MultiCellLoadReportingResponse-Item ::= CHOICE{
   eUTRANResponse
                                            EUTRANResponse,
                                            OCTET STRING,
   uTRANResponse
   gERANResponse
                                            OCTET STRING,
    eHRPD
                                            EHRPDMultiSectorLoadReportingResponseItem
}
-- IEs for Event-triggered Cell Load Reporting application
NumberOfMeasurementReportingLevels ::= ENUMERATED {
   r12,
   r13.
   rl4,
   r15,
   rl10,
}
EventTriggeredCellLoadReportingRequest ::= SEQUENCE {
   numberOfMeasurementReportingLevels
                                          NumberOfMeasurementReportingLevels,
}
OverloadFlag ::= ENUMERATED {
   overload,
```

```
}
 \begin{tabular}{ll} EventTriggeredCellLoadReportingResponse ::= SEQUENCE & \\ \end{tabular} 
   cellLoadReportingResponse
                                             CellLoadReportingResponse,
   overloadFlag
                                             OverloadFlag
                                                                                    OPTIONAL,
}
-- IEs for HO Reporting application
HOReport::= SEQUENCE {
                            НоТуре,
   hoType
                         HoReport,
IRAT-Cell-ID,
   hoReportType
   hosourceID
   hoTargetID
                             IRAT-Cell-ID,
   candidateCellList
                            CandidateCellList,
   candidatePCIList CandidatePCIList
                                                OPTIONAL
}
HoType ::= ENUMERATED {
   ltetoutran,
    ltetogeran,
}
HoReportType ::= ENUMERATED {
  unnecessaryhotoanotherrat,
    earlyirathandover
CandidateCellList ::= SEQUENCE (SIZE(1..maxnoofcandidateCells)) OF IRAT-Cell-ID
CandidatePCIList ::= SEQUENCE (SIZE(1..maxnoofcandidateCells)) OF CandidatePCI
CandidatePCI ::= SEQUENCE {
  pCI INTEGER (0..503),
eARFCN OCTET STRING,
   . . .
}
-- IEs for E-UTRAN Cell Activation application
CellActivationRequest ::= SEQUENCE {
   cellsToActivateList CellsToActivateList, minimumActivationTime INTEGER (1..60) OPTIONAL,
}
CellsToActivateList ::= SEQUENCE (SIZE(1.. maxnoofCellineNB)) OF CellsToActivateList-Item
CellsToActivateList-Item ::= SEQUENCE {
                            OCTET STRING,
   cell-ID
}
CellActivationResponse ::= SEQUENCE {
   activatedCellsList
                           ActivatedCellsList,
}
ActivatedCellsList ::= SEQUENCE (SIZE(0.. maxnoofCellineNB)) OF ActivatedCellsList-Item
ActivatedCellsList-Item ::= SEQUENCE {
                            OCTET STRING,
  cell-ID
}
-- IEs for Energy Savings Indication application
```

```
CellStateIndication ::= SEQUENCE {
   notificationCellList
                                   NotificationCellList,
}
NotificationCellList ::= SEQUENCE (SIZE(1.. maxnoofCellineNB)) OF NotificationCellList-Item
NotificationCellList-Item ::= SEQUENCE {
               OCTET STRING,
   cell-ID
   notifyFlag
                          NotifyFlag,
}
NotifyFlag ::= ENUMERATED {
   activated.
   deactivated,
}
FailureEventReport::= CHOICE {
   {\tt tooEarlyInterRATHOReportFromEUTRAN} \qquad {\tt TooEarlyInterRATHOReportFromEUTRAN},
}
{\tt TooEarlyInterRATHOReportReportFromEUTRAN} \; ::= \; {\tt SEQUENCE} \; \left\{ \right.
   uerlfreportContainer OCTET STRING, -- as defined in TS 36.331 [16] -- mobilityInformation MobilityInformation OPTIONAL,
}
MobilityInformation ::= BIT STRING (SIZE(32))
-- IEs for reporting of eHRPD load
EHRPDCapacityValue ::= INTEGER (0..100)
EHRPDSectorCapacityClassValue ::= INTEGER (1..100, ...)
EHRPDSectorLoadReportingResponse ::= SEQUENCE {
   dL-EHRPD-CompositeAvailableCapacity
                                              EHRPDCompositeAvailableCapacity,
   uL-EHRPD-CompositeAvailableCapacity
                                              EHRPDCompositeAvailableCapacity,
}
EHRPDCompositeAvailableCapacity ::= SEQUENCE {
   eHRPDSectorCapacityClassValue
                                               EHRPDSectorCapacityClassValue,
   {\tt eHRPDCapacityValue}
                                              EHRPDCapacityValue,
eHRPD-Sector-ID
                                          EHRPD-Sector-ID,
   {\tt eHRPDSectorLoadReportingResponse}
                                          EHRPDSectorLoadReportingResponse,
}
__ ********************************
-- Constants
__ **********************
                                           INTEGER ::= 128
maxnoofIRATReportingCells
                                           INTEGER ::= 16
maxnoofcandidateCells
maxnoofCellineNB
                                           INTEGER ::= 256
END
```

Annex C (informative): Processing of Transparent Containers at the MME

The encoding of the *Source to Target Transparent Container* and *Target to Source Transparent Container* IEs in this specification is different from the one specified in TS 25.413 [19].

Irrespective of the mobility scenario (inter-RAT or intra-LTE), the MME always processes these IEs in the following way:

- The MME shall convey to the eNodeB the information received within
 - the GTPv1-C "UTRAN transparent field" of the "UTRAN Transparent Container" IE across the Gn-interface (see subclause 7.7.38 of TS 29.060 [35]), or
 - the GTPv1-C "BSS Container" (value part octets 4-n) of the "BSS Container" IE across the Gn- interface (see subclause 7.7.72 of TS 29.060 [35]), or
 - the GTPv2 "F-container field" of the "F-Container" IE across the S3/S10- interface (see subclause 8.48 of TS 29.274 [36]).

by including it in the octets of the OCTET STRING of the *Source to Target Transparent Container* IE, the *Target to Source Transparent Container* IE or the *Target to Source Transparent Container Secondary* IE of the corresponding S1AP message.

- The MME shall convey to the GTP peer the information received within the octets of the OCTET STRING of the Source to Target Transparent Container IE, the Target to Source Transparent Container IE or the Target to Source Transparent Container Secondary IE by including it in
 - the GTPv1-C "UTRAN transparent field" of the "UTRAN Transparent Container" IE across the Gn- interface (see subclause 7.7.38 of TS 29.060 [35]), or
 - the GTPv1-C "BSS Container" (value part octets 4-n) of the "BSS Container" IE across the Gn- interface (see subclause 7.7.72 of TS 29.060 [35]), or
 - the GTPv2 "F-container field" of the "F-Container" IE across the S3/S10- interface (see subclause 8.48 of TS 29.274 [36]).

Annex D (informative): Change history

TSG#	TSG Doc.	CR	Rev	Subject/Comment	New
38				Specification approved at TSG-RAN and placed under change control	8.0.0
39	RP-080080			RAN3 agreed changes for TS 36.413	8.1.0
40	RP-080304		1	RAN3 agreed changes for TS 36.413	8.2.0
41	RP-080584			changes to TS36.413 agreed in RAN3#61	8.3.0
42	RP-080846		1	changes to TS36.413 agreed in RAN3#62	8.4.0
43	RP-090083		4	Adding extension container in SEQUENCE type for forward compatibility	8.5.0
43 43	RP-090091 RP-090086		1	Corrections on S1AP: eNB configuration update procedure Corrections on S1AP: Paging procedure	8.5.0 8.5.0
43	RP-090089		1	Handling detection of two S1 connections towards one UE	8.5.0
43	RP-090089		1	Interaction between UE Context Release Request and UE Context Release	8.5.0
	000000	0001		procedure	0.0.0
43	RP-090246	0337	2	IP address retrieval for ANRF	8.5.0
43	RP-090083			Modification of RRC context indexing	8.5.0
43	RP-090086		1	Completion of LTE cause values	8.5.0
43	RP-090090		1	Correction of served GUMMEIs	8.5.0
43	RP-090086		1	Correction of Initial Context Setup	8.5.0
43	RP-090086		1	Clarification of path switch failure	8.5.0
43	RP-090091		2	Correction of eNB Status Transfer	8.5.0
43	RP-090083		4	Addition of the description of Timer TX2RELOCOverall	8.5.0
43	RP-090089		1	New cause value "Interaction with other procedure"	8.5.0
43 43	RP-090087 RP-090089		1	S1AP Review on Location Reporting procedures Definition on parameters related to a trace activation	8.5.0 8.5.0
43	RP-090089		2	Adding EUTRAN CELL TRAFFIC TRACE message over S1 interfaces	8.5.0
43	RP-090090		2	Adding MS Classmark 2 and MS Clssmark 3 IEs over S1 interface	8.5.0
43	RP-090086		1	New Invalid E-RAB Id causes	8.5.0
43	RP-090091		2	S1AP Review: S1 Handover Cancel procedure	8.5.0
43	RP-090158			S1AP Review: Write-Replace Warning procedure	8.5.0
43	RP-090246			Definition of Cell Type	8.5.0
43	RP-090085		1	Abnormal condition related to UE Security Capabilities	8.5.0
43	RP-090245			Removal of UE Security Capabilities IE from HANDOVER NOTIFY message	8.5.0
43	RP-090086	0378	1	Corrections for the procedure concurrency	8.5.0
43	RP-090091		2	Clarification of eNB Name and MME Name IE's	8.5.0
43	RP-090083			Clarifications on access control at handover	8.5.0
43	RP-090087		1	Paging response	8.5.0
43	RP-090077			Correction on usage of UE History Information	8.5.0
43	RP-090086		1	Delete the UDP port in the note for GTP-TEID	8.5.0
43	RP-090245		4	S1AP CR on CDMA2000 RAT Type	8.5.0
43 43	RP-090246 RP-090091		3	Editorial Updates TS 36.413 NAS Security Parameters for to/from E-UTRAN/UTRAN handovers	8.5.0 8.5.0
43	RP-090085		1	Updates for Next Hop Chaining Count	8.5.0
43	RP-090245			Transparent Container content – informative annex	8.5.0
43	RP-090093		1	Transparent container handling in case of SRVCC operation to GERAN	8.5.0
43	RP-090090			Changes to S1AP to support paging optimization	8.5.0
43	RP-090245			S1 handover Clean up	8.5.0
43	RP-090087		1	Support blocking 3GPP2 handover	8.5.0
43	RP-090091		2	Inclusion of eNB default paging DRX in S1 setup and configuration update	8.5.0
43	RP-090087		1	Explicit resetting of overload state information on S1 Setup	8.5.0
43	RP-090090			Clarify Security Context IE description	8.5.0
43	RP-090091		2	Criticality corrections in 36.413	8.5.0
43	RP-090245			Add abnormal conditions section to UE Context Release and fix tabular error	8.5.0
43	RP-090245		_	Consistent references to S1AP	8.5.0
43	RP-090090		2	Two new cause values in the Cause IE	8.5.0
43 43	RP-090089			Alignment of QCI range	8.5.0
40	RP-090089	U4Z0		Remove the Handover Type IE from the HANDOVER REQUEST ACKNOWLEDGE message	8.5.0
43	RP-090090	0427	1	Correction of the trace procedural text and trace related IEs	8.5.0
March	-	-	-	Minor corrections before freezing of ASN.1	8.5.1
2009					
44	RP-090637	0504	2	Editorial Updates	8.6.0
44	RP-090637			Correction of RAN#43 CR implementation	8.6.0
44	RP-090637			Explicitly allow TRACE START to be the first UE-associated message	8.6.0
				received at the eNB	
44	RP-090637		1	Clarification of UE Capability Info Indication	8.6.0
44	RP-090637	0500	1	Mandatory UE History Information IE in HANDOVER REQUIRED For Inter-	8.6.0
				RAT HO from E-UTRAN to UMTS	1

44	RP-090637	0482	1	Clarify eNB may send Release msg rather than RRC Reject msg on receiving	8.6.0
4.4	DD 000007	0.400		OVERLOAD Start msg	0.0.0
44	RP-090637		1	Clarify reporting of duplicate E-RABs in E-RAB RESPONSE	8.6.0
44	RP-090637		4	Correction of security parameters	8.6.0
44 44	RP-090637 RP-090638		2	Emergency call Indicator during CS Fallback	8.6.0 8.6.0
44	RP-090636		2	Correction on Path Switch Request procedure Removing 'outcome' element from the Triggering Message IE	8.6.0
44	RP-090644		1	Missing S1AP functions	8.6.0
44	RP-090644		1	Correction of abnormal conditions in UE Context Release	8.6.0
44	RP-090644		1	Clarification of E-UTRAN Trace ID in Cell Traffice Trace message	8.6.0
44	RP-090644		'	Removal of duplication description of MME UE S1AP ID and eNB UE S1AP	8.6.0
	111 000011	0 100		ID	0.0.0
44	RP-090644	0455	1	Abnormal condition for Handover Cancellation	8.6.0
44	RP-090640		1	NNSF for HeNB GW deployment scenario	8.6.0
44	RP-090640		1	Transparent Container Coding	8.6.0
44	RP-090640		2	Some Editorial Corrections on ASN.1	8.6.0
44	RP-090640			Failure of the eNB Configuration Update procedure	8.6.0
44	RP-090640			Rephrasing of abnormal conditions for S1 setup	8.6.0
44	RP-090640			Cause value for inter-RAT Redirection	8.6.0
44	RP-090628		2	NAS PDU in E-RAB Release Command	8.6.0
44	RP-090636			Alignment of eNB configuration update procedure	8.6.0
44	RP-090636		2	Add that a non-GBR must be received and admitted on S1-HO	8.6.0
44	RP-090636		1	Clarification of Security Context to be used in HANDOVER REQUEST	8.6.0
				message	
44	RP-090636	0459		Correction the text about the Handover Resource Allocation procedure	8.6.0
44	RP-090636	0502		Clarification for RAT list in S1 Setup Response and MME configuration	8.6.0
				Update	
44	RP-090636	0501	1	Range bound for maximal number of PLMNs per MME and GUMMEIs	8.6.0
June				Correction of an ASN.1 implementation error of CR0463r1 in RP-090637	8.6.1
2009				(R3-091456)	
45	RP-090767		1	Corrections for 36.413	8.7.0
45	RP-090964			SRVCC to GERAN/UTRAN	8.7.0
45	RP-090964			Clean up the Terminology of home eNB in S1AP	8.7.0
45	RP-090964	0534		Specify how report dup E-RAB ID in Tabular and replace MME with EPC in	8.7.0
				8.3.1.2	
45	RP-090964		1	Indirect path use by the MME	8.7.0
45	RP-090767		1	Handling of not supported QCI values	8.7.0
45	RP-090964		1	E-RABs subject to forwarding	8.7.0
45	RP-090767		1	Mandatory NAS PDU in E-RAB Release Command	8.7.0
45	RP-090767 RP-090767		1	Missing reference and specification for encoding the CDMA2000 Pilot List	8.7.0
45	RP-090767		1	CR on Repetition Period IE Miscellaneous correction to 36.413v8.6.1	8.7.0
45					8.7.0 8.7.0
45	RP-090768 RP-090767			ASN1 object identified correction Interaction between Initial Context Setup/UE Context Modification and	
45	KF-090767	0554		Handover Preparation/Redirection procedures during CS Fallback	8.7.0
09/2009				Rel-9 version is created based on v.8.7.0	9.0.0
45	RP-090767	0521	3	Adding the RTD information in UPLINK CDMA2000 TUNNELING	9.0.0
45	RP-090787		1	Handling of Emergency Calls in Limited Service Mode	9.0.0
45	RP-090787		1	Emergency Calls Mobility Handling	9.0.0
45	RP-090776		1	S1AP Kill procedure for cancellation of PWS warning messages	9.0.0
45	RP-090776		1	S1AP Write-Replace Warning procedure for PWS/CMAS	9.0.0
46	RP-091191		4	Support for paging optimization with CSG membership changes	9.1.0
46	RP-091191		3	Inclusion of Access Mode and Subscription Status for UE prioritisation in LTE	
	501101	2330		hybrid cells	
46	RP-091194	0557		Handling of Multiple concurrent CMAS Warning Notifications	9.1.0
46	RP-091189		2	CR for Transportation support for LPPa	9.1.0
46	RP-091195		3	Introducing the "Data Forwarding Not Possible" indication to HANDOVER	9.1.0
				REQUEST	
40	RP-091183	0569		ASN.1 correction for BroadcastCompleteAreaList	9.1.0
46			1	Correction on abnormal handling of Subscriber Profile ID for RAT/Frequency	
46	RP-091183	0311			
	RP-091183	0371		priority IE	
	RP-091183 RP-091368				9.1.0
46		0580	2	priority IE Align IE's in Tabular for two messages with their ASN.1 for R9 Rejection Criteria for Overload	9.1.0 9.1.0
46 46	RP-091368	0580 0589		Align IE's in Tabular for two messages with their ASN.1 for R9	
46 46 46	RP-091368 RP-091183	0580 0589 0592		Align IE's in Tabular for two messages with their ASN.1 for R9 Rejection Criteria for Overload	9.1.0
46 46 46 46	RP-091368 RP-091183 RP-091369	0580 0589 0592 0605		Align IE's in Tabular for two messages with their ASN.1 for R9 Rejection Criteria for Overload Introduction of inbound LTE mobility	9.1.0 9.1.0

46	RP-091183	0619	2	Correction of Transport Layer Address	9.1.0
46	RP-091183		1	Missing reference and unclear handling of the CDMA2000 Sector ID	9.1.0
47	RP-100214		1	Correction of RTD range	9.2.0
47	RP-100214		1	Correction of Path switch failure	9.2.0
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66 RP-120750 (9981 b) Introduction of the Security Algorithm (ZUC) 66 RP-120752 (9982 b) Correction on Emergency ARP Value 66 RP-120747 (1010 c) Improved granularity for the time UE stayed in cell 67 RP-121140 (1011 c) UE Radio Capability Match Indicator for Voice Continuity 67 RP-121138 (1041 c) UE Radio Capability Match Indicator for Voice Continuity 57 RP-121138 (1041 c) Addition of HO Cause value to the UE history information in S1AP 57 RP-121138 (1041 c) Addition of HO Cause value to the UE history information in S1AP 58 RP-121738 (1041 c) Addition of HO Cause value to the UE history information in S1AP 58 RP-121736 (1049 c) Addition of HO Cause value to the UE history information in S1AP 58 RP-121736 (1042 c) Membership verification during Path Switch Request procedure (Option A) 58 RP-121737 (1067 c) Rapporteur correction of constants names 58 RP-121739 (1061 c) Multi-PLIM M DT 58 RP-121739 (1061 c) Multi-PLIM M DT 59 RP-130211 (1095 c) ASA (1740 c) 50 RP-130211 (1095 c) ASA (1740 c) <td></td> <td>11 - 120/44</td> <td>0300</td> <td>-</td> <td></td> <td>11.0.0</td>		11 - 120/44	0300	-		11.0.0
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68 RP-12/1730 1048 3 Introduction of new MDT measurements 58 RP-12/1732 1052 2 Membership verification dring Path Switch Request procedure (Option A) 58 RP-12/1737 1056 1 Reporteur delionial corrections 58 RP-12/1731 1061 2 Multi-PLMN MDT 58 RP-12/1730 1062 2 Correction of Capability Match Request 58 RP-12/1731 1068 2 Introduce support for Inter-RAT IMRO 58 RP-12/1731 1075 1 Establishment of UE-associated logical S1-connection in eNB 58 RP-12/1731 1075 1 Establishment of UE-associated logical S1-connection in eNB 602/2013 RP-130211 1095 Correction of GUMMEI Type Criticality 59 RP-130211 1095 Correction of GUMMEI Type Criticality 59 RP-130211 108 Correction of GUMMEI Type Criticality 59 RP-130211 108 Correction of Classmark Encoding 59 RP-130211 1108 Correction of Classmark Encoding						11.1.0
RP-121732 1052 2				-		11.2.0
RP-121737 1056						11.2.0
58 RP-121737 1056 1 Rapporteur editorial corrections 58 RP-121730 1061 2 Multi-PLMN MDT 58 RP-121730 1062 2 Multi-PLMN MDT 58 RP-121731 1068 2 Introduce support for Inter-RAT MRO 58 RP-121739 1074 2 New Information for BBF access 58 RP-121730 1075 1 Establishment of UE-associated logical S1-connection in eNB 02/2013 History table update 1 List by Correction of GUMMEI Type Criticality 59 RP-130211 11097 2 ASIA Treview for S1AP 59 RP-130211 1100 1 Clarification of Warning Area List IE 59 RP-130211 1100 1 Clarification of Warning Area List IE 59 RP-130211 1108 2 Correction of Classmark Encoding 60 RP-130641 111 1 1 Correction of Text Port SW with security feature 60 RP-130643 1111 1 Correction of Text Port SW with Security feature 60 RP-130643 1110 1 Correction for March Transfer IE tabular definition				2		11.2.0
Rep-121730 1062 Correction of constants' names						11.2.0
S8						11.2.0
Search				2		11.2.0
RP-121731 1068 2 Introduce support for Inter-RAT MRO						11.2.0
S8				2		11.2.0
RP-121736 1075						11.2.0
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RP-130211 1095 Correction of GUMMEI Type Criticality						11.2.1
69 RP-130211 1097 2 ASN.1 review for S1AP 59 RP-130212 1100 1 Clarification of Warning Area List IE 59 RP-130211 1108 3 Correction of Classmark Encoding 59 RP-130210 1109 1 S1AP modification for PDCP SN extension 60 RP-130643 1111 1 Correction for the MDT Location Information IE 60 RP-130643 1111 1 Correction of the presence of the X2 TNL Configuration Info IE inside the SON Configuration Transfer IE tabular definition 60 RP-130643 1116 1 Correction of Kill 61 RP-131862 1127 1 Correction of Transfer IE tabular definition 61 RP-131892 1127 1 Correction of LPPa Signalling Transport Function to support UTDOA 62 RP-131890 1150 1 Correction of LPPa Signalling Transport Function to support UTDOA 62 RP-131902 1150 1 Correction of terminology concerning the mobility restriction function 62 RP-131990 1153 1 C		RP-130211	1095	-		11.3.0
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67 RP-150356 1276 1 Corrections of SON configuration transfer 12.5.0 67 RP-150356 1281 2 Rapporteur Review-ASN.1 consistency check 12.5.0 67 RP-150361 1281 2 Rapporteur Review-ASN.1 consistency check 12.5.0 68 RP-150943 1289 2 Add indication in the E-RAB MODIFICATION CONFIRM for E-RAB(s) that shall be released 12.6.0 68 RP-150943 1293 3 Adding Criticality Diagnostics in E-RAB Modification Confirm message 12.6.0 68 RP-150944 1310 3 Masked IMEISV IE correction 12.6.0 68 RP-150943 1310 1 Correction of Muting procedure 12.6.0 68 RP-150944 1311 2 Correction of PWB Broadcast Completed Area List 12.6.0 68 RP-150944 1311 2 Correction of PWB Broadcast Completed Area List 12.6.0 68 RP-150945 1303 2 Rehaviour for IRAT handovers in AAS 13.0.0 68/2015 7 RP-152094 1312 3 Rehaviour for IRAT handovers in AAS 13.0.0 70 RP-152109 1345 2 Extension of PDCP SN 13.1.0 70 RP-152006 3362 4 Introduction	67	RP-150353	1230	6	ProSe UE Authorization in S1AP	12.5.0		
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						Change history	
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2017-03	75	RP-170544	1480	5	В	Introduction of eDECOR in RAN	14.2.0
2017-03	75	RP-170540		1	В	Overload control for CP CloT EPS optimization	14.2.0
2017-03	75	RP-170539	1495	-	С	Handling of NB-IOT UE capabilities	14.2.0
2017-03	75	RP-170540		1	В	Reliable DL NAS delivery based on hop-by-hop acknowledgements	14.2.0
2017-03	75	RP-170541		-	В	Support of Redirection for VoLTE	14.2.0
2017-03	75	RP-170538		-	В	Support of V2X over S1	14.2.0
2017-03	75	RP-170542		-	В	Introduction of New types of eNB ID	14.2.0
2017-03	75	RP-170539		-	В	Introduction of coverage level for location service	14.2.0
2017-03	75	RP-170539		—	В	Introduction of Coverage Enhancement Authorization	14.2.0
2017-03	75 76	RP-170319 RP-171329		1	B A	Introduction of S1 UE information retrieve procedure	14.2.0
2017-06 2017-06	76	RP-171329		3 2	A	Correction on the presence of Extended UE Identity Index Value Correction on Overload action for exception reporting	14.3.0 14.3.0
2017-06	76	RP-171323			F	Impact on paging from NB-IoT enhancements	14.3.0
2017-06	76	RP-171329			A	Correction of missing security information in Suspend and Resume	14.3.0
2017 00	10	17 17 1020	1010		, ,	messages	14.0.0
2017-06	76	RP-171323	1517	2	F	Correction on UE-AMBR for NB-IoT UE using CP solution	14.3.0
2017-06	76	RP-171329	1520		Α	Correction to Path Switch Request for RRC Resume Cause	14.3.0
2017-06	76	RP-171323		3		Support of RLF for CP CloT Optimisation	14.3.0
2017-09	77	RP-171974		-	F	Correction of the mismatched code points of overload action	14.4.0
2017-09	77	RP-171975		1	F	Remove the description of Inter RAT Redirection value for MMTEL	14.4.0
2017-09	77	RP-171974		-	F	S1AP Cause for E-UTRAN Pre-emption operations	14.4.0
2017-12	78	RP-172672	1524	6	В	Baseline CR to TS 36.413 covering agreements of RAN3 #98	15.0.0
2017-12	78	RP-172674	1543	2	В	Introduction of QoE Measurement Collection for LTE	15.0.0
2018-03	79	RP-180468	1558	-	F	Add NR UE Security Capabilities to DL NAS Transport message	15.1.0
2018-03	79	RP-180468		1	F	Clarification and correction on S1 for EN-DC	15.1.0
2018-03	79	RP-180473		-	Α	Correct ASN.1 error for NAS DELIVERY INDICATION	15.1.0
2018-03	79	RP-180472		2		Support for unlicensed access as secondary RAT in S1AP	15.1.0
2018-03	79	RP-180473		1	A	Stage-3 impacts to support "voice centric" UE in CE mode B	15.1.0
2018-03	79	RP-180473		-	A	Enhanced Coverage Restricted Indication for Paging	15.1.0
2018-03	79 79	RP-180472		2	F	MDT correction	15.1.0
2018-03 2018-06	80	RP-180468 RP-181241		6		Add missing range for secondary RAT data volume Support of Enhanced VoLTE Performance	15.1.0 15.2.0
2018-06	80	RP-181241		3		Introduction of QMC for MTSI in EUTRAN	15.2.0
2018-06	80	RP-181241		3		Triggering UE capability info retrieval using DL NAS TRANSPORT	15.2.0
2018-06	80	RP-181237		4		Introduction of SA NR (36.413 Baseline CR covering RAN3	15.2.0
20.000		1 101201				agreements)	
2018-06	80	RP-181242	1578	4	В	Introduction of early data transmission	15.2.0
2018-06	80	RP-181241	1580	2	В	Introduction of LTE-M (eMTC) traffic Differentiation	15.2.0
2018-06	80	RP-181243		3	В	Baseline CR: Introduction of the Aerial Usage Indication	15.2.0
2018-06	80	RP-181244	1590	-	Α	Clarification on Connection Establishment Indication procedure	15.2.0
				<u>.</u>		scenarios	
2018-06	80	RP-181241	1594	1	F	Correction of applicability of Secondary RAT Data Usage report for LAA, LWA and LWIP	15.2.0
2018-09	81	RP-181920	1600	2	F	Correction of Secondary RAT Data Usage Report	15.3.0
2018-09	81	RP-181922		2		NR Corrections (36.413 Baseline CR covering RAN3-101	15.3.0
2010 00	01	101022	1001	_		agreements)	10.0.0
2018-09	81	RP-181923	1608	1	F	Introduction of Warning Area Coordinates in S1AP: WRITE- REPLACE WARNING REQUEST	15.3.0
2018-09	81	RP-181923	1611	 -	F	Correction on target NG-RAN Node ID	15.3.0
2018-09	81	RP-181921		1	F	Access Restriction Data for NR in EPC	15.3.0
2018-09	81	RP-181926		1		Pending Data Indication	15.3.0
2018-09	81	RP-181924	1617	1	В	CR to S1AP to introduce Bluetooth and WLAN measurement in MDT	15.3.0
2018-09	81	RP-182115		3	В	Introduction of Subscription based UE differentiation	15.3.0
2018-12	RP-82	RP-182446		1		Correction on Handover Type	15.4.0
2018-12	RP-82	RP-182451		1		Pending Data Indication	15.4.0
2019-03	RP-83	RP-190556		2	F	Extending GUMMEI Type	15.5.0
2019-03	RP-83	RP-190556		2		Correction of EPC interworking	15.5.0
2019-03	RP-83	RP-190555		2		Transfer of the PSCell information to Core Network	15.5.0
2019-03	RP-83	RP-190559		 -	F	Correction on Initial UE Message to include EDT for MTC	15.5.0
2019-03	RP-83	RP-190556		-	F	Change of Interfaces to Trace IE in S1AP	15.5.0
2019-03	RP-83	RP-190558		1	<u> </u>	Addition of procedural text for Warning Area Coordinates IE	15.5.0
2019-03	RP-83	RP-190561	1662		F	Introduction of TNL Address discovery for EN-DC (using new container)	15.5.0
2019-07	RP-84	RP-191397		1	F	Correction of Core Network Type Restrictions	15.6.0
2019-07	RP-84	RP-191397		1		5G to 4G Handover with non eligible PDU sessions	15.6.0
2019-07	RP-84	RP-191394		1		Adding PSCell to the User Location Information	15.6.0
2019-07	RP-84	RP-191400	1686		Α	NB-IoT Correction: inconsistent between tabular and ASN.1	15.6.0
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2019-09	RP-85	RP-192166	1688	1	F	CR for addressing Race condition between X2 and S1	15.7.0
2019-09	RP-85	RP-192169		1	F	S1AP Introduction of New Indicator for EPS Fallback	15.7.0
2019-09	RP-85	RP-192167		2	F	Update of TNL Address discovery for EN-DC (using new container)	15.7.0
2019-09	RP-85	RP-192167		2	F	Enabling additional PSCell reporting and time since EN-DC was	15.7.0
2013-03	111 -05	101-192101	1703		'	deconfigured	13.7.0
2019-09	RP-85	RP-192166	1707	2	F	Correction to EN-DC TNL address discovery	15.7.0
2019-10						Editorial Correction to ASN1: Adding a missing comma after "id-	15.7.1
						IMSvoiceEPSfallbackfrom5G"	
2019-12	RP-86	RP-192916	1734	2	F	Addition of Handover Restriction List to PATH SWITCH REQUEST	15.8.0
						ACKNOWLEDGE message	
2019-12	RP-86	RP-192916	1737		F	CR for Clarification on purpose of path switch request	15.8.0
2019-12	RP-86	RP-192913		8	В	Temporary Identifier usage at interworking	16.0.0
2019-12	RP-86	RP-192913	1669	5	В	Introduction of Additional RRM Policy Index (ARPI)	16.0.0
2019-12	RP-86	RP-192913	1670	5	F	ERROR INDICATION Message in S1AP	16.0.0
2019-12	RP-86	RP-192913	1690	3	F	Introduction of inter UE QoS in CP relocation scenario	16.0.0
2020-03	RP-87-e	RP-200422		2	В	Introduction of NR-U	16.1.0
2020-03	RP-87-e	RP-200419	1738	1	В	SA to EN DC handover and direct forwarding with shared SgNB/gNB	16.1.0
2020-03	RP-87-e	RP-200425	1745	1	F	PSCell information report for EN-DC	16.1.0
2020-03	RP-87-e	RP-200423	1746	1	В	Signalling UE capability identity	16.1.0
						(The CR is not implemented. The CR was marked agreed by	
						mistake while the WI is not yet complete)	
2020-07	RP-88-e	RP-201077		13	В	BL CR to 36.413: Support for IAB	16.2.0
2020-07	RP-88-e	RP-201086		13	В	Introduction of MT Early Data Transmission	16.2.0
2020-07	RP-88-e	RP-201079		9	В	Support of Ethernet Type Bearer	16.2.0
2020-07	RP-88-e	RP-201074		10	В	Support of NR V2X over S1	16.2.0
2020-07	RP-88-e	RP-201082		10	В	Addition of SON features	16.2.0
2020-07	RP-88-e	RP-201088		4	В	Support of RLF in NB-IoT	16.2.0
2020-07	RP-88-e	RP-201078		5	В	Signalling UE capability identity	16.2.0
2020-07	RP-88-e	RP-201082		4	В	MDT support for EN-DC	16.2.0
2020-07	RP-88-e	RP-201089	1760	5	В	Baseline CR for introducing Rel-16 LTE further mobility	16.2.0
						enhancements	
2020-07	RP-88-e	RP-201086		3	В	Support of WUS Group	16.2.0
2020-07	RP-88-e	RP-201088		3	В	Support NB-IoT UE Specific DRX	16.2.0
2020-07	RP-88-e	RP-201092		2	Α	Correction of connected en-gNBs	16.2.0
2020-07	RP-88-e	RP-201091		2	Α	Corrected handling of Selected TAI for TNL discovery for EN-DC	16.2.0
2020-07	RP-88-e	RP-201092		3	Α	Correction the NCC for 5G to 4G handover	16.2.0
2020-09	RP-89-e	RP-201951			F	Correction of LTE-M Indication	16.3.0
2020-09	RP-89-e	RP-201948		-	F	Correction the NR Sidelink AMBR in ASN.1 definition	16.3.0
2020-09	RP-89-e	RP-201954		1	Α	No N26 interface cause value	16.3.0
2020-09	RP-89-e	RP-201948	1793	-	D	Rapporteur cleanup of S1AP	16.3.0

History

	Document history						
V16.2.0	July 2020	Publication					
V16.3.0	November 2020	Publication					