# 9 Mobility management

## 9.1 5GS mobility management

### 9.1.1 Primary authentication and key agreement

#### 9.1.1.1 EAP based primary authentication and key agreement / EAP-AKA' related procedures

9.1.1.1.1 Test Purpose (TP)

(1)

**with** { the UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { the SS sends an EAP-Request/AKA'-Identity message within AUTHENTICATION REQUEST }

**then** { the UE sends an EAP-Response/AKA'-Identity message within AUTHENTICATION RESPONSE }

}

(2)

**with** { the UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { the SS sends the EAP-request/AKA'-challenge message within AUTHENTICATION REQUEST with the sequence number in AUTN is not correct }

**then** { the UE sends an EAP-response/AKA'-synchronization-failure message within AUTHENTICATION RESPONSE }

}

(3)

**with** { the UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { the SS sends an EAP-request/AKA'-challenge message within AUTHENTICATION REQUEST }

**then** { the UE sends an EAP-response/AKA'-challenge message within AUTHENTICATION RESPONSE }

}

(4)

**with** { the UE in 5GMM-REGISTERED-INITIATED state and SS initiates an EAP based primary authentication and key agreement procedure }

**ensure that** {

**when** { the SS sends an EAP-success message within AUTHENTICATION RESULT }

**then** { the UE considers the procedure complete and authentication procedure succeed }

}

9.1.1.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501 clauses 5.4.1.2.2.3, 5.4.1.2.2.4, 5.4.1.2.2.6B, 5.4.1.2.2.8.

[TS 24.501, clause 5.4.1.2.2.6B (TP1)]

Upon receipt of the AUTHENTICATION REQUEST message with EAP-Request/Identity message the UE shall send an AUTHENTICATION RESPONSE message with EAP-Response/Identity to the network. In the EAP-Response/Identity message, the UE shall provide the requested identity according to 3GPP TS 33.501 [24] annex F.2, in the UE identity in the EAP-Response/Identity message as specified in IETF RFC 5448 [40].

Upon receipt of the AUTHENTICATION REQUEST message with EAP-Request/AKA'-Identity message the UE shall send an AUTHENTICATION RESPONSE message with EAP-Response/AKA'-Identity to the network. Based on the attribute received in the EAP-Request/AKA'-Identity, the UE shall provide the requested identity according to 3GPP TS 33.501 [24] annex F.2, in the EAP-Response/AKA'-Identity message, as specified in IETF RFC 5448 [40].

If the EAP-Request/AKA'-Identity carries the AT\_PERMANENT\_REQ, the UE shall respond with EAP-Response/AKA'-Client-Error with the error code "unable to process packet".

[TS 24.501, clause 5.4.1.2.2.4 (TP2)]

If a USIM is present, the SNN check fails or the UE does not accept AUTN during handling of the EAP-request/AKA'-challenge message as specified in IETF RFC 5448 [40], the UE shall send an EAP-response/AKA'-authentication-reject message as specified in IETF RFC 5448 [40].

If a USIM is present, the SNN check is successful but the UE detects that the sequence number in AUTN is not correct during handling of the EAP-request/AKA'-challenge message as specified in IETF RFC 5448 [40], the UE shall send an EAP-response/AKA'-synchronization-failure message as specified in IETF RFC 5448 [40].

If a USIM is present, the SNN check is successful, the sequence number in AUTN is correct and the UE detects another error during handling of the EAP-request/AKA'-challenge message as specified in IETF RFC 5448 [40], the UE shall send an EAP-response/AKA'-client-error message as specified in IETF RFC 5448 [40].

If a USIM is not present, the UE shall send an EAP-response/AKA'-client-error message as specified in IETF RFC 5448 [40].

For any of the above, the UE shall start timer T3520 when the AUTHENTICATION RESPONSE message containing the EAP-response message is sent. Furthermore, the UE shall stop any of the retransmission timers that are running (e.g. T3510, T3517 or T3521). Upon receiving an AUTHENTICATION REQUEST message with the EAP message IE containing an EAP-request/AKA'-challenge from the network, the UE shall stop timer T3520, if running, and then process the EAP-request/AKA'-challenge information as normal.

[TS 24.501, clause 5.4.1.2.2.3 (TP3)]

If a USIM is present and the SNN check is successful, the UE shall handle the EAP-request/AKA'-challenge message as specified in IETF RFC 5448 [40]. The USIM shall derive CK and IK and compute the authentication response (RES) using the 5G authentication challenge data received from the ME, and pass RES to the ME. The ME shall derive CK' and IK' from CK and IK, and EMSK from CK' and IK'. Furthermore, the ME may generate KAUSF from the EMSK, the KSEAF from the KAUSF, and the KAMF from the ABBA received together with the EAP-request/AKA'-challenge message, and the KSEAF as described in 3GPP TS 33.501 [24], and create a partial native 5G NAS security context identified by the ngKSI value received together with the EAP-request/AKA'-challenge message in clause 5.4.1.2.4.2 in the volatile memory of the ME. If the KAMF and the partial native 5G NAS security context are created, the ME shall store the KAMF in the created partial native 5G NAS security context, and shall send an EAP-response/AKA'-challenge message as specified in IETF RFC 5448 [40].

If the EAP-request/AKA'-challenge message contains AT\_RESULT\_IND attribute, the UE may include AT\_RESULT\_IND attribute in the EAP-response/AKA'-challenge message as specified in IETF RFC 5448 [40].

[TS 24.501, clause 5.4.1.2.2.8 (TP4)]

Upon receiving an EAP-success message, if the ME has not generated a partial native 5G NAS security context as described in subclause 5.4.1.2.2.3, the ME shall:

a) generate the KAUSF from the EMSK, the KSEAF from the KAUSF, and the KAMF from the ABBA that was received with the EAP-success message, and the KSEAF as described in 3GPP TS 33.501 [24];

b) create a partial native 5G NAS security context identified by the ngKSI value in the volatile memory of the ME; and

c) store the KAMF in the created partial native 5G NAS security context.

The UE shall consider the procedure complete.

9.1.1.1.3 Test description

9.1.1.1.3.1 Pre-test conditions

System Simulator:

- NGC Cell A is configured according to table 6.3.2.2-1 in TS 38.508-1 [4].

UE:

- None

Preamble:

- The UE is in state Switched OFF Mode (state 0N-B) according to TS 38.508-1 [4].

9.1.1.1.3.2 Test procedure sequence

Table 9.1.1.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2-4 | The UE establishes RRC connection and initiates registration procedure by executing steps 2-4 of Table 4.5.2.2-2 in TS 38.508-1 [4]. | - | - | - | - |
| 5 | SS transmits an AUTHENTICATION REQUEST message with an EAP-Request/AKA'-Identity message. | <-- | 5GMM: AUTHENTICATION REQUEST |  |  |
| 6 | Check: Does the UE respond with an AUTHENTICATION RESPONSE message, with an EAP-Response/AKA'-Identity message? | --> | 5GMM: AUTHENTICATION RESPONSE | 1 | P |
| 7 | SS transmits an AUTHENTICATION REQUEST message with an EAP-Request/AKA'-challenge message which contains a not correct sequence number. | <-- | 5GMM: AUTHENTICATION REQUEST | - | - |
| 8 | Check: Does the UE respond with an AUTHENTICATION RESPONSE message, with an EAP-Response/AKA’-synchronization-failure? | --> | 5GMM: AUTHENTICATION RESPONSE | 2 | P |
| 9 | SS transmits a correct AUTHENTICATION REQUEST message with an EAP-Request/AKA'-challenge message. | <-- | 5GMM: AUTHENTICATION REQUEST | - | - |
| 10 | Check: Does the UE respond with a correct AUTHENTICATION RESPONSE message, with an EAP-Response/AKA'-challenge message? | --> | 5GMM: AUTHENTICATION RESPONSE | 3 | P |
| 11 | SS transmits an AUTHENTICATION RESULT message with an EAP-success message. | <-- | 5GMM: AUTHENTICATION RESULT | - | - |
| 12-18 | The registration procedure is performed by executing steps 8-14 of Table 4.5.2.2-2 in TS 38.508-1 [4]. | - | - | - | - |
| 19 | Check: Does the UE transmit a REGISTRATION COMPLETE message? | --> | 5GMM: REGISTRATION COMPLETE | 4 | P |
| 20 | Steps 19a1 of Table 4.5.2.2-2 in TS 38.508-1 [4] are performed | - | - | - | - |

9.1.1.1.3.3 Specific message contents

Table 9.1.1.1.3.3-1: Message AUTHENTICATION REQUEST (step 5, Table 9.1.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-1 | | | |
| Information Element | Value/Remark | Comment | Condition |
| EAP message | EAP-request/AKA'-Identity | See Table 9.1.1.1.3.3-7 | EAP-AKA |

Table 9.1.1.1.3.3-2: Message AUTHENTICATION RESPONSE (step 6, Table 9.1.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-2 | | | |
| Information Element | Value/Remark | Comment | Condition |
| EAP message | EAP-response/AKA'-Identity | See Table 9.1.1.1.3.3-8 | EAP-AKA |

Table 9.1.1.1.3.3-3: Message AUTHENTICATION REQUEST (step 7, Table 9.1.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-1 | | | |
| Information Element | Value/Remark | Comment | Condition |
| EAP message | EAP-request/AKA'- challenge | The sequence number in AUTN is not correct | EAP-AKA |

Table 9.1.1.1.3.3-4: Message AUTHENTICATION RESPONSE (step 8, Table 9.1.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-2 | | | |
| Information Element | Value/Remark | Comment | Condition |
| EAP message | EAP-response/AKA'-synchronization-failure |  | EAP-AKA |

Table 9.1.1.1.3.3-5: Message AUTHENTICATION RESPONSE (step 10, Table 9.1.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-2 | | | |
| Information Element | Value/Remark | Comment | Condition |
| EAP message | EAP-Response/AKA'-Challenge | RES\* equal to the XRES\* calculated in the SS with the parameters provided/indicated in the AUTHENTICATION REQUEST | EAP-AKA |

Table 9.1.1.1.3.3-6: Message AUTHENTICATION RESULT (step 11, Table 9.1.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-3 | | | |
| Information Element | Value/Remark | Comment | Condition |
| EAP message | EAP-Success |  | EAP-AKA |

Table 9.1.1.1.3.3-7: Message EAP-Request/AKA’-Identity (Table 9.1.1.1.3.3-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: IETF RFC 4187 [30] clause 9.1, RFC 3748 [32] clause 4 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Code | 1 | Request |  |
| Length | Set to length of EAP packet |  |  |
| Data |  |  |  |
| AT\_ANY\_ID\_REQ | AT\_ANY\_ID\_REQ\_Def | See Table 9.1.1.1.3.3-9 |  |

Table 9.1.1.1.3.3-8: Message EAP-Response/AKA'-Identity (Table 9.1.1.1.3.3-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: IETF RFC 4187 [30] clause 9.2, RFC 3748 [32] clause 4 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Code | 2 | Response |  |
| Length | Set to length of EAP packet |  |  |
| Data |  |  |  |
| AT\_IDENTITY | AT\_IDENTITY\_Def | See Table 9.1.1.1.3.3-10 |  |

Table 9.1.1.1.3.3-9: AT\_ANY\_ID\_REQ\_Def (Table 9.1.1.1.3.3-7)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: IETF RFC 4187 [30] clause 10.3 | | | |
| Information Element | Value/remark | Comment | Condition |
| AT\_ANY\_ID\_REQ | '0000 1101'B | 13 |  |
| Length | '0000 0001'B | 1 |  |
| Reserved | '0000 0000 0000 0000'B |  |  |

Table 9.1.1.1.3.3-10: AT\_IDENTITY\_Def (Table 9.1.1.1.3.3-8)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: IETF RFC 4187 [30] clause 10.5 | | | |
| Information Element | Value/remark | Comment | Condition |
| AT\_IDENTITY | '0000 1110'B | 14 |  |
| Length | Set to the Length of AT\_IDENTITY attribute in 4 bytes |  |  |
| Actual Identity Length | Set to the actual length of 'identity' in bytes excluding any appended all zero bytes at end |  |  |
| Identity | Value generated according to TS 24.501 [28] clause 9.11.3.4 and shall be a multiple of 4 bytes (appended with 1,2 or 3 bytes of all zero bits when necessary) | SUCI of the UE |  |

#### 9.1.1.2 EAP based primary authentication and key agreement / Reject

9.1.1.2.1 Test Purpose (TP)

(1)

**with** {the UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { the SS sends the EAP-request/AKA'-challenge message within AUTHENTICATION REQUEST with incorrect SNN }

**then** { the UE sends an EAP-response/AKA'-authentication-reject message within AUTHENTICATION RESPONSE}

}

(2)

**with** {the UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { the SS sends an EAP-Request/AKA'-notification message within AUTHENTICATION REQUEST }

**then** { the UE sends an EAP-Response/AKA'-notification message within AUTHENTICATION RESPONSE }

}

(3)

**with** {the UE in 5GMM-REGISTERED-INITIATED state and SS initiates an EAP based primary authentication and key agreement procedure}

**ensure that** {

**when** { the SS sends an EAP-failure message within AUTHENTICATION REJECT }

**then** { the UE deletes the stored 5G-GUTI, TAI list, last visited registered TAI and ngKSI and enter state 5GMM-DEREGISTERED, the USIM is considered invalid until switching off the UE }

}

9.1.1.2.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501, clauses 5.4.1.2.2.4, 5.4.1.2.2.6, and 5.4.1.2.2.11.

[TS 24.501, clause 5.4.1.2.2.4]

If a USIM is present, the SNN check fails or the UE does not accept AUTN during handling of the EAP-request/AKA'-challenge message as specified in IETF RFC 5448 [40], the UE shall send an EAP-response/AKA'-authentication-reject message as specified in IETF RFC 5448 [40].

If a USIM is present, the SNN check is successful but the UE detects that the sequence number in AUTN is not correct during handling of the EAP-request/AKA'-challenge message as specified in IETF RFC 5448 [40], the UE shall send an EAP-response/AKA'-synchronization-failure message as specified in IETF RFC 5448 [40].

If a USIM is present, the SNN check is successful, the sequence number in AUTN is correct and the UE detects another error during handling of the EAP-request/AKA'-challenge message as specified in IETF RFC 5448 [40], the UE shall send an EAP-response/AKA'-client-error message as specified in IETF RFC 5448 [40].

If a USIM is not present, the UE shall send an EAP-response/AKA'-client-error message as specified in IETF RFC 5448 [40].

For any of the above, the UE shall start timer T3520 when the AUTHENTICATION RESPONSE message containing the EAP-response message is sent. Furthermore, the UE shall stop any of the retransmission timers that are running (e.g. T3510, T3517 or T3521). Upon receiving an AUTHENTICATION REQUEST message with the EAP message IE containing an EAP-request/AKA'-challenge from the network, the UE shall stop timer T3520, if running, and then process the EAP-request/AKA'-challenge information as normal.

[TS 24.501, clause 5.4.1.2.2.6]

Upon receiving an EAP-request/AKA'-notification message, the UE shall send an EAP-response/AKA'-notification message as specified in IETF RFC 5448 [40].

[TS 24.501, clause 5.4.1.2.2.11]

Upon receiving an EAP-failure message, the UE shall delete the partial native 5G NAS security context if any was created as described in subclause 5.4.1.2.2.3.

The UE shall consider the procedure complete.

If the EAP-failure message is received in an AUTHENTICATION REJECT message:

- the UE shall set the update status to 5U3 ROAMING NOT ALLOWED, delete the stored 5G-GUTI, TAI list, last visited registered TAI and ngKSI. The USIM shall be considered invalid until switching off the UE or the UICC containing the USIM is removed; and

- if the UE is operating in single-registration mode, the UE shall handle 4G-GUTI, last visited registered TAI, TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the authentication procedure is not accepted by the network. The USIM shall be considered as invalid also for non-EPS services until switching off or the UICC containing the USIM is removed.

If the AUTHENTICATION REJECT message is received by the UE, the UE shall abort any 5GMM signalling procedure, stop any of the timers T3510, T3517 or T3521 (if they were running) and enter state 5GMM-DEREGISTERED.

9.1.1.2.3 Test description

9.1.1.2.3.1 Pre-test conditions

System Simulator:

- NGC Cell A "Serving cell" TS 38.508-1 [4] Table 6.2.2.1-3

UE:

- None

Preamble:

- The UE is in state Switched OFF (state 0N-B) according to TS 38.508-1 [4].

9.1.1.2.3.2 Test procedure sequence

Table 9.1.1.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U – S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2-4 | The UE executes steps 2-4 of Table 4.5.2.2-2 in TS38.508-1 [4]. | - | - | - | - |
| 5 | The SS transmits "EAP-request/AKA'-challenge" message in AUTHENTICATION REQUEST with incorrect SNN. | <-- | 5GMM: AUTHENTICATION REQUEST | - | - |
| 6 | Check: Does the UE transmit an “EAP-response/AKA'-authentication-reject” message in AUTHENTICATION RESPONSE? | --> | 5GMM: AUTHENTICATION RESPONSE | 1 | P |
| 6A | The SS transmits "EAP-failure" message within AUTHENTICATION RESULT message. | <-- | 5GMM: AUTHENTICATION RESULT | - | - |
| 7 | The SS transmits “EAP-request/AKA'-challenge” message in AUTHENTICATION REQUEST. | <-- | 5GMM: AUTHENTICATION REQUEST | - | - |
| 8 | The UE transmits an “EAP-response/AKA'- challenge” message in AUTHENTICATION RESPONSE. | --> | 5GMM: AUTHENTICATION RESPONSE | - | - |
| 9 | The SS transmits “EAP- request /AKA'-notification“message in AUTHENTICATION REQUEST. | <-- | 5GMM: AUTHENTICATION REQUEST | - | - |
| 10 | Check: Does the UE transmit an “EAP-response/AKA'-notification” message in AUTHENTICATION RESPONSE? | --> | 5GMM: AUTHENTICATION RESPONSE | 2 | P |
| 11 | The SS transmits an “EAP-failure” message within AUTHENTICATION REJECT | <-- | 5GMM: AUTHENTICATION REJECT | - | - |
| 12 | The SS releases the RRC connection. | - | - | - | - |
| 13 | Check: Does the UE transmit an RRCSetupRequest message for initial registration procedure within the next 30 seconds? | --> | NR RRC: RRCSetupRequest | 3 | F |
| 14 | The UE is switched off by executing generic procedure in Table 4.9.6.4-1 in TS 38.508-1 [4]. | - | - | - | - |
| 15 | The UE is switched on. | - | - | - | - |
| 16 | Check: Does the UE transmit a REGISTRATION REQUEST message? | --> | 5GMM: REGISTRATION REQUEST | 3 | P |
| 17 | The UE executes steps 5-20a1 of Table 4.5.2.2-2 in TS38.508-1 [4] complete registration procedure. | - | - | - | - |

9.1.1.2.3.3 Specific message contents

Table 9.1.1.2.3.3-1: AUTHENTICATION REQUEST (step 5, Table 9.1.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-1 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Extended protocol discriminator | 5GMM |  |  |
| Security header type | ’0000’B | Plain 5GS NAS message, not security protected |  |
| Spare half octet | '0000'B |  |  |
| EAP message | “EAP-request/AKA'-challenge” | SNN in EAP message is incorrect or does not match with the PLMN identity saved in the UE. |  |
| NOTE: This message is sent within SECURITY PROTECTED 5GS NAS MESSAGE message with Integrity protected and ciphered. | | | |

Table 9.1.1.2.3.3-2: AUTHENTICATION RESPONSE (step 6, Table 9.1.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-2 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Extended protocol discriminator | 5GMM |  |  |
| Security header type | ’0000’B | Plain 5GS NAS message, not security protected |  |
| Spare half octet | '0000'B |  |  |
| EAP message | “EAP-response/AKA'-authentication-reject “ |  |  |
| NOTE: This message is sent within SECURITY PROTECTED 5GS NAS MESSAGE message with Integrity protected and ciphered. | | | |

Table 9.1.1.2.3.3-2A: AUTHENTICATION RESULT (step 6A, Table 9.1.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-3 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Extended protocol discriminator | 5GMM |  |  |
| Security header type | ’0000’B | Plain 5GS NAS message, not security protected |  |
| Spare half octet | '0000'B |  |  |
| ngKSI | The same value as the last AUTHENTICATION REQUEST message |  |  |
| Spare half octet | '0000'B |  |  |
| EAP message | EAP-failure | EAP-failure |  |
| ABBA | ‘0000 0000 0000 0000’B |  |  |
| NOTE: This message is sent within SECURITY PROTECTED 5GS NAS MESSAGE message with Integrity protected and ciphered. | | | |

Table 9.1.1.2.3.3-3: AUTHENTICATION RESPONSE (step 8, Table 9.1.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-2 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Extended protocol discriminator | 5GMM |  |  |
| Security header type | ’0000’B | Plain 5GS NAS message, not security protected |  |
| Spare half octet | '0000'B |  |  |
| EAP message | “EAP-request/AKA'-challenge” |  |  |
| NOTE: This message is sent within SECURITY PROTECTED 5GS NAS MESSAGE message with Integrity protected and ciphered. | | | |

Table 9.1.1.2.3.3-4: AUTHENTICATION REQUEST (step 9, Table 9.1.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-1 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Extended protocol discriminator | 5GMM |  |  |
| Security header type | ’0000’B | Plain 5GS NAS message, not security protected |  |
| Spare half octet | '0000'B |  |  |
| EAP message | “EAP-request /AKA'-notification“ | See Table 9.1.1.2.3.3-8 |  |
| NOTE: This message is sent within SECURITY PROTECTED 5GS NAS MESSAGE message with Integrity protected and ciphered. | | | |

Table 9.1.1.2.3.3-5: AUTHENTICATION RESPONSE (step 10, Table 9.1.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-2 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Extended protocol discriminator | 5GMM |  |  |
| Security header type | ’0000’B | Plain 5GS NAS message, not security protected |  |
| Spare half octet | '0000'B |  |  |
| EAP message | “EAP-response/AKA'-notification“ | See Table 9.1.1.2.3.3-9 |  |
| NOTE: This message is sent within SECURITY PROTECTED 5GS NAS MESSAGE message with Integrity protected and ciphered. | | | |

Table 9.1.1.2.3.3-6: AUTHENTICATION REJECT (step 11, Table 9.1.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-5 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Extended protocol discriminator | 5GMM |  |  |
| Security header type | ’0000’B | Plain 5GS NAS message, not security protected |  |
| Spare half octet | '0000'B |  |  |
| EAP message | EAP-failure | EAP-failure |  |
| NOTE: This message is sent within SECURITY PROTECTED 5GS NAS MESSAGE message with Integrity protected and ciphered. | | | |

Table 9.1.1.2.3.3-7: REGISTRATION REQUEST (step16, Table 9.1.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type | '001'B | Initial registration |  |
| ngKSI |  |  |  |
| NAS key set identifier | '111'B | no key is available |  |
| TSC | Any allowed value | TSC does not apply for NAS key set identifier value "111" |  |
| Last visited registered TAI | Not present |  |  |
| 5GS mobile identity | SUCI of the UE |  |  |

Table 9.1.1.2.3.3-8: EAP-Request/AKA'-Notification (Table 9.1.1.2.3.3-4)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: IETF RFC 4187 [30] clause 9.10, RFC 3748 [32] clause 4 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Code | 1 | Request |  |
| Length | Set to length of EAP packet |  |  |
| Data |  |  |  |
| AT\_NOTIFICATION | AT\_NOTIFICATION\_Def | See Table 9.1.1.2.3.3-10 |  |

Table 9.1.1.2.3.3-9: EAP-Response/AKA'-Notification (Table 9.1.1.2.3.2-5)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: IETF RFC 4187 [30] clause 9.11, RFC 3748 [32] clause 4 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Code | 2 | Response |  |
| Length | Set to length of EAP packet |  |  |
| Data | Not present |  |  |

Table 9.1.1.2.3.3-10: AT\_NOTIFICATION\_Def (Table 9.1.1.2.3.3-8)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: IETF RFC 4187 [30] clause 10.19 | | | |
| Information Element | Value/remark | Comment | Condition |
| AT\_NOTIFICATION | '0000 1100'B | 12 |  |
| Length | '0000 0001'B | 1 |  |
| Notification Code | '0100 0000 0000 0000'B | Set to “General failure” |  |

#### 9.1.1.3 EAP based primary authentication and key agreement / EAP message transport / Abnormal

9.1.1.3.1 Test Purpose (TP)

(1)

**with** { the UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { the SS sends the EAP-request/AKA'-challenge message within AUTHENTICATION REQUEST with ngKSI is already in use }

**then** { the UE sends an AUTHENTICATION FAILURE message with 5GMM cause #71 "ngKSI already in use" }

}

(2)

**with** { the UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { the third time SS sends the EAP-request/AKA'-challenge message within AUTHENTICATION REQUEST with ngKSI is already in use }

**then** { the UE locally releases the RRC connection and treats the active cell as barred }

}

(3)

**with** { the UE in 5GMM-REGISTERED-INITIATED state, the SS sends the EAP-request/AKA'-challenge message within AUTHENTICATION REQUEST with ngKSI is already in use and the UE sends an AUTHENTICATION FAILURE message }

**ensure that** {

**when** { T3520 times out }

**then** { the UE locally releases the RRC connection and treats the active cell as barred }

}

(4)

**Void**

(5)

**with** { the UE in 5GMM-REGISTERED state and initiates a mobility registration update procedure }

**ensure that** {

**when** { the SS sends the EAP-request/AKA'-challenge message within AUTHENTICATION REQUEST and the UE fails on transmission of AUTHENTICATION RESPONSE message with the indication from lower layers }

**then** { the UE re-initiate the mobility registration update procedure }

}

9.1.1.3.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501 clauses 5.4.1.2.4.5. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.4.1.2.4.5 (TP1, TP2, TP3, TP4, TP5)]

The following abnormal cases can be identified:

a) Authentication failure (5GMM cause #71 "ngKSI already in use").

The UE shall send an AUTHENTICATION FAILURE message, with 5GMM cause #71 "ngKSI already in use", to the network and start the timer T3520 (see example in figure 5.4.1.3.7.1). Furthermore, the UE shall stop any of the retransmission timers that are running (e.g. T3510, T3517 or T3521). Upon the first receipt of an AUTHENTICATION FAILURE message from the UE with 5GMM cause #71 "ngKSI already in use", the network performs necessary actions to select a new ngKSI and send the same EAP-request message to the UE.

NOTE 1: Upon receipt of an AUTHENTICATION FAILURE message from the UE with 5GMM cause #71 "ngKSI already in use", the network can also re-initiate the EAP based primary authentication and key agreement procedure (see subclause 5.4.1.2.2.2).

Upon receiving a new AUTHENTICATION REQUEST message with the EAP message IE containing an EAP-request message from the network, the UE shall stop timer T3520, if running, process the EAP-request message as normal.

If the network is validated successfully (an AUTHENTICATION REQUEST message that contains a valid ngKSI and EAP-request message is received), the UE shall send the AUTHENTICATION RESPONSE message to the network and shall start any retransmission timers (e.g. T3510, T3517 or T3521) if they were running and stopped when the UE received the first failed AUTHENTICATION REQUEST message.

b) Transmission failure of AUTHENTICATION RESPONSE message or AUTHENTICATION FAILURE message indication from lower layers (if the EAP based primary authentication and key agreement procedure is triggered by a registration procedure for mobility and periodic registration update).

The UE shall stop the timer T3520, if running, and re-initiate the registration procedure for mobility and periodic registration update.

c) Transmission failure of AUTHENTICATION RESPONSE message or AUTHENTICATION FAILURE message indication with TAI change from lower layers (if the EAP based primary authentication and key agreement procedure is triggered by a service request procedure).

The UE shall stop the timer T3520, if running.

If the current TAI is not in the TAI list, the EAP based primary authentication and key agreement procedure shall be aborted and a registration procedure for mobility and periodic registration update shall be initiated.

If the current TAI is still part of the TAI list, it is up to the UE implementation how to re-run the ongoing procedure that triggered the EAP based primary authentication and key agreement procedure.

…

e) Network failing the authentication check.

If the UE deems that the network has failed the authentication check, then it shall request RRC to locally release the RRC connection and treat the active cell as barred (see 3GPP TS 38.304 [28]). The UE shall start any retransmission timers (e.g. T3510, T3517 or T3521), if they were running and stopped when the UE received the first AUTHENTICATION REQUEST message containing an ngKSI that was already in use.

For item e, whether or not the UE is registered for emergency services:

The UE shall stop timer T3520, if the timer is running and the UE enters 5GMM-IDLE mode, e.g. upon detection of a lower layer failure, release of the N1 NAS signalling connection, or as the result of an inter-system change in 5GMM-CONNECTED mode from N1 mode to S1 mode.

The UE shall deem that the network has failed the authentication check or assume that the authentication is not genuine and proceed as described in item e above if any of the following occurs:

- the timer T3520 expires;

- the UE detects any combination of the EAP-based authentication failures: transmission of AUTHENTICATION FAILURE message with 5GMM cause #71 "ngKSI already in use", transmission of AUTHENTICATION RESPONSE message with an EAP-response message after detecting an error as described in subclause 5.4.1.2.2.4 or with an EAP-response message after not accepting of the server certificate as described in subclause 5.4.1.2.3.1, during three consecutive authentication challenges. The EAP-request/AKA'-challenge challenges shall be considered as consecutive only, if the EAP-request/AKA'-challenge challenges causing the second and third EAP-based authentication failure are received by the UE, while the timer T3520 started after the previous EAP-based authentication failure is running. Not accepting of the server certificate shall be considered as consecutive only, if the EAP-request messages causing the second and third not accepting of the server certificate are received by the UE, while the timer T3520 started after the previous EAP request message causing the previous not accepting of the server certificate is running.

NOTE 2: Reception of an EAP-failure message is not considered when determining the three consecutive authentication challenges or three consecutive not accepting of the server certificate.

…

9.1.1.3.3 Test description

9.1.1.3.3.1 Pre-test conditions

System Simulator:

- NGC Cell A, NGC Cell B, NGC Cell C and NGC Cell D are configured according to table 6.3.2.2-1 in TS 38.508-1 [4].

- System information combination NR-2 as defined in TS 38.508-1 [4] clause 4.4.3.1.2 is used.

UE:

- None

Preamble:

- The UE is in state Switched OFF Mode (state 0N-B) according to TS 38.508-1 [4].

9.1.1.3.3.2 Test procedure sequence

Table 9.1.1.3.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS configures:  - NGC Cell A as the "Serving cell".  - NGC Cell B, NGC Cell C and NGC Cell D as a "Non-suitable 'Off' cell". | - | - | - | - |
| - | The following messages are to be observed on NGC Cell A unless explicitly stated otherwise. | - | - | - | - |
| 2 | The UE is switched on. | - | - | - | - |
| 3-5 | The UE establishes RRC connection by executing steps 2-4 of Table 4.5.2.2-2 in TS 38.508-1 [4] and transmits a REGISTRATION REQUEST message. | --> | 5GMM: REGISTRATION REQUEST | - | - |
| 6 | SS transmits the EAP-request/AKA'-challenge message within an AUTHENTICATION REQUEST message, with ngKSI is already in use in the UE to initiate an EAP-AKA' procedure. | <-- | 5GMM: AUTHENTICATION REQUEST | - | - |
| 7 | Check: Does the UE respond with an AUTHENTICATION FAILURE message, with 5GMM cause "ngKSI already in use"? | --> | 5GMM: AUTHENTICATION FAILURE | 1 | P |
| 8 | SS transmits the EAP-request/AKA'-challenge message within an AUTHENTICATION REQUEST message, with ngKSI is already in use in the UE to initiate an EAP-AKA' procedure. | <-- | 5GMM: AUTHENTICATION REQUEST | - | - |
| 9 | Check: Does the UE respond with an AUTHENTICATION FAILURE message, with 5GMM cause "ngKSI already in use"? | --> | 5GMM: AUTHENTICATION FAILURE | 1 | P |
| 10 | The SS configures:  - NGC Cell B as the "Serving cell".  - NGC Cell A as a "Suitable neighbour intra-frequency cell". | - | - | - | - |
| 11 | SS transmits the EAP-request/AKA'-challenge message within an AUTHENTICATION REQUEST message, with ngKSI is already in use in the UE to initiate an EAP-AKA' procedure. | <-- | 5GMM: AUTHENTICATION REQUEST | - | - |
| 11a1 | EXCEPTION: The UE may send an AUTHENTICATION FAILURE before locally releasing the RRC Connection | --> | 5GMM: AUTHENTICATION FAILURE | - | - |
| - | The following messages are to be observed on NGC Cell B unless explicitly stated otherwise. | - | - | - | - |
| 12-14 | The UE establishes RRC connection by executing steps 2-4 of Table 4.5.2.2-2 in TS 38.508-1 [4]. | - | - | - | - |
| 15 | Check: Does the UE transmit a REGISTRATION REQUEST message with the 5GS registration type IE setting as Initial registration? | --> | 5GMM: REGISTRATION REQUEST | 2 | P |
| 16 | SS transmits the EAP-request/AKA'-challenge message within an AUTHENTICATION REQUEST message, with ngKSI is already in use in the UE to initiate an EAP-AKA' procedure. | <-- | 5GMM: AUTHENTICATION REQUEST | - | - |
| 17 | The UE responds with an AUTHENTICATION FAILURE message, with 5GMM cause "ngKSI already in use". | --> | 5GMM: AUTHENTICATION FAILURE | - | - |
| 17A | The SS starts timer of t\_Waits=T3520. | - | - | - | - |
| 18 | The SS configures:  - NGC Cell C as the "Serving cell".  - NGC Cell B as a "Suitable neighbour intra-frequency cell".  - NGC Cell A as the "Non-suitable ‘Off’ cell". | - | - | - | - |
| 19 | SS responds nothing and waits for the expiration of t\_Waits. | - | - | - | - |
| - | The following messages are to be observed on NGC Cell C unless explicitly stated otherwise. | - | - | - | - |
| 20-22 | The UE establishes RRC connection by executing steps 2-4 of Table 4.5.2.2-2 in TS 38.508-1 [4]. | - | - | - | - |
| 23 | Check: Does the UE transmit a REGISTRATION REQUEST message with the 5GS registration type IE setting as Initial registration? | --> | 5GMM: REGISTRATION REQUEST | 3 | P |
| 24-39a1 | The registration procedure is successfully completed by executing steps 5 to 20a1 of the generic procedure in TS 38.508-1 [4] Table 4.5.2.2-2. | - | - | - | - |
| - | The UE is in end state Registered, Idle Mode (1N-A) on NGC Cell C according to TS 38.508-1 [4]. | - | - | - | - |
| 40-44 | Void | - | - | - | - |
| 45 | The SS configures:  - NGC Cell D as the "Serving cell", and the tracking area of NGC Cell D is not in the list of tracking areas that the UE previously registered.  - NGC Cell C as the “Non-suitable ‘Off’ cell".  - NGC Cell B as the "Non-suitable ‘Off’ cell". | - | - | - | - |
| 46-47 | Void | - | - | - | - |
| - | The following messages are to be observed on Cell D unless explicitly stated otherwise. | - | - | - | - |
| 48-50 | The UE establishes RRC connection by executing steps 2-4 of Table 4.5.2.2-2 in TS 38.508-1 [4]. | - | - | - | - |
| 51 | The UE transmit a REGISTRATION REQUEST message with the 5GS registration type IE setting as Mobility registration updating. | --> | 5GMM: REGISTRATION REQUEST | - | - |
| 52 | The SS cuts off the UL grant and RA Response.  (Note 1) | - | - | - | - |
| 53 | SS transmits the EAP-request/AKA'-challenge message within a correct AUTHENTICATION REQUEST message to initiate an EAP-AKA' procedure. | <-- | 5GMM: AUTHENTICATION REQUEST | - | - |
| 54 | SS starts a timer t\_Delay = 10s.  (Note 2) | - | - | - | - |
| 55 | SS locally releases the RRC connection and waits for the expiration of t\_Delay. | - | - | - | - |
| 56 | The SS turn on the UL grant and RA Response. | - | - | - | - |
| 57-59 | The UE establishes RRC connection by executing steps 1-3 of Table 4.9.5.2.2-1 in TS 38.508-1 [4]. | - | - | - | - |
| 60 | Check: Does the UE transmit a REGISTRATION REQUEST message with the 5GS registration type IE setting as mobility registration updating? | --> | 5GMM: REGISTRATION REQUEST | 5 | P |
| 61-63a1 | The registration procedure is successfully completed by executing steps 4 to 6a1 of the generic procedure in TS 38.508-1 [4] Table 4.9.5.2.2-1. | - | - | - | - |
| Note 1: For transmission of the AUTHENTICATION RESPONSE message, the UE needs to initiate RACH to get UL grant. Since not RA Response, registration failure due to lower layer failure will occur, then timer T3511 will be started.  Note 2: Timer t\_Delay is derived from timer T3511. During timer t\_Delay, UE fails on transmission of the AUTHENTICATION RESPONSE message with the indication from lower layers. | | | | | |

9.1.1.3.3.3 Specific message contents

Table 9.1.1.3.3.3-1: AUTHENTICATION REQUEST (step 6, 8, 11 and 16, Table 9.1.1.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-1 | | | |
| Information Element | Value/Remark | Comment | Condition |
| ngKSI | ngKSI | SS shall use the ngKSI is already in use in the UE |  |

Table 9.1.1.3.3.3-2: AUTHENTICATION FAILURE (step 7, 9, 11a1 and 17, Table 9.1.1.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-4 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GMM cause | '0100 0111'B | ngKSI already in use |  |

Table 9.1.1.3.3.3-3: REGISTRATION REQUEST (step 15 and step 23, Table 9.1.1.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type | '001'B | Initial registration |  |

Table 9.1.1.3.3.3-4: REGISTRATION REQUEST (step 51 and step 60, Table 9.1.1.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type | '010'B | Mobility registration updating |  |

Table 9.1.1.3.3.3-5: AUTHENTICATION REQUEST (step 53, Table 9.1.1.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-1 | | | |
| Information Element | Value/Remark | Comment | Condition |
| ngKSI | ngKSI | Different from the ngKSI assigned in step 24. |  |

#### 9.1.1.4 5G AKA based primary authentication and key agreement / 5G-AKA related procedures

9.1.1.4.1 Test Purpose (TP)

(1)

**with** { the UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { the SS initiates a 5G AKA based primary authentication and key agreement procedure by sending AUTHENTICATION REQUEST with invalid MAC code }

**then** { the UE sends an AUTHENTICATION FAILURE message to the network, with the 5GMM cause #20 "MAC failure" }

}

(2)

**with** { the UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { the SS initiates a 5G AKA based primary authentication and key agreement procedure by sending AUTHENTICATION REQUEST with the "separation bit" in the AMF field of AUTN supplied by the core network is set to 0 }

**then** { the UE sends an AUTHENTICATION FAILURE message to the network, with the 5GMM cause #26 "non-5G authentication unacceptable" }

}

(3)

**with** { the UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { the SS initiates a 5G AKA based primary authentication and key agreement procedure by sending AUTHENTICATION REQUEST with the sequence number SQN to be out of range }

**then** { the UE sends an AUTHENTICATION FAILURE message to the network, with the 5GMM cause #21 "synch failure" and a re-synchronization token AUTS provided by the USIM }

}

(4)

**with** { the UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { the SS initiates a 5G AKA based primary authentication and key agreement procedure by sending AUTHENTICATION REQUEST }

**then** { the UE process the 5G authentication challenge data and respond with an AUTHENTICATION RESPONSE message }

}

(5)

**with** { the UE in 5GMM-REGISTERED-INITIATED state and sends out an AUTHENTICATION RESPONSE message }

**ensure that** {

**when** { the SS proceeds with the registration procedure }

**then** { the UE consider the authentication procedure complete and succeed }

}

9.1.1.4.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501 clauses 5.4.1.3.3, 5.4.1.3.6, 5.4.1.3.7. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.4.1.3.3]

The UE shall respond to an AUTHENTICATION REQUEST message. With the exception of the cases described in subclause 5.4.1.3.5, the UE shall process the 5G authentication challenge data and respond with an AUTHENTICATION RESPONSE message to the network.

Upon a successful 5G authentication challenge, the new KAMF calculated from the 5G authentication challenge data shall be stored in a new 5G NAS security context in the volatile memory of the ME.

[TS 24.501, clause 5.4.1.3.6]

In the 5G authentication challenge, the UE shall check the 5G authentication challenge data (RAND, AUTN and ngKSI) received in the AUTHENTICATION REQUEST message to verify authenticity of the 5G core network.

The ME shall check that ngKSI received in the AUTHENTICATION REQUEST message is not already in use. The ME shall forward the RAND and AUTN to the USIM to check.

The UE may reject the core network due to an incorrect AUTN or ngKSI parameter. If the UE has to reject the 5G authentication challenge, the UE shall return AUTHENTICATION FAILURE message to the network with a cause value indicating the reason for the failure (see 3GPP TS 33.501 [24]).

Incorrect 5G authentication challenge data contains four possible causes for authentication failure:

a) MAC code failure:

If the UE finds the MAC code (supplied by the core network in the AUTN parameter) to be invalid, the UE shall send an AUTHENTICATION FAILURE message to the network, with the 5GMM cause #20 "MAC failure". The UE shall then follow the procedure described in subclause 5.4.1.3.7, item c.

b) Non-5G authentication unacceptable:

If the UE finds that the "separation bit" in the AMF field of AUTN supplied by the core network is set to 0, the UE shall send an AUTHENTICATION FAILURE message to the network, with the 5GMM cause #26 "non-5G authentication unacceptable" (see subclause 6.1.3 in 3GPP TS 33.501 [24]). The UE shall then follow the procedure described in subclause 5.4.1.3.7, item d.

...

d) SQN failure:

If the UE finds the sequence number SQN (supplied by the core network in the AUTN parameter) to be out of range, the UE shall send an AUTHENTICATION FAILURE message to the network, with the 5GMM cause #21 "synch failure" and a re-synchronization token AUTS provided by the USIM (see 3GPP TS 33.102 [23]). The UE shall then follow the procedure described in subclause 5.4.1.3.7, item f.

[TS 24.501, clause 5.4.1.3.7]

c) Authentication failure (5GMM cause #20 "MAC failure").

The UE shall send an AUTHENTICATION FAILURE message, with 5GMM cause #20 "MAC failure" according to subclause 5.4.1.3.6, to the network and start timer T3520 (see example in figure 5.4.1.3.7.1). Furthermore, the UE shall stop any of the retransmission timers that are running (e.g. T3510, T3517 or T3521). Upon the first receipt of an AUTHENTICATION FAILURE message from the UE with 5GMM cause #20 "MAC failure", the network may initiate the identification procedure described in subclause 5.4.3. This is to allow the network to obtain the SUCI from the UE. The network may then check that the 5G-GUTI originally used in the 5G authentication challenge corresponded to the correct SUPI. Upon receipt of the IDENTITY REQUEST message from the network, the UE shall proceed as specified in subclause 5.4.3.3.

NOTE 1: Upon receipt of an AUTHENTICATION FAILURE message from the UE with 5GMM cause #20 "MAC failure", the network may also terminate the 5G AKA based primary authentication and key agreement procedure (see subclause 5.4.1.3.5).

If the mapping of 5G-GUTI to SUPI in the network was incorrect, the network should respond by sending a new AUTHENTICATION REQUEST message to the UE. Upon receiving the new AUTHENTICATION REQUEST message from the network, the UE shall stop the timer T3520, if running, and then process the 5G challenge information as normal. If the mapping of 5G-GUTI to SUPI in the network was correct, the network should terminate the 5G AKA based primary authentication and key agreement procedure by sending an AUTHENTICATION REJECT message (see subclause 5.4.1.3.5).

If the network is validated successfully (an AUTHENTICATION REQUEST message that contains a valid SQN and MAC is received), the UE shall send the AUTHENTICATION RESPONSE message to the network and shall start any retransmission timers (e.g. T3510, T3517 or T3521) if they were running and stopped when the UE received the first failed AUTHENTICATION REQUEST message.

If the UE receives the second AUTHENTICATION REQUEST message, and the MAC value cannot be resolved, the UE shall follow the procedure specified in this subclause, item c, starting again from the beginning, or if the message contains a UMTS authentication challenge, the UE shall follow the procedure specified in item d. If the SQN is invalid, the UE shall proceed as specified in item f.



Figure 5.4.1.3.7.1: Authentication failure during 5G AKA based primary authentication and key agreement procedure

d) Authentication failure (5GMM cause #26 "non-5G authentication unacceptable").

The UE shall send an AUTHENTICATION FAILURE message, with 5GMM cause #26 "non-5G authentication unacceptable", to the network and start the timer T3520 (see example in figure 5.4.1.3.7.1). Furthermore, the UE shall stop any of the retransmission timers that are running (e.g. T3510, T3517 or T3521). Upon the first receipt of an AUTHENTICATION FAILURE message from the UE with 5GMM cause #26 "non-5G authentication unacceptable", the network may initiate the identification procedure described in subclause 5.4.3. This is to allow the network to obtain the SUCI from the UE. The network may then check that the 5G-GUTI originally used in the 5G authentication challenge corresponded to the correct SUPI. Upon receipt of the IDENTITY REQUEST message from the network, the UE shall proceed as specified in subclause 5.4.3.3.

NOTE 2: Upon receipt of an AUTHENTICATION FAILURE message from the UE with 5GMM cause #26 "non-5G authentication unacceptable", the network may also terminate the 5G AKA based primary authentication and key agreement procedure (see subclause 5.4.1.3.5).

If the mapping of 5G-GUTI to SUPI in the network was incorrect, the network should respond by sending a new AUTHENTICATION REQUEST message to the UE. Upon receiving the new AUTHENTICATION REQUEST message from the network, the UE shall stop the timer T3520, if running, and then process the 5G challenge information as normal. If the mapping of 5G-GUTI to SUPI in the network was correct, the network should terminate the 5G AKA based primary authentication and key agreement authentication procedure by sending an AUTHENTICATION REJECT message (see subclause 5.4.1.3.5).

...

f) Authentication failure (5GMM cause #21 "synch failure").

The UE shall send an AUTHENTICATION FAILURE message, with 5GMM cause #21 "synch failure", to the network and start the timer T3520 (see example in figure 5.4.1.3.7.1). Furthermore, the UE shall stop any of the retransmission timers that are running (e.g. T3510, T3517 or T3521). Upon the first receipt of an AUTHENTICATION FAILURE message from the UE with the 5GMM cause #21 "synch failure", the network shall use the returned AUTS parameter from the authentication failure parameter IE in the AUTHENTICATION FAILURE message, to re-synchronise. The re-synchronisation procedure requires the AMF to delete all unused authentication vectors for that SUPI and obtain new vectors from the UDM/AUSF. When re-synchronisation is complete, the network shall initiate the 5G AKA based primary authentication and key agreement procedure. Upon receipt of the AUTHENTICATION REQUEST message, the UE shall stop the timer T3520, if running.

NOTE 4: Upon receipt of two consecutive AUTHENTICATION FAILURE messages from the UE with 5GMM cause #21 "synch failure", the network may terminate the 5G AKA based primary authentication and key agreement procedure by sending an AUTHENTICATION REJECT message.

If the network is validated successfully (a new AUTHENTICATION REQUEST message is received which contains a valid SQN and MAC) while T3520 is running, the UE shall send the AUTHENTICATION RESPONSE message to the network and shall start any retransmission timers (e.g. T3510, T3517 or T3521), if they were running and stopped when the UE received the first failed AUTHENTICATION REQUEST message.

Upon receipt of an AUTHENTICATION REJECT message, the UE shall perform the actions as specified in subclause 5.4.1.3.5.

9.1.1.4.3 Test description

9.1.1.4.3.1 Pre-test conditions

System Simulator:

- NR cell A.

UE:

- None.

Preamble:

- the UE is in state Switched OFF (state 0N-B) according to TS 38.508-1 [4].

9.1.1.4.3.2 Test procedure sequence

Table 9.1.1.4.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Switch the UE on | - | - | - | - |
| 2-4 | The UE establishes RRC connection and initiates registration procedure by executing steps 2-4 of Table 4.5.2.2-2 in TS 38.508-1 [4]. | - | - | - | - |
| 5 | The SS transmits an AUTHENTICATION REQUEST message which contains an invalid MAC code. | <-- | AUTHENTICATION REQUEST | - | - |
| 6 | Check: Does the UE respond with an AUTHENTICATION FAILURE message with 5GMM cause "MAC failure"? | --> | AUTHENTICATION FAILURE | 1 | P |
| 7 | SS transmits a correct AUTHENTICATION REQUEST message with RAND different to the one send in Step 5 | <-- | AUTHENTICATION REQUEST | - | - |
| 8 | Check: Does the UE respond with a correct AUTHENTICATION RESPONSE message with RES\* that is equal to the XRES\* calculated in the SS? | --> | AUTHENTICATION RESPONSE | 4 | P |
| 9 | SS transmits a NAS SECURITY MODE COMMAND message including the ngKSI of the new 5G NAS security context (as provided in step 7), to proceed with the registration procedure. | <-- | SECURITY MODE COMMAND | - | - |
| 10 | Check: Does the UE respond with NAS SECURITY MODE COMPLETE message integrity protected and ciphered with the new 5G NAS security context identified by the ngKSI received in the SECURITY MODE COMMAND message in step 9. | --> | SECURITY MODE COMPLETE | 5 | P |
| 11-20a1 | Steps 10-19a1 of the generic procedure (TS 38.508-1 Table 4.5.2.2-2 [4]) are executed to successfully complete the registration procedure. | - | - | - | - |
| 21 | Switch off UE in RRC\_CONNECTED as described in TS 38.508-1 [4] subclause 4.9.6.3 | - | - | - | - |
| 22-25 | Steps 1-4 above are repeated | - | - | - | - |
| 26 | SS transmits an AUTHENTICATION REQUEST message with "separation bit" in the AMF field is 0. | <-- | AUTHENTICATION REQUEST | - | - |
| 27 | Check: Does the UE respond with an AUTHENTICATION FAILURE message, with 5GMM cause " Non-5G authentication unacceptable "? | --> | AUTHENTICATION FAILURE | 2 | P |
| 28 | SS transmits a correct AUTHENTICATION REQUEST message with RAND different to the one send in Step 26 | <-- | AUTHENTICATION REQUEST | - | - |
| 29 | Check: Does the UE respond with a correct AUTHENTICATION RESPONSE message with RES\* that is equal to the XRES\* calculated in the SS? | --> | AUTHENTICATION RESPONSE | 4 | P |
| 30-41a1 | Steps 8-19a1 of the generic procedure (TS 38.508-1 Table 4.5.2.2-2 [4]) are executed to successfully complete the registration procedure. | - | - | - | - |
| 42 | Switch off UE in RRC\_CONNECTED as described in TS 38.508-1 [4] subclause 4.9.6.3 | - | - | - | - |
| 43-46 | Steps 1-4 above are repeated | - | - | - | - |
| 47 | SS transmits AUTHENTICATION REQUEST message with the AMF field in the IE "Authentication parameter AUTN" set to "AMFRESYNCH" value to trigger SQN re-synchronisation procedure in test USIM | <-- | AUTHENTICATION REQUEST | - | - |
| 48 | Check: Does the UE respond with an AUTHENTICATION FAILURE message, with 5GMM cause "Synch failure" and Authentication failure parameter? | --> | AUTHENTICATION FAILURE | 3 | P |
| 49 | SS transmits a correct AUTHENTICATION REQUEST message with RAND different to the one send in Step 47. | <-- | AUTHENTICATION REQUEST | - | - |
| 50 | Check: Does the UE respond with a correct AUTHENTICATION RESPONSE message with RES\* that is equal to the XRES\* calculated in the SS? | --> | AUTHENTICATION RESPONSE | 4 | P |
| 51-62a1 | Steps 8-19a1of the generic procedure (TS 38.508-1 Table 4.5.2.2-2 [4]) are executed to successfully complete the registration procedure. | - | - | - | - |

9.1.1.4.3.3 Specific message contents

Table 9.1.1.4.3.3-1: AUTHENTICATION RESPONSE (step 8, step 29 and step 50，Table 9.1.1.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508, Table 4.7.1-2 | | | |
| Information Element | Value/remark | Comment | Condition |
| Authentication response parameter | RES\* equal to the XRES\* calculated in the SS with the parameters provided/indicated in the AUTHENTICATION REQUEST |  |  |

Table 9.1.1.4.3.3-2: AUTHENTICATION REQUEST (step 5, Table 9.1.1.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508, Table 4.7.1-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Authentication parameter AUTN | Invalid MAC | SS shall calculate the correct MAC value as specified in TS 33.102 and use any different value, e.g. correct\_MAC+5. |  |

Table 9.1.1.4.3.3-3: AUTHENTICATION FAILURE (step 6, Table 9.1.1.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508, Table 4.7.1-4 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | '0001 0100'B | MAC failure |  |

Table 9.1.1.4.3.3-4: AUTHENTICATION REQUEST (step 26, Table 9.1.1.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508, Table 4.7.1-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Authentication parameter AUTN | "separation bit"=0 | The "separation bit" in the AMF field of AUTN supplied by the core network is 0. |  |

Table 9.1.1.4.3.3-5: AUTHENTICATION FAILURE (step 27, Table 9.1.1.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508, Table 4.7.1-4 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | '0001 1010'B | Non-5G authentication unacceptable |  |

Table 9.1.1.4.3.3-6: AUTHENTICATION REQUEST (step 47, Table 9.1.1.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508, Table 4.7.1-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Authentication parameter AUTN | AMF field set to "AMFRESYNCH",  AMFRESYNCH = '1111 1111 1111 1111'B | AMFRESYNCH see TS 34.108, 8.1.2.2 |  |

Table 9.1.1.4.3.3-7: AUTHENTICATION FAILURE (step 48, Table 9.1.1.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508, Table 4.7.1-4 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | '0001 0101'B | Synch failure |  |
| Authentication failure parameter | AUTS | AUTS see TS 34.108, 8.1.2.2 |  |

#### 9.1.1.5 5G AKA based primary authentication and key agreement / Reject

9.1.1.5 Test Purpose (TP)

(1)

**with** { the UE in 5GMM-REGISTERED-INITIATED state and SS initiates a 5G AKA based primary authentication and key agreement procedure }

**ensure that** {

**when** { the SS sends an a AUTHENTICATION REJECT message }

**then** { the UE deletes the stored 5G-GUTI, last visited registered TAI and ngKSI and enter state 5GMM-DEREGISTERED, the USIM is considered invalid until switching off the UE. }

}

9.1.1.5.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501 clauses 5.4.1.3.5. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.4.1.3.5]

If the authentication response (RES) returned by the UE is not valid, the network response depends upon the type of identity used by the UE in the initial NAS message, that is:

- if the 5G-GUTI was used; or

- if the SUCI was used.

If the 5G-GUTI was used, the network should initiate an identification procedure to retrieve SUCI from the UE and restart the 5G AKA based primary authentication and key agreement procedure with the received SUCI.

If the SUCI was used for identification in the initial NAS message or in a restarted 5G AKA based primary authentication and key agreement procedure, or the network decides not to initiate the identification procedure to retrieve SUCI from the UE after an unsuccessful 5G AKA based primary authentication and key agreement procedure, the network should send an AUTHENTICATION REJECT message to the UE.

Upon receipt of an AUTHENTICATION REJECT message,

1) if the message has been successfully integrity checked by the NAS, the UE shall set the update status to 5U3 ROAMING NOT ALLOWED, delete the stored 5G-GUTI, TAI list, last visited registered TAI and ngKSI.

In case of PLMN, the USIM shall be considered invalid until switching off the UE or the UICC containing the USIM is removed. In case of SNPN, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN shall be considered invalid until the UE is switched off or the entry is updated.

- The UE shall set:

i) the counter for "SIM/USIM considered invalid for GPRS services" events and the counter for "SIM/USIM considered invalid for 5GS services over non-3GPP access" events in case of PLMN; or

ii) the counter for "the entry for the current SNPN considered invalid for 3GPP access" events in case of SNPN;

to UE implementation-specific maximum value. If the UE maintains a counter for "SIM/USIM considered invalid for non-GPRS services", then the UE shall set this counter to UE implementation-specific maximum value; and

- if the UE is operating in single-registration mode, the UE shall handle 4G-GUTI, TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the authentication procedure is not accepted by the network. The USIM shall be considered as invalid also for non-EPS services until switching off or the UICC containing the USIM is removed.

2) if the message is received without integrity protection, the UE shall start timer T3247 with a random value uniformly drawn from the range between 30 minutes and 60 minutes, if the timer is not running (see subclause 5.3.20). Additionally, the UE shall:

a) if the message is received over 3GPP access, and the counter for "SIM/USIM considered invalid for GPRS services" events or the counter for "the entry for the current SNPN considered invalid for 3GPP access" events has a value less than a UE implementation-specific maximum value, proceed as specified in subclause 5.3.20, list item 1)-a) of clause 5.3.20.2 (if the UE is not SNPN enabled or is not operating in SNPN access mode) or list item a) of clause 5.30.20.3 (if the UE is operating in SNPN access mode) for the case that the 5GMM cause value received is #3;

b) if the message is received over non-3GPP access, and the counter for "SIM/USIM considered invalid for 5GS services over non-3GPP access" events has a value less than a UE implementation-specific maximum value, proceed as specified in subclause 5.3.20, list item 1)-b) of clause 5.3.20.2 for the case that the 5GMM cause value received is #3.

c) otherwise

i) if the 5GMM cause value is received over 3GPP access, the UE shall:

- set the update status for 3GPP access to 5U3 ROAMING NOT ALLOWED, delete for 3GPP access only the stored 5G-GUTI, TAI list, last visited registered TAI and ngKSI. The USIM shall be considered invalid for 5GS services via 3GPP access and non-EPS service until switching off the UE or the UICC containing the USIM is removed or the entry of the "list of subscriber data" with the SNPN identity of the current SNPN shall be considered invalid for 3GPP access until the UE is switched off or the entry is updated.

- The UE shall set the counter for "SIM/USIM considered invalid for GPRS services" events or the counter for "the entry for the current SNPN considered invalid for 3GPP access" events to UE implementation-specific maximum value. If the UE maintains a counter for "SIM/USIM considered invalid for non-GPRS services", then the UE shall set this counter to UE implementation-specific maximum value.

- If the UE is operating in single-registration mode, the UE shall handle 4G-GUTI, TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the authentication procedure is not accepted by the network. The USIM shall be considered as invalid also for non-EPS services until switching off or the UICC containing the USIM is removed; and

ii) if the 5GMM cause value is received over non-3GPP access, the UE shall:

- set the update status for non-3GPP access to 5U3 ROAMING NOT ALLOWED, delete for non-3GPP access only the stored 5G-GUTI, TAI list, last visited registered TAI and ngKSI. The USIM shall be considered invalid for 5GS services via non-3GPP access until switching off the UE or the UICC containing the USIM is removed.

The UE shall set the counter for "SIM/USIM considered invalid for 5GS services over non-3GPP access" events to UE implementation-specific maximum value.

If the AUTHENTICATION REJECT message is received by the UE, the UE shall abort any 5GMM signalling procedure, stop any of the timers T3510, T3516, T3517, T3519 or T3521 (if they were running), enter state 5GMM-DEREGISTERED and delete any stored SUCI.

Depending on local requirements or operator preference for emergency services, if the UE initiates a registration procedure with 5GS registration type IE set to "emergency registration" and the AMF is configured to allow emergency registration without user identity, the AMF needs not follow the procedures specified for the authentication failure in the present subclause. The AMF may continue a current 5GMM specific procedure.

9.1.1.5.3 Test description

9.1.1.5.3.1 Pre-test conditions

System Simulator:

- NGC Cell A "Serving cell" TS 38.508-1 [4] Table 6.2.2.1-3

UE:

- None

Preamble:

- The UE is in state Switched OFF (state 0N-B) according to TS 38.508-1 [4].

9.1.1.5.3.2 Test procedure sequence

Table 9.1.1.5.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2-4 | The UE executes steps 2-4 of Table 4.5.2.2-2 in TS38.508-1 [4]. | - | - | - | - |
| 5 | The SS transmits an AUTHENTICATION REQUEST message |  | 5GMM: AUTHENTICATION REQUEST | - | - |
| 6 | The UE transmits an AUTHENTICATION RESPONSE |  | 5GMM: AUTHENTICATION RESPONSE | - | - |
| 7 | The SS transmits an AUTHENTICATION REJECT message | <-- | 5GMM: AUTHENTICATION REJECT | - | - |
| 8 | SS releases the RRC connection | - | - | - | - |
| 9 | Check: Does the UE transmit an RRCSetupRequest message for initial registration procedure within the next 30 seconds? | --> | NR RRC: RRCSetupRequest | 1 | F |
| 10 | The UE is switched off by executing generic procedure in Table 4.9.6.4-1 in TS 38.508-1 [4]. | - | - | - | - |
| 11 | The UE is switched on. | - | - | - | - |
| 12 | Check: Does the UE transmit a REGISTRATION REQUEST message? | --> | 5GMM: REGISTRATION REQUEST | 1 | P |
| 13-28a1 | The UE executes steps 5-20a1 of Table 4.5.2.2-2 in TS 38.508-1 [4] complete registration procedure. | - | - | - | - |

9.1.1.5.3.3 Specific message contents

Table 9.1.1.5.3.3-1: REGISTRATION REQUEST (step 4, Table 9.1.1.5.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type |  |  |  |
| 5GS registration type value | '001'B | initial registration |  |

Table 9.1.1.5.3.3-2: REGISTRATION REQUEST (step 12, Table 9.1.1.5.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type |  |  |  |
| 5GS registration type value | '001'B | initial registration |  |
| ngKSI | ‘111’ | no key is available |  |
| 5GS mobile identity | SUCI of the UE | a freshly generated SUCI |  |
| Last visited registered TAI | Not present |  |  |

#### 9.1.1.6 5G AKA based primary authentication and key agreement / Abnormal

9.1.1.6 Test Purpose (TP)

(1)

**with** { the UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { the SS initiates a 5G AKA based primary authentication and key agreement procedure by sending AUTHENTICATION REQUEST with ngKSI is already in use }

**then** { the UE sends an AUTHENTICATION FAILURE message to the network, with the 5GMM cause #71 "ngKSI already in use" }

}

(2)

**with** { the UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { the third time SS initiates 5G AKA based primary authentication and key agreement procedure by sending AUTHENTICATION REQUEST with ngKSI is already in use }

**then** { the UE locally releases the RRC connection and treats the active cell as barred }

}

(3)

**with** { the UE in 5GMM-REGISTERED-INITIATED state, the SS sends an AUTHENTICATION REQUEST with ngKSI is already in use and the UE sends an AUTHENTICATION FAILURE message }

**ensure that** {

**when** { T3520 times out }

**then** { the UE locally releases the RRC connection and treats the active cell as barred }

}

(4)

**Void**

(5)

**with** { the UE in 5GMM-REGISTERED state and initiates a mobility registration update procedure }

**ensure that** {

**when** { the SS initiates a 5G AKA based primary authentication and key agreement procedure by sending AUTHENTICATION REQUEST and the UE fails on transmission of AUTHENTICATION RESPONSE message with the indication from lower layers }

**then** { the UE re-initiate the mobility registration update procedure }

}

9.1.1.6.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501 clauses 5.4.1.3.7. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.4.1.3.7]

e) Authentication failure (5GMM cause #71 "ngKSI already in use").

The UE shall send an AUTHENTICATION FAILURE message, with 5GMM cause #71 "ngKSI already in use", to the network and start the timer T3520 (see example in figure 5.4.1.3.7.1). Furthermore, the UE shall stop any of the retransmission timers that are running (e.g. T3510, T3517 or T3521). Upon the first receipt of an AUTHENTICATION FAILURE message from the UE with 5GMM cause #71 "ngKSI already in use", the network performs necessary actions to select a new ngKSI and send the same 5G authentication challenge to the UE.

…

g) Network failing the authentication check.

If the UE deems that the network has failed the authentication check, then it shall request RRC to locally release the RRC connection and treat the active cell as barred (see 3GPP TS 38.304 [28]). The UE shall start any retransmission timers (e.g. T3510, T3517 or T3521), if they were running and stopped when the UE received the first AUTHENTICATION REQUEST message containing an incorrect authentication challenge data causing authentication failure.

h) Transmission failure of AUTHENTICATION RESPONSE message or AUTHENTICATION FAILURE message indication from lower layers (if the 5G AKA based primary authentication and key agreement procedure is triggered by a registration procedure for mobility and periodic registration update).

The UE shall stop the timer T3520, if running, and re-initiate the registration procedure for mobility and periodic registration update.

…

i) Transmission failure of AUTHENTICATION RESPONSE message or AUTHENTICATION FAILURE message indication with TAI change from lower layers (if the 5G AKA based primary authentication and key agreement procedure is triggered by a service request procedure).

The UE shall stop the timer T3520, if running.

If the current TAI is not in the TAI list, the 5G AKA based primary authentication and key agreement procedure shall be aborted and a registration procedure for mobility and periodic registration update shall be initiated.

If the current TAI is still part of the TAI list, it is up to the UE implementation how to re-run the ongoing procedure that triggered the 5G AKA based primary authentication and key agreement procedure.

…

For items c, d, e, and f whether or not the UE is registered for emergency services:

…

The UE shall deem that the network has failed the authentication check or assume that the authentication is not genuine and proceed as described in item g above if any of the following occurs:

- the timer T3520 expires;

- the UE detects any combination of the 5G authentication failures: 5GMM causes #20 "MAC failure", #21 "synch failure", #26 "non-5G authentication unacceptable" or #71 "ngKSI already in use", during three consecutive authentication challenges. The 5G authentication challenges shall be considered as consecutive only, if the 5G authentication challenges causing the second and third 5G authentication failure are received by the UE, while the timer T3520 started after the previous 5G authentication failure is running.

9.1.1.6.3 Test description

9.1.1.6.3.1 Pre-test conditions

System Simulator:

- NGC Cell A, NGC Cell B, NGC Cell C and NGC Cell D are configured according to table 6.3.2.2-1 in TS 38.508-1 [4].

- The SS configures the NGC Cell A as the "Serving cell" and other NGC Cells as "Non-suitable "Off" cell".

- System information combination NR-2 as defined in TS 38.508-1 [4] clause 4.4.3.1.2 is used.

UE:

- None.

Preamble:

- The UE is in test state 0N-B on NGC Cell A according to TS 38.508-1 [4]. The ngKSI-1 has been assigned and security context has been established.

9.1.1.6.3.2 Test procedure sequence

Table 9.1.1.6.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| - | The following messages are to be observed on NGC Cell A unless explicitly stated otherwise. | - | - | - | - |
| 0 | The UE is switched on. | - | - | - | - |
| 0A | The UE establishes RRC connection by executing steps 2-4 of Table 4.5.2.2-2 in TS 38.508-1 [4] and transmits a REGISTRATION REQUEST message. | --> | 5GMM: REGISTRATION REQUEST | - | - |
| 1 | The SS initiates a 5G AKA based primary authentication and key agreement procedure by sending AUTHENTICATION REQUEST with ngKSI is already in use (ngKSI-1). | <-- | 5GMM: AUTHENTICATION REQUEST | - | - |
| 2 | Check: Does the UE send an AUTHENTICATION FAILURE message to the network, with the 5GMM cause #71 "ngKSI already in use"? | --> | 5GMM: AUTHENTICATION FAILURE | 1 | P |
| 3 | The SS initiates a 5G AKA based primary authentication and key agreement procedure by sending AUTHENTICATION REQUEST with ngKSI is already in use (ngKSI-1). | <-- | 5GMM: AUTHENTICATION REQUEST | - | - |
| 4 | Check: Does the UE send an AUTHENTICATION FAILURE message to the network, with the 5GMM cause #71 "ngKSI already in use"? | --> | 5GMM: AUTHENTICATION FAILURE | 1 | P |
| 5 | Void | - | - | - | - |
| 6 | The SS initiates a 5G AKA based primary authentication and key agreement procedure by sending AUTHENTICATION REQUEST with ngKSI is already in use (ngKSI-1). | <-- | 5GMM: AUTHENTICATION REQUEST | - | - |
| 6a1 | EXCEPTION: The UE may send an AUTHENTICATION FAILURE before locally releasing the RRC Connection. | --> | 5GMM: AUTHENTICATION FAILURE | - | - |
| 6A | Check: Does the UE transmit a RRCSetupRequest on NGC Cell A in the next 30 seconds? (Note 1) | --> | 5G RRC: RRCSetupRequest | 2 | F |
| 6B | The SS configures:  -NGC Cell B as the "Serving cell".  -NGC Cell A as a "Suitable neighbour intra-frequency cell". | - | - | - | - |
| - | The following messages are to be observed on NGC Cell B unless explicitly stated otherwise. | - | - | - | - |
| 7-9 | The UE establishes RRC connection by executing steps 2-4 of Table 4.5.2.2-2 in TS 38.508-1 [4]. | - | - | - | - |
| 10 | Check: Does the UE transmit a REGISTRATION REQUEST message with the 5GS registration type IE setting as initial registration? | --> | 5GMM: REGISTRATION REQUEST | 2 | P |
| 11 | The SS initiates a 5G AKA based primary authentication and key agreement procedure by sending AUTHENTICATION REQUEST with ngKSI is already in use (ngKSI-1). | <-- | 5GMM: AUTHENTICATION REQUEST | - | - |
| 12 | The UE sends an AUTHENTICATION FAILURE message to the network, with the 5GMM cause #71 "ngKSI already in use". | --> | 5GMM: AUTHENTICATION FAILURE | - | - |
| 12A | SS starts timer of t\_Waits=T3520. | - | - | - | - |
| 13 | Void | - | - | - | - |
| 14 | SS waits for the expiration of t\_Waits. | - | - | - | - |
| 14A | Check: Does the UE transmit a RRCSetupRequest on NGC Cell B in the next 30 seconds? (Note 1) | --> | 5G RRC: RRCSetupRequest | 2 | F |
| 14B | The SS configures:  -NGC Cell C as the "Serving cell".  -NGC Cell B as a "Suitable neighbour intra-frequency cell".  -NGC Cell A as a "Non-suitable "Off" cell" | - | - | - | - |
| - | The following messages are to be observed on NGC Cell C unless explicitly stated otherwise. | - | - | - | - |
| 15-17 | The UE establishes RRC connection by executing steps 2-4 of Table 4.5.2.2-2 in TS 38.508-1 [4]. | - | - | - | - |
| 18 | Check: Does the UE transmit a REGISTRATION REQUEST message with the 5GS registration type IE setting as initial registration? | --> | 5GMM: REGISTRATION REQUEST | 3 | P |
| 19-34a1 | Steps 5-20a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 35-39 | Void | - | - | - | - |
| 40 | The SS configures:  - NGC Cell D as the “Serving cell”.  - NGC Cell C as a “Non-suitable "Off" cell “.  - NGC Cell B as a "Non-suitable "Off" cell ". | - | - | - | - |
| 41-42 | Void | - | - | - | - |
| - | The following messages are to be observed on NGC Cell D unless explicitly stated otherwise. | - | - | - | - |
| 43-45 | The UE establishes RRC connection by executing steps 2-4 of Table 4.5.2.2-2 in TS 38.508-1 [4]. | - | - | - | - |
| 46 | The UE transmits a REGISTRATION REQUEST message with the 5GS registration type IE setting as Mobility registration updating. | --> | 5GMM: REGISTRATION REQUEST | - | - |
| 47 | The SS cuts off the UL grant and RA Response, so that the UE cannot send the AUTHENTICATION RESPONSE to SS. | - | - | - | - |
| 48 | SS transmits an AUTHENTICATION REQUEST message with ngKSI-2 to initiate the 5G-AKA procedure. | <-- | 5GMM: AUTHENTICATION REQUEST | - | - |
| 49 | SS starts timer of t\_Delay =10s. (Note2). | - | - | - | - |
| 50 | SS performs local release. | - | - | - | - |
| 51 | Check whether t\_Delay is still running, if it’s running, then waiting for timeout. | - | - | - | - |
| 52 | SS configures the RA Response. | - | - | - | - |
| 53 | Check: Does the test result of generic test procedure in TS 38.508-1 [4] subclause 4.9.5 indicate that the UE is camped on NGC Cell D? | - | - | 5 | P |
| Note 1: If the cell is not barred, after the transmission of REGISTRATION REQUEST, the UE will start T3510 and T3511. After 25s (T3510+T3511), the UE shall send REGISTRATION REQUEST.  Note 2: To send the AUTHENTICATION RESPONSE, the UE will initiate RACH to get UL grant. Since there is no RA Response, registration failure due to lower layer failure will occur, then T3511 will start. Timer t\_Delay is derived from T3511. During timer t\_Delay, UE fails on transmission of AUTHENTICATION RESPONSE message with the indication from lower layers. | | | | | |

9.1.1.6.3.3 Specific message contents

Table 9.1.1.6.3.3-1: AUTHENTICATION REQUEST (step 1, step 3, step 6 and step 11, Table 9.1.1.6.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-1 | | | |
| Information Element | Value/Remark | Comment | Condition |
| ngKSI | ngKSI-1 | The same with the ng-KSI assigned in Preamble. |  |

Table 9.1.1.6.3.3-2: AUTHENTICATION FAILURE (step 2, step 4, step 6a1 and step 12, Table 9.1.1.6.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-4 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GMM cause | ‘0100 0111’B | ngKSI already in use |  |

Table 9.1.1.6.3.3-3: AUTHENTICATION REQUEST (step 48, Table 9.1.1.6.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-1 | | | |
| Information Element | Value/Remark | Comment | Condition |
| ngKSI | ngKSI-2 | Different from the ng-KSI assigned in step 19 |  |

Table 9.1.1.6.3.3-4: REGISTRATION REQUEST (step 10 and step 18, Table 9.1.1.6.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type |  |  |  |
| 5GS registration type value | '001'B | initial registration |  |

Table 9.1.1.6.3.3-5: REGISTRATION REQUEST (step 46, Table 9.1.1.6.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type |  |  |  |
| 5GS registration type value | '010'B | mobility registration updating |  |

### 9.1.2 Security mode control

#### 9.1.2.1 NAS security mode command

9.1.2.1.1 Test Purpose (TP)

(1)

**with** { the UE is in 5GMM-REGISTERED-INITIATED state and the SS initiates the NAS security mode control procedure by sending a SECURITY MODE COMMAND message during initial registration procedure }

**ensure that** {

**when** { the UE receives an integrity protected SECURITY MODE COMMAND message including not matching replayed security capabilities }

**then** { the UE send a SECURITY MODE REJECT message and does not start applying the NAS security in both UL and DL }

}

(2)

**with** { the UE is in 5GMM-REGISTERED-INITIATED state and the SS initiates the NAS security mode control procedure by sending a SECURITY MODE COMMAND message during initial registration procedure }

**ensure that** {

**when** { the UE receives an integrity protected SECURITY MODE COMMAND message including IMEISV request }

**then** { the UE send an integrity protected and ciphered SECURITY MODE COMPLETE message including IMEISV **and** starts applying the NAS Security in both UL and DL }

}

9.1.2.1.2 Conformance requirements

References: The conformance requirements covered in the present test case are specified in: TS 24.501, clauses 5.4.2.1, 5.4.2.3 and 5.4.2.5. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.4.2.1]

The purpose of the NAS security mode control procedure is to take a 5G NAS security context into use, and initialise and start NAS signalling security between the UE and the AMF with the corresponding 5G NAS keys and 5G NAS security algorithms.

Furthermore, the network may also initiate the security mode control procedure in the following cases:

a) in order to change the 5G NAS security algorithms for a current 5G NAS security context already in use;

b) in order to change the value of uplink NAS COUNT used in the latest SECURITY MODE COMPLETE message as described in 3GPP TS 33.501 [24], subclause 6.9.4.4.

c) in order to provide the Selected EPS NAS security algorithms to the UE.

For restrictions concerning the concurrent running of a security mode control procedure with other security related procedures in the AS or inside the core network see 3GPP TS 33.501 [24], subclause 6.9.5.

[TS 24.501, clause 5.4.2.3]

Upon receipt of the SECURITY MODE COMMAND message, the UE shall check whether the security mode command can be accepted or not. This is done by performing the integrity check of the message, and by checking that the received Replayed UE security capabilities IE has not been altered compared to the latest values that the UE sent to the network.

When the SECURITY MODE COMMAND message includes an EAP-success message the UE handles the EAP-success message and the ABBA as described in subclause 5.4.1.2.2.8 and 5.4.1.2.3.1.

If:

a) the UE is registered for emergency services, performing initial registration for emergency services or establishing an emergency PDU session; or

b) the W-AGF acts on behalf of the FN-RG;

and the SECURITY MODE COMMAND message is received with ngKSI value "000" and 5G-IA0 and 5G-EA0 as selected 5G NAS security algorithms, the UE shall locally derive and take in use 5G NAS security context. The UE shall delete existing current 5G NAS security context.

The UE shall accept a SECURITY MODE COMMAND message indicating the "null integrity protection algorithm" 5G-IA0 as the selected 5G NAS integrity algorithm only if the message is received when the UE is registered for emergency services, performing initial registration for emergency services or establishing an emergency PDU session or when the W-AGF acts on behalf of the FN-RG.

If the type of security context flag included in the SECURITY MODE COMMAND message is set to "native security context" and if the ngKSI matches a valid non-current native 5G NAS security context held in the UE while the UE has a mapped 5G NAS security context as the current 5G NAS security context, the UE shall take the non-current native 5G NAS security context into use which then becomes the current native 5G NAS security context and delete the mapped 5G NAS security context.

The UE shall ignore the Replayed S1 UE security capabilities IE if this IE is included in the SECURITY MODE COMMAND message.

If the SECURITY MODE COMMAND message can be accepted, the UE shall take the 5G NAS security context indicated in the message into use. The UE shall in addition reset the uplink NAS COUNT counter if:

a) the SECURITY MODE COMMAND message is received in order to take a 5G NAS security context into use created after a successful execution of the 5G AKA based primary authentication and key agreement procedure or the EAP based primary authentication and key agreement procedure; or

b) the SECURITY MODE COMMAND message received includes the type of security context flag set to "mapped security context" in the NAS key set identifier IE the ngKSI does not match the current 5G NAS security context, if it is a mapped 5G NAS security context.

If the SECURITY MODE COMMAND message can be accepted and a new 5G NAS security context is taken into use and SECURITY MODE COMMAND message does not indicate the "null integrity protection algorithm" 5G-IA0 as the selected NAS integrity algorithm, the UE shall:

- if the SECURITY MODE COMMAND message has been successfully integrity checked using an estimated downlink NAS COUNT equal to 0, then the UE shall set the downlink NAS COUNT of this new 5G NAS security context to 0;

- otherwise the UE shall set the downlink NAS COUNT of this new 5G NAS security context to the downlink NAS COUNT that has been used for the successful integrity checking of the SECURITY MODE COMMAND message.

If the SECURITY MODE COMMAND message includes the horizontal derivation parameter indicating "KAMF derivation is required", the UE shall derive a new K'AMF, as specified in 3GPP TS 33.501 [24] for KAMF to K'AMF derivation in mobility, and set both uplink and downlink NAS COUNTs to zero. When the new 5G NAS security context is taken into use for current access and the UE is registered with the same PLMN over the 3GPP access and the non-3GPP access:

a) the UE is in 5GMM-IDLE mode over the non-current access, the AMF and the UE shall activate the new 5G NAS security context over the non-current access as described in 3GPP TS 33.501 [24]. The AMF and the UE shall set the downlink NAS COUNT and uplink NAS COUNT to zero for the non-current access; or

b) the UE is in 5GMM-CONNECTED mode over the non-current access, the AMF shall send the SECURITY MODE COMMAND message over the non-current access to activate the new 5G NAS security context that was activated over the current access as described in 3GPP TS 33.501 [24]. The AMF shall include the same ngKSI in the SECURITY MODE COMMAND message to identify the new 5G NAS security context.

If the SECURITY MODE COMMAND message includes the horizontal derivation parameter indicating "KAMF derivation is not required" or the Additional 5G security parameters IE is not included in the message, the UE is registered with the same PLMN over the 3GPP access and non-3GPP access, then after the completion of a security mode control procedure over the current access:

a) the UE is in 5GMM-IDLE mode over the non-current access, the AMF and the UE shall activate the new 5G NAS security context for the non-current access. If a primary authentication and key agreement procedure was completed before the security mode control procedure, the AMF and the UE shall set the downlink NAS COUNT and uplink NAS COUNT to zero for the non-current access, otherwise the downlink NAS COUNT and uplink NAS COUNT for the non-3GPP access are not changed; or

b) the UE is in 5GMM-CONNECTED mode over the non-current access, the AMF shall send the SECURITY MODE COMMAND message over the non-current access to activate the new 5G NAS security context that was activated over the current access as described in 3GPP TS 33.501 [24]. The AMF shall include the same ngKSI in the SECURITY MODE COMMAND message to identify the new 5G NAS security context.

If the SECURITY MODE COMMAND message can be accepted, the UE shall send a SECURITY MODE COMPLETE message integrity protected with the selected 5GS integrity algorithm and the 5G NAS integrity key based on the KAMF or mapped K'AMF if the type of security context flag is set to "mapped security context" indicated by the ngKSI. When the SECURITY MODE COMMAND message includes the type of security context flag set to "mapped security context" in the NAS key set identifier IE, then the UE shall check whether the SECURITY MODE COMMAND message indicates the ngKSI of the current 5GS security context, if it is a mapped 5G NAS security context, in order not to re-generate the K'AMF.

Furthermore, if the SECURITY MODE COMMAND message can be accepted, the UE shall cipher the SECURITY MODE COMPLETE message with the selected 5GS ciphering algorithm and the 5GS NAS ciphering key based on the KAMF or mapped K'AMF indicated by the ngKSI. The UE shall set the security header type of the message to "integrity protected and ciphered with new 5G NAS security context".

From this time onward the UE shall cipher and integrity protect all NAS signalling messages with the selected 5GS integrity and ciphering algorithms.

If the AMF indicated in the SECURITY MODE COMMAND message that the IMEISV is requested:

1) if the UE has an IMEISV, the UE shall include its IMEISV in the SECURITY MODE COMPLETE message; or

2) if the 5G-CRG or the W-AGF acting on behalf of the FN-CRG do not have an IMEISV, the 5G-CRG or the W-AGF acting on behalf of the FN-CRG shall include the 5G-CRG's cable modem MAC address or the FN-CRG's cable modem MAC address in the SECURITY MODE COMPLETE message.

If, during an ongoing registration procedure or service request procedure, the SECURITY MODE COMMAND message includes the Additional 5G security information IE with the RINMR bit set to "Retransmission of the initial NAS message requested", the UE shall include the entire uncyphered REGISTRATION REQUEST message or SERVICE REQUEST message, which the UE had previously included in the NAS message container IE of the initial NAS message (i.e. REGISTRATION REQUEST message or SERVICE REQUEST message, respectively), in the NAS message container IE of the SECURITY MODE COMPLETE message.

If, prior to receiving the SECURITY MODE COMMAND message, the UE without a valid 5G NAS security context had sent a REGISTRATION REQUEST message the UE shall include the entire REGISTRATION REQUEST message in the NAS message container IE of the SECURITY MODE COMPLETE message as described in subclause 4.4.6.

If the UE operating in the single-registration mode receives the Selected EPS NAS security algorithms IE, the UE shall use the IE according to 3GPP TS 33.501 [24].

For a UE operating in single-registration mode with N26 interface supported in the network, after an inter-system change from S1 mode to N1 mode in 5GMM-CONNECTED mode, the UE shall set the value of the Selected EPS NAS security algorithms IE in the 5G NAS security context to the NAS security algorithms that were received from the source MME when the UE was in S1 mode.

[TS 24.501, clause 5.4.2.5]

If the security mode command cannot be accepted, the UE shall send a SECURITY MODE REJECT message. The SECURITY MODE REJECT message contains a 5GMM cause that typically indicates one of the following cause values:

#23 UE security capabilities mismatch.

#24 security mode rejected, unspecified.

If the UE detects that the received Replayed UE security capabilities IE has been altered compared to the latest values that the UE sent to the network, the UE shall set the cause value to #23 "UE security capabilities mismatch".

Upon receipt of the SECURITY MODE REJECT message, the AMF shall stop timer T3560. The AMF shall also abort the ongoing procedure that triggered the initiation of the NAS security mode control procedure.

Both the UE and the AMF shall apply the 5G NAS security context in use before the initiation of the security mode control procedure, if any, to protect the SECURITY MODE REJECT message and any other subsequent messages according to the rules in subclause 4.4.4 and 4.4.5.

9.1.2.1.3 Test description

9.1.2.1.3.1 Pre-test conditions

System Simulator:

- NGC Cell A.

UE:

- None.

Preamble:

- The procedure defined in subclause 4.9.8 in 38.508-1 [4] has been performed to ensure that the UE does not have a valid 5G NAS security context

- The UE is in state 0-A on NGC Cell A according to TS 38.508-1 [4].

9.1.2.1.3.2 Test procedure sequence

Table 9.1.2.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2-2E | Steps 1-6 of the generic procedure for UE registration specified in TS 38.508-1 [4] table 4.5.2.2-2 are performed. | - | - | - | - |
| 3 | The SS transmits a SECURITY MODE COMMAND message to activate NAS security. It is integrity protected and includes unmatched replayed security capabilities. | <-- | SECURITY MODE COMMAND | - | - |
| 4 | Check: Does the UE transmit a SECURITY MODE REJECT message with cause’#23: UE security capabilities mismatch’? | --> | SECURITY MODE REJECT | 1 | P |
| 5 | The SS transmits an IDENTITY REQUEST message (Security not applied). | <-- | IDENTITY REQUEST | - | - |
| 6 | Check: Does the UE transmit a non security protected IDENTIY RESPONSE message? | --> | IDENTITY RESPONSE | 1 | P |
| 6A | The SS transmits an AUTHENTICATION REQUEST message to establish a new security context. (NOTE 1) | <-- | 5GMM: AUTHENTICATION REQUEST | - | - |
| 6B | The UE transmits an AUTHENTICATION RESPONSE message. | --> | 5GMM: AUTHENTICATION RESPONSE | - | - |
| 7 | The SS transmits a SECURITY MODE COMMAND message to activate NAS security. It is integrity protected and includes IMEISV. | <-- | SECURITY MODE COMMAND | - | - |
| 8 | Check: Does the UE transmit a SECURITY MODE COMPLETE message and does it establish the initial security configuration? | --> | SECURITY MODE COMPLETE | 2 | P |
| 9a1-9Ja1 | Steps 9a1-19a1 of the generic procedure for UE registration specified in TS 38.508-1 [4] table 4.5.2.2-2 are performed. | - | - | - | - |
| 10 | The SS transmits an IDENTITY REQUEST message (Security protected as per the algorithms specified in step 7). | <- | IDENTITY REQUEST | - | - |
| 11 | Check: Does the UE transmit an IDENTIY RESPONSE message (Security Protected as per the algorithms specified in step 7)? | -> | IDENTITY RESPONSE | 2 | P |
| NOTE 1: Upon receipt of the SECURITY MODE REJECT message at Step 4, Both the UE and the AMF shall apply the 5G NAS security context in use before the initiation of the security mode control procedure (see TS 24.501 [22], clause 5.4.2.5). This means that the UE may delete the partial context (that was created during authentication) on sending SMC reject at step 4. So, network will need to perform authentication again to establish a new security context prior to initating a SMC. | | | | | |

9.1.2.1.3.3 Specific message contents

Table 9.1.2.1.3.3-1: SECURITY MODE COMMAND (Step 3, Table 9.1.2.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4],table 4.7.1-25 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Replayed UE security capabilities | Set to mismatch the security capability of UE under test |  |  |

Table 9.1.2.1.3.3-2: SECURITY MODE REJECT (Step 4, Table 9.1.2.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4],table 4.7.1-27 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GMM cause | #23 |  |  |

Table 9.1.2.1.3.3-3: IDENTITY REQUEST (Step 5, Table 9.1.2.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4],table 4.7.1-21 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Identity type | '0001'B | SUCI |  |

Table 9.1.2.1.3.3-4: IDENTITY RESPONSE (Step 6, Table 9.1.2.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4],table 4.7.1-22 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Mobile identity |  |  |  |
| Type of identity | '001'B | SUCI |  |

Table 9.1.2.1.3.3-5: SECURITY MODE COMMAND (Step 7, Table 9.1.2.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-25 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Selected NAS security algorithms |  |  |  |
| Type of ciphering algorithm | Set according to PIXIT parameter for default ciphering algorithm if it is set to a value different to 5G-EA0, or, set to any value different to 5G-EA0 otherwise | Non-zero ciphering algorithm |  |
| IMEISV request | Present |  |  |

Table 9.1.2.1.3.3-6: SECURITY MODE COMPLETE (Step 8, Table 9.1.2.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-26 | | | |
| Information Element | Value/Remark | Comment | Condition |
| IMEISV | Present |  |  |

Table 9.1.2.1.3.3-7: IDENTITY REQUEST (Step 10, Table 9.1.2.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4],table 4.7.1-21 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Identity type | '0011'B | IMEI |  |

Table 9.1.2.1.3.3-8: IDENTITY RESPONSE (Step 11, Table 9.1.2.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4],table 4.7.1-22 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Mobile identity |  |  |  |
| Type of identity | '011'B | IMEI |  |

#### 9.1.2.2 Protection of initial NAS signalling messages

9.1.2.2.1 Test Purpose (TP)

(1)

**with** { the UE is switched-off with no valid 5G NAS security context }

**ensure that** {

**when** { the UE is switched on }

**then** {the UE sends a REGISTRATION REQUEST message including cleartext IEs only }

}

(2)

**with** { the UE is in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { the UE is activating a 5G NAS security context resulting from a security mode control procedure }

**then** {the UE sends SECURITY MODE COMPLETE message with the entire REGISTRATION REQUEST message }

}

9.1.2.2.2 Conformance requirements

References: The conformance requirements covered in the present test case are specified in: TS 24.501, clauses 4.4.6 and 5.5.1. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 4.4.6]

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

a) If the UE does not have a valid 5G NAS security context, the UE sends a REGISTRATION REQUEST message including cleartext IEs only. After activating a 5G NAS security context resulting from a security mode control procedure:

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

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

b) If the UE has a valid 5G NAS security context and the UE needs to send non-cleartext IEs in a REGISTRATION REQUEST or SERVICE REQUEST message, the UE includes the entire REGISTRATION REQUEST or SERVICE REQUEST message (i.e. containing both cleartext IEs and non-cleartext IEs) in the NAS message container IE and shall cipher the value part of the NAS message container IE. The UE shall then send a REGISTRATION REQUEST or SERVICE REQUEST message containing the cleartext IEs and the NAS message container IE.

When the initial NAS message is a REGISTRATION REQUEST message, the cleartext IEs are:

- Extended protocol discriminator;

- Security header type;

- Spare half octet;

- Registration request message identity;

- 5GS registration type;

- ngKSI;

- 5GS mobile identity;

- UE security capability;

- Additional GUTI;

- UE status; and

- EPS NAS message container.

…

When the UE sends a REGISTRATION REQUEST or SERVICE REQUEST message that includes a NAS message container IE, the UE shall set the security header type of the initial NAS message to "integrity protected".

If the UE does not need to send non-cleartext IEs in the initial NAS message, the UE shall send the initial NAS message i.e. REGISTRATION REQUEST or SERVICE REQUEST message with cleartext IEs only i.e. without including the NAS message container IE in the initial NAS message.

[TS 24.501, clause 5.5.1]

…

If the UE does not have a valid 5G NAS security context, the UE shall send the REGISTRATION REQUEST message without including the NAS message container IE. The UE shall include the entire REGISTRATION REQUEST message (i.e. containing cleartext IEs and non-cleartext IEs) in the NAS message container IE that is sent as part of the SECURITY MODE COMPLETE message as described in subclauses 4.4.6 and 5.2.4.

9.1.2.2.3 Test description

9.1.2.2.3.1 Pre-test conditions

System Simulator:

- NGC Cell A.

UE:

- None.

Preamble:

- The UE is in state 0-A on NGC Cell A according to TS 38.508-1 [4].

- The procedure defined in subclause 4.9.8 in TS 38.508-1 [4] has been performed to ensure that the UE does not have a valid 5G NAS security context.

9.1.2.2.3.2 Test procedure sequence

Table 9.1.2.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2-4 | Steps 1-3 of the generic procedure for UE registration specified in TS 38.508-1 [4] table 4.5.2.2-2 are performed. | - | - | - | - |
| 5 | Check: Does he UE transmit an *RRCSetupComplete* message and a REGISTRATION REQUEST message? | --> | REGISTRATION REQUEST | 1 | P |
| 6 | The SS transmits a *DLInformationTransfer* message and an AUTHENTICATION REQUEST message. | <-- | AUTHENTICATION REQUEST |  |  |
| 7 | The UE transmits an *ULInformationTransfer* message and an AUTHENTICATION RESPONSE message. | --> | AUTHENTICATION RESPONSE |  |  |
| 8 | The SS transmits a *DLInformationTransfer* message and a SECURITY MODE COMMAND message. | <-- | SECURITY MODE COMMAND |  |  |
| 9 | Check: Does the UE transmit an *ULInformationTransfer* message and a SECURITY MODE COMPLETE message? | --> | SECURITY MODE COMPLETE | 2 | P |
| 10-20 | Steps 10-20a1 of the generic procedure for UE registration specified in TS 38.508-1 [4] table 4.5.2.2-2 are performed. | - | - | - | - |

9.1.2.2.3.3 Specific message contents

Table 9.1.2.2.3.3-1: REGISTRATION REQUEST (Step 5, Table 9.1.2.2.3.2-1)

|  |
| --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-6 using condition NON\_CLEARTEXT\_IE = FALSE |

Table 9.1.2.2.3.3-2: REGISTRATION REQUEST (Step 9, Table 9.1.2.2.3.2-1)

|  |
| --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-6 using condition CIPHERED\_MESSAGE |

Table 9.1.2.2.3.3-3: SECURITY MODE COMPLETE (Step 9, Table 9.1.2.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-26 | | | |
| Information Element | Value/Remark | Comment | Condition |
| NAS message container | Contents of Table 9.1.2.2.3.3-2 | The entire REGISTRATION REQUEST message. |  |

#### 9.1.2.3 Integrity protection / Correct functionality of 5G NAS integrity algorithm / SNOW3G

9.1.2.3.1 Test Purpose (TP)

(1)

**with** { successful completion of 5G authentication and key agreement (AKA) procedure }

**ensure that** {

**when** { UE receives a an integrity protected SECURITY MODE COMMAND message instructing to start integrity protection using algorithm SNOW3G }

**then** { UE transmits an integrity protected SECURITY MODE COMPLETE using SNOW3G and starts applying the NAS Integrity protection in both UL and DL }

}

(2)

**with** { Integrity protection successful started by executing Security Mode Procedure }

**ensure that** {

**when** { UE receives an IDENTITY REQUEST message (requested identification parameter is not SUCI), without integrity protected }

**then** { UE does not transmit IDENTITY Response }

}

9.1.2.3.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501 clause 4.4.4.1, 4.4.4.2, 5.4.2.1, 5.4.2.2 and 5.4.2.3. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 4.4.4.1]

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

[TS 24.501, clause 4.4.4.2]

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

[TS 24.501, clause 5.4.2.1]

The purpose of the NAS security mode control procedure is to take a 5G NAS security context into use, and initialise and start NAS signalling security between the UE and the AMF with the corresponding 5G NAS keys and 5G NAS security algorithms.

[TS 24.501, clause 5.4.2.2]

The AMF initiates the NAS security mode control procedure by sending a SECURITY MODE COMMAND message to the UE and starting timer T3560 (see example in figure 5.4.2.2).

The AMF shall reset the downlink NAS COUNT counter and use it to integrity protect the initial SECURITY MODE COMMAND message if the security mode control procedure is initiated:

a) to take into use the security context created after a successful execution of the 5G AKA based primary authentication and key agreement procedure or the EAP based primary authentication and key agreement procedure; or

…

The AMF shall send the SECURITY MODE COMMAND message uncyphered, but shall integrity protect the message with the 5G NAS integrity key based on KAMF or mapped K'AMF indicated by the ngKSI included in the message. The AMF shall set the security header type of the message to "integrity protected with new 5G NAS security context".

…

The AMF shall include the replayed security capabilities of the UE (including the security capabilities with regard to NAS, RRC and UP (user plane) ciphering as well as NAS and RRC integrity, and other possible target network security capabilities, i.e. E-UTRAN if the UE included them in the message to network), the selected 5GS ciphering and integrity algorithms and the ngKSI.

[TS 24.501, clause 5.4.2.3]

Upon receipt of the SECURITY MODE COMMAND message, the UE shall check whether the security mode command can be accepted or not. This is done by performing the integrity check of the message, and by checking that the received Replayed UE security capabilities IE has not been altered compared to the latest values that the UE sent to the network.

…

If the type of security context flag included in the SECURITY MODE COMMAND message is set to "native security context" and if the ngKSI matches a valid non-current native 5G NAS security context held in the UE while the UE has a mapped 5G NAS security context as the current 5G NAS security context, the UE shall take the non-current native 5G NAS security context into use which then becomes the current native 5G NAS security context and delete the mapped 5G NAS security context.

…

If the SECURITY MODE COMMAND message can be accepted, the UE shall take the 5G NAS security context indicated in the message into use. The UE shall in addition reset the uplink NAS COUNT counter if:

a) the SECURITY MODE COMMAND message is received in order to take a 5G NAS security context into use created after a successful execution of the 5G AKA based primary authentication and key agreement procedure or the EAP based primary authentication and key agreement procedure; or

b) the SECURITY MODE COMMAND message received includes the type of security context flag set to "mapped security context" in the NAS key set identifier IE the ngKSI does not match the current 5G NAS security context, if it is a mapped 5G NAS security context.

…

If the SECURITY MODE COMMAND message can be accepted, the UE shall send a SECURITY MODE COMPLETE message integrity protected with the selected 5GS integrity algorithm and the 5G NAS integrity key based on the KAMF or mapped K'AMF if the type of security context flag is set to "mapped security context" indicated by the ngKSI. When the SECURITY MODE COMMAND message includes the type of security context flag set to "mapped security context" in the NAS key set identifier IE, then the UE shall check whether the SECURITY MODE COMMAND message indicates the ngKSI of the current 5GS security context, if it is a mapped 5G NAS security context, in order not to re-generate the K'AMF.

…

From this time onward the UE shall cipher and integrity protect all NAS signalling messages with the selected 5GS integrity and ciphering algorithms.

9.1.2.3.3 Test description

9.1.2.3.3.1 Pre-test conditions

System Simulator:

- NGC Cell A.

UE:

- None.

Preamble:

- The UE is in state Switched OFF (state 0N-B) according to TS 38.508-1 [4].

9.1.2.3.3.2 Test procedure sequence

Table 9.1.2.3.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2-6 | Steps 2-6 of the generic procedure for UE registration specified in TS 38.508-1 [4] table 4.5.2.2-2 are performed. | - | - | - | - |
| 7 | The SS transmits a SECURITY MODE COMMAND message to activate NAS security. It is integrity protected. | <-- | SECURITY MODE COMMAND | - | - |
| 8 | Check: Does the UE transmit a SECURITY MODE COMPLETE message and starts applying the NAS Integrity protection in both UL and DL? | --> | SECURITY MODE COMPLETE | 1 | P |
| 9-18a1 | Steps 10-19a1 of the generic procedure for UE registration specified in TS 38.508-1 [4] table 4.5.2.2-2 are performed. | - | - | - | - |
| 19 | The SS transmits an IDENTITY REQUEST message with Integrity protected and with default ciphering | <-- | IDENTITY REQUEST | - | - |
| 20 | Check: Does the UE transmit an IDENTIY RESPONSE message with Integrity Protected and with default ciphering? | --> | IDENTITY RESPONSE | 1 | P |
| 21 | The SS transmits an IDENTITY REQUEST message (not Integrity protected) | <-- | IDENTITY REQUEST | - | - |
| 22 | Check: Does the UE transmit an IDENTIY RESPONSE message within the next 5 seconds? | --> | IDENTITY RESPONSE | 2 | F |

9.1.2.3.3.3 Specific message contents

Table 9.1.2.3.3.3-1: SECURITY MODE COMMAND (Step 7, Table 9.1.2.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4],table 4.7.1-25 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Selected NAS security algorithms |  |  |  |
| Type of integrity protection algorithm | '0001'B | 5G integrity algorithm 128-5G-IA1 [SNOW3G] |  |

#### 9.1.2.4 Integrity protection / Correct functionality of 5G NAS integrity algorithm / AES

9.1.2.4.1 Test Purpose (TP)

(1)

**with** { successful completion of 5G authentication and key agreement (AKA) procedure }

**ensure that** {

**when** { UE receives a an integrity protected SECURITY MODE COMMAND message instructing to start integrity protection using algorithm AES }

**then** { UE transmits an integrity protected SECURITY MODE COMPLETE using AES and starts applying the NAS Integrity protection in both UL and DL }

}

(2)

**with** { Integrity protection successful started by executing Security Mode Procedure }

**ensure that** {

**when** { UE receives an IDENTITY REQUEST message (requested identification parameter is not SUCI), without integrity protected }

**then** { UE does not transmit IDENTITY Response }

}

9.1.2.4.2 Conformance requirements

Same Conformance requirements as in clause 9.1.2.3.2.

9.1.2.4.3 Test description

9.1.2.4.3.1 Pre-test conditions

Same Pre-test conditions as in clause 9.1.2.3.3.1.

9.1.2.4.3.2 Test procedure sequence

Same Test procedure sequence as in table 9.1.2.3.3.2-1, except the integrity protection algorithm is AES.

9.1.2.4.3.3 Specific message contents

Table 9.1.2.4.3.3-1: SECURITY MODE COMMAND (Step 7)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4],table 4.7.1-25 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Selected NAS security algorithms |  |  |  |
| Type of integrity protection algorithm | '0010'B | 5G integrity algorithm 128-5G-IA2 [AES] |  |

#### 9.1.2.5 Integrity protection / Correct functionality of 5G NAS integrity algorithm / ZUC

9.1.2.5.1 Test Purpose (TP)

(1)

**with** { successful completion of 5G authentication and key agreement (AKA) procedure }

**ensure that** {

**when** { UE receives a an integrity protected SECURITY MODE COMMAND message instructing to start integrity protection using algorithm ZUC }

**then** { UE transmits an integrity protected SECURITY MODE COMPLETE using ZUC and starts applying the NAS Integrity protection in both UL and DL }

}

(2)

**with** { Integrity protection successful started by executing Security Mode Procedure }

**ensure that** {

**when** { UE receives an IDENTITY REQUEST message (requested identification parameter is not SUCI), without integrity protected }

**then** { UE does not transmit IDENTITY Response }

}

9.1.2.5.2 Conformance requirements

Same Conformance requirements as in clause 9.1.2.3.2.

9.1.2.5.3 Test description

9.1.2.5.3.1 Pre-test conditions

Same Pre-test conditions as in clause 9.1.2.3.3.1.

9.1.2.5.3.2 Test procedure sequence

Same Test procedure sequence as in table 9.1.2.3.3.2-1, except the integrity protection algorithm is ZUC.

9.1.2.5.3.3 Specific message contents

Table 9.1.2.5.3.3-1: SECURITY MODE COMMAND (Step 7)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4],table 4.7.1-25 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Selected NAS security algorithms |  |  |  |
| Type of integrity protection algorithm | '0011'B | 5G integrity algorithm 128-5G-IA3 [ZUC] |  |

#### 9.1.2.6 Ciphering and deciphering / Correct functionality of 5G NAS encryption algorithm / SNOW3G

9.1.2.6.1 Test Purpose (TP)

(1)

**with** { successful completion of 5G authentication and key agreement (AKA) procedure }

**ensure that** {

**when** { UE receives a SECURITY MODE COMMAND instructing to start ciphering using algorithm SNOW3G }

**then** { UE sends a SECURITY MODE COMPLETE message ciphered with SNOW3G and starts applying the NAS ciphering in both UL and DL }

}

9.1.2.6.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501 clause 5.4.2.1, 5.4.2.2 and 5.4.2.3. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.4.2.1]

The purpose of the NAS security mode control procedure is to take a 5G NAS security context into use, and initialise and start NAS signalling security between the UE and the AMF with the corresponding 5G NAS keys and 5G NAS security algorithms.

[TS 24.501, clause 5.4.2.2]

The AMF initiates the NAS security mode control procedure by sending a SECURITY MODE COMMAND message to the UE and starting timer T3560 (see example in figure 5.4.2.2).

The AMF shall reset the downlink NAS COUNT counter and use it to integrity protect the initial SECURITY MODE COMMAND message if the security mode control procedure is initiated:

a) to take into use the security context created after a successful execution of the 5G AKA based primary authentication and key agreement procedure or the EAP based primary authentication and key agreement procedure; or

…

The AMF shall send the SECURITY MODE COMMAND message uncyphered, but shall integrity protect the message with the 5G NAS integrity key based on KAMF or mapped K'AMF indicated by the ngKSI included in the message. The AMF shall set the security header type of the message to "integrity protected with new 5G NAS security context".

…

The AMF shall include the replayed security capabilities of the UE (including the security capabilities with regard to NAS, RRC and UP (user plane) ciphering as well as NAS and RRC integrity, and other possible target network security capabilities, i.e. E-UTRAN if the UE included them in the message to network), the selected 5GS ciphering and integrity algorithms and the ngKSI.

[TS 24.501, clause 5.4.2.3]

Upon receipt of the SECURITY MODE COMMAND message, the UE shall check whether the security mode command can be accepted or not. This is done by performing the integrity check of the message, and by checking that the received Replayed UE security capabilities IE has not been altered compared to the latest values that the UE sent to the network.

…

If the type of security context flag included in the SECURITY MODE COMMAND message is set to "native security context" and if the ngKSI matches a valid non-current native 5G NAS security context held in the UE while the UE has a mapped 5G NAS security context as the current 5G NAS security context, the UE shall take the non-current native 5G NAS security context into use which then becomes the current native 5G NAS security context and delete the mapped 5G NAS security context.

…

If the SECURITY MODE COMMAND message can be accepted, the UE shall take the 5G NAS security context indicated in the message into use. The UE shall in addition reset the uplink NAS COUNT counter if:

a) the SECURITY MODE COMMAND message is received in order to take a 5G NAS security context into use created after a successful execution of the 5G AKA based primary authentication and key agreement procedure or the EAP based primary authentication and key agreement procedure; or

b) the SECURITY MODE COMMAND message received includes the type of security context flag set to "mapped security context" in the NAS key set identifier IE the ngKSI does not match the current 5G NAS security context, if it is a mapped 5G NAS security context.

…

If the SECURITY MODE COMMAND message can be accepted, the UE shall send a SECURITY MODE COMPLETE message integrity protected with the selected 5GS integrity algorithm and the 5G NAS integrity key based on the KAMF or mapped K'AMF if the type of security context flag is set to "mapped security context" indicated by the ngKSI. When the SECURITY MODE COMMAND message includes the type of security context flag set to "mapped security context" in the NAS key set identifier IE, then the UE shall check whether the SECURITY MODE COMMAND message indicates the ngKSI of the current 5GS security context, if it is a mapped 5G NAS security context, in order not to re-generate the K'AMF.

Furthermore, if the SECURITY MODE COMMAND message can be accepted, the UE shall cipher the SECURITY MODE COMPLETE message with the selected 5GS ciphering algorithm and the 5GS NAS ciphering key based on the KAMF or mapped K'AMF indicated by the ngKSI. The UE shall set the security header type of the message to "integrity protected and ciphered with new 5G NAS security context".

From this time onward the UE shall cipher and integrity protect all NAS signalling messages with the selected 5GS integrity and ciphering algorithms

9.1.2.6.3 Test description

9.1.2.6.3.1 Pre-test conditions

System Simulator:

- NGC Cell A.

UE:

- None.

Preamble:

- The UE is in state Switched OFF (state 0N-B) according to TS 38.508-1 [4].

9.1.2.6.3.2 Test procedure sequence

Table 9.1.2.6.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2-6 | Steps 2-6 of the generic procedure for UE registration specified in TS 38.508-1 [4] subclause 4.5.2.3 are performed. | - | - | - | - |
| 7 | The SS transmits a SECURITY MODE COMMAND message to activate NAS security. | <-- | SECURITY MODE COMMAND | - | - |
| 8 | Check: Does the UE transmit a SECURITY MODE COMPLETE message ciphered and starts applying the NAS ciphering in both UL and DL? | --> | SECURITY MODE COMPLETE | 1 | P |
| 9-18a1 | Steps 10-19a1 of the generic procedure for UE registration specified in TS 38.508-1 [4] table 4.5.2.2-2 are performed. | - | - | - | - |
| 19 | The SS transmits an IDENTITY REQUEST message Ciphered | <-- | IDENTITY REQUEST | - | - |
| 20 | Check: Does the UE transmit an IDENTIY RESPONSE message Ciphered? | --> | IDENTITY RESPONSE | 1 | P |

9.1.2.6.3.3 Specific message contents

Table 9.1.2.6.3.3-1: SECURITY MODE COMMAND (Step 7, Table 9.1.2.6.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4],table 4.7.1-25 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Selected NAS security algorithms |  |  |  |
| Type of ciphering algorithm | '0001'B | 5G encryption algorithm 128-5G-EA1 [SNOW3G] |  |

#### 9.1.2.7 Ciphering and deciphering / Correct functionality of 5G NAS encryption algorithm / AES

9.1.2.7.1 Test Purpose (TP)

(1)

**with** { successful completion of 5G authentication and key agreement (AKA) procedure }

**ensure that** {

**when** { UE receives a SECURITY MODE COMMAND instructing to start ciphering using algorithm AES }

**then** { UE sends a SECURITY MODE COMPLETE message ciphered with AES and starts applying the NAS ciphering in both UL and DL }

}

9.1.2.7.2 Conformance requirements

Same conformance requirement as in clause 9.1.2.6.2.

9.1.2.7.3 Test description

9.1.2.7.3.1 Pre-test conditions

Same Pre-test conditions as in clause 9.1.2.6.3.1.

9.1.2.7.3.2 Test procedure sequence

Same Test procedure sequence as in Table 9.1.2.6.3.2-1, except the ciphering algorithm is AES.

9.1.2.7.3.3 Specific message contents

Table 9.1.2.7.3.3-1: SECURITY MODE COMMAND (Step 7)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4],table 4.7.1-25 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Selected NAS security algorithms |  |  |  |
| Type of ciphering algorithm | '0010'B | 5G encryption algorithm 128-5G-EA2 [AES] |  |

#### 9.1.2.8 Ciphering and deciphering / Correct functionality of 5G NAS encryption algorithm / ZUC

9.1.2.8.1 Test Purpose (TP)

(1)

**with** { successful completion of 5G authentication and key agreement (AKA) procedure }

**ensure that** {

**when** { UE receives a SECURITY MODE COMMAND instructing to start ciphering using algorithm ZUC }

**then** { UE sends a SECURITY MODE COMPLETE message ciphered with ZUC and starts applying the NAS ciphering in both UL and DL }

}

9.1.2.8.2 Conformance requirements

Same conformance requirement as in clause 9.1.2.6.2.

9.1.2.8.3 Test description

9.1.2.8.3.1 Pre-test conditions

Same Pre-test conditions as in clause 9.1.2.6.3.1.

9.1.2.8.3.2 Test procedure sequence

Same Test procedure sequence as in Table 9.1.2.6.3.2-1, except the ciphering algorithm is ZUC.

9.1.2.8.3.3 Specific message contents

Table 9.1.2.8.3.3-1: SECURITY MODE COMMAND (Step 7)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4],table 4.7.1-25 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Selected NAS security algorithms |  |  |  |
| Type of ciphering algorithm | '0011'B | 5G encryption algorithm 128-5G-EA3 [ZUC] |  |

### 9.1.3 Identification

#### 9.1.3.1 Identification procedure

9.1.3.1.1 Test Purpose (TP)

(1)

**with** { The UE is in 5GMM-REGISTERED-INITIATED state and the SS sends an IDENTITY REQUEST message }

**ensure that** {

**when** { UE detects transmission failure of IDENTITY RESPONSE message }

**then** { The UE re-initiates the Initial registration procedure }

}

(2)

**with** { The UE is in 5GMM-CONNECTED mode and the SS sends an IDENTITY REQUEST message }

**ensure that** {

**when** { The UE receives the unprotected IDENTITY REQUEST message with identity type as SUCI }

**then** { UE transmits the IDENTITY RESPONSE message with identity type set to SUCI }

}

(3)

**with** { The UE is in 5GMM-CONNECTED mode and the SS sends an IDENTITY REQUEST message }

**ensure that** {

**when** { the UE receives an IDENTITY REQUEST with identity type set as IMEISV }

**then** { UE transmits an IDENTITY RESPONSE with identity type set as IMEISV }

}

(4)

**with** { The UE is in 5GMM-CONNECTED mode and the SS sends an IDENTITY REQUEST message }

**ensure that** {

**when** { the UE receives an IDENTITY REQUEST with identity type set as “IMEI” }

**then** { UE transmits an IDENTITY RESPONSE with identity type set as “IMEI” }

}

(5)

**with** { The UE is in 5GMM-CONNECTED mode and the SS sends an IDENTITY REQUEST message }

**ensure that** {

**when** { the UE receives an IDENTITY REQUEST with identity type set as “5G-GUTI” and has no valid 5G-GUTI available }

**then** { UE transmits an IDENTITY RESPONSE with identity type set as “No identity” }

}

9.1.3.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clauses 5.4.3.3, 4.4.4.3 and 5.4.3.5. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.4.3.3]

A UE shall be ready to respond to an IDENTITY REQUEST message at any time whilst in 5GMM-CONNECTED mode.

Upon receipt of the IDENTITY REQUEST message:

a) if the Identity type IE in the IDENTITY REQUEST message is not set to "SUCI", the UE shall send an IDENTITY RESPONSE message to the network. The IDENTITY RESPONSE message shall contain the identification parameters as requested by the network; and

b) if the Identity type IE in the IDENTITY REQUEST message is set to "SUCI", the UE shall:

1) if timer T3519 is not running, generate a fresh SUCI as specified in 3GPP TS 33.501 [24], send an IDENTITY RESPONSE message with the SUCI, start timer T3519 and store the value of the SUCI sent in the IDENTITY RESPONSE message; and

2) if timer T3519 is running, send an IDENTITY RESPONSE message with the stored SUCI.

[TS 24.501, clause 4.4.4.3]

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

a) REGISTRATION REQUEST;

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

c) AUTHENTICATION RESPONSE;

d) AUTHENTICATION FAILURE;

e) SECURITY MODE REJECT;

f) DEREGISTRATION REQUEST; and

g) DEREGISTRATION ACCEPT;

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

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

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

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

a) REGISTRATION REQUEST;

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

c) AUTHENTICATION RESPONSE;

d) AUTHENTICATION FAILURE;

e) SECURITY MODE REJECT;

f) DEREGISTRATION REQUEST;

g) DEREGISTRATION ACCEPT; and

h) SERVICE REQUEST;

…

[TS 24.501, clause 5.4.3.5]

The following abnormal cases can be identified:

a) Transmission failure of the IDENTITY RESPONSE message (if the identification procedure is triggered by a registration procedure).

The UE shall re-initiate the registration procedure.

b) Requested identity is not available

If the UE cannot encode the requested identity in the IDENTITY RESPONSE message, e.g. because no valid USIM is available, then it shall encode the identity type as "No identity".

9.1.3.1.3 Test description

9.1.3.1.3.1 Pre test conditions

System Simulator:

- NGC Cell A is configured as "Serving cell" according to TS 38.508-1 [4] Table 6.3.2.2-1.

- System information combination NR-1 as defined in TS 38.508-1 [4] clause 4.4.3.1.2 is used.

UE:

None.

Preamble:

- The UE is in state Switched OFF (State 0N-B) as per TS 38.508-1 [4] Table 4.4A.2-0.

9.1.3.1.3.2 Test procedure sequence

Table 9.1.3.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| - | Void | - | - | - | - |
| 1 | The UE is switched on. | - | - | - | - |
| 2-4 | The UE establishes RRC connection by executing steps 2-4 of Table 4.5.2.2-2 in TS 38.508-1 [4]. | - | - | - | - |
| 5 | SS is configured to not allocate any UL grant and RA Response, so that the UE cannot send the IDENTITY RESPONSE to SS. | - | - | - | - |
| 6 | The SS transmits an IDENTITY REQUEST requesting SUCI in the IE identity type. | <-- | IDENTITY REQUEST | - | - |
| 6A | SS starts timer of T3511 (Note 1). | - | - | - | - |
| 6B | SS locally releases the RRC connection. | - | - | - | - |
| 6C | Wait for T3511 to time out. | - | - | - | - |
| 6D | SS configures the RA Response. | - | - | - | - |
| 7-9 | The UE establishes RRC connection by executing steps 2-4 of Table 4.5.2.2-2 in TS 38.508-1 [4]. (Note 2) | - | - | 1 | P |
| 10 | The SS transmits an unprotected IDENTITY REQUEST requesting SUCI in the IE identity type. | <-- | IDENTITY REQUEST | - | - |
| 11 | Check: Does the UE respond with an IDENTITY RESPONSE message with IE identity type set to “SUCI”? | --> | IDENTITY RESPONSE | 2 | P |
| 11A | The SS transmits a REGISTRATION REJECT (Cause #3, illegal UE). | <-- | REGISTRATION REJECT | - | - |
| 11B | The SS releases the RRC. | - | - | - | - |
| 11C | The UE is Switched OFF. | - | - | - | - |
| 11D | The UE is Switched ON. | - | - | - | - |
| 12-24 | Steps 1–13 of Table 4.5.2.2-2 in TS 38.508-1 [4] are performed. | - |  |  |  |
| 25 | The SS transmits an IDENTITY REQUEST requesting 5G-GUTI in the IE identity type. | <-- | IDENTITY REQUEST | - | - |
| 26 | Check: Does the UE respond with an IDENTITY RESPONSE message with IE identity type set to “No identity”? | --> | IDENTITY RESPONSE | 5 | P |
| 27-29Ba1 | Steps 14-19a1 of Table 4.5.2.2-2 in TS 38.508-1 [4] are performed. | - | - | - | - |
| 30 | The SS transmits an IDENTITY REQUEST requesting IMEISV in the IE identity type. | <-- | IDENTITY REQUEST | - | - |
| 31 | Check: Does the UE respond with an IDENTITY RESPONSE message with IE identity type set to IMEISV? | --> | IDENTITY RESPONSE | 3 | P |
| 32 | The SS transmits an IDENTITY REQUEST requesting IMEI in the IE identity type. | <-- | IDENTITY REQUEST | - | - |
| 33 | Check: Does the UE respond with an IDENTITY RESPONSE message with IE identity type set to IMEI? | --> | IDENTITY RESPONSE | 4 | P |
| 34-35 | Void | - | - | - | - |
| Note 1: To send the IDENTITY RESPONSE, the UE will initiate RACH to get UL grant. Since there is no RA Response, registration failure due to lower layer failure will occur, then T3511 will start.  Note 2: The UL grant is restarted in step 8. | | | | | |

9.1.3.1.3.3 Specific message contents

Table 9.1.3.1.3.3-1: IDENTITY REQUEST (step 6, 10 Table 9.1.3.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-21 | | | |
| Information Element | Value/remark | Comment | Condition |
| Identity type | ‘001’B | SUCI |  |

Table 9.1.3.1.3.3-2: IDENTITY RESPONSE (step 11 Table 9.1.3.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-22 | | | |
| Information Element | Value/remark | Comment | Condition |
| Identity type | ‘001’B | SUCI |  |

Table 9.1.3.1.3.3-3: IDENTITY REQUEST (step 30 Table 9.1.3.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-21 | | | |
| Information Element | Value/remark | Comment | Condition |
| Identity type | ‘101’B | IMEISV |  |

Table 9.1.3.1.3.3-4: IDENTITY RESPONSE (step 31 Table 9.1.3.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-22 | | | |
| Information Element | Value/remark | Comment | Condition |
| Identity type | ‘101’B | IMEISV |  |

Table 9.1.3.1.3.3-5: IDENTITY REQUEST (step 32 Table 9.1.3.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-21 | | | |
| Information Element | Value/remark | Comment | Condition |
| Identity type | ‘011’B | IMEI |  |

Table 9.1.3.1.3.3-6: IDENTITY RESPONSE (step 33 Table 9.1.3.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-22 | | | |
| Information Element | Value/remark | Comment | Condition |
| Identity type | ‘011’B | IMEI |  |

Table 9.1.3.1.3.3-7: IDENTITY REQUEST (step 25 Table 9.1.3.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-21 | | | |
| Information Element | Value/remark | Comment | Condition |
| Identity type | ‘010’B | 5G-GUTI |  |

Table 9.1.3.1.3.3-8: IDENTITY RESPONSE (step 26 Table 9.1.3.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-22 | | | |
| Information Element | Value/remark | Comment | Condition |
| Identity type | ‘000’B | No Identity |  |

Table 9.1.3.1.3.3-9: Void

Table 9.1.3.1.3.3-10: REGISTRATION REJECT (step 11A Table 9.1.3.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | ‘00000011’B | Illegal UE |  |

### 9.1.4 Generic UE configuration update

#### 9.1.4.1 Generic UE configuration update / New 5G-GUTI, NITZ, registration requested, network slicing indication, new allowed NSSAI / Acknowledgement from the UE

9.1.4.1.1 Test Purpose (TP)

(1)

**with** { UE in 5GMM-REGISTERED state }

**ensure that** {

**when** { UE receives a new 5G-GUTI in the CONFIGURATION UPDATE COMMAND message and acknowledgement from the UE is requested }

**then** { UE sends a CONFIGURATION UPDATE COMPLETE message and UE shall consider new 5G-GUTI as valid }

}

(2)

**with** { UE in 5GMM-REGISTERED state }

**ensure that** {

**when** { UE receives a NITZ information in the CONFIGURATION UPDATE COMMAND message and acknowledgement from the UE is not requested }

**then** { UE updates NITZ information }

}

(3)

**with** { UE in 5GMM-REGISTERED state }

**ensure that** {

**when** { UE receives CONFIGURATION UPDATE COMMAND message indicating “registration requested” and contains no other parameters }

**then** { UE deletes any stored allowed NSSAI for this PLMN and then release the existing N1 NAS signalling connection, starts a mobility registration procedure }

}

(4)

**with** { UE in 5GMM-REGISTERED state }

**ensure that** {

**when** { UE receives a new allowed NSSAI in the CONFIGURATION UPDATE COMMAND message and registration is not requested }

**then** { UE replaces any stored allowed NSSAI for this PLMN with new allowed NSSAI }

}

(5)

**with** { UE in 5GMM-REGISTERED state }

**ensure that** {

**when** { UE receives a Network Slicing subscription change indication set to "Network slicing subscription changed" in the CONFIGURATION UPDATE COMMAND message and registration is not requested }

**then** { UE deletes the network slicing information for each and every PLMN except for the current PLMN and default configured NSSAI }

}

9.1.4.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clause 4.6.2.2, 5.4.4.1, 5.4.4.2, 5.4.4.3, 5.5.1.2.2 and 5.5.1.3.2. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501 clause 4.6.2.2]

If available, the configured NSSAI(s) shall be stored in a non-volatile memory in the ME as specified in annex C.

…

If the UE receives the CONFIGURATION UPDATE COMMAND message indicating "registration requested" and contains no other parameters (see subclauses 5.4.4.2 and 5.4.4.3), the UE shall delete any stored allowed NSSAI for this PLMN, and delete any stored mapping of each S-NSSAI of the allowed NSSAI to the S-NSSAI(s) of the HPLMN, if available;

…

d) When the UE receives the Network slicing indication IE with the Network slicing subscription change indication set to "Network slicing subscription changed" in the REGISTRATION ACCEPT message or in the CONFIGURATION UPDATE COMMAND message, the UE shall delete the network slicing information for each of the PLMNs that the UE has slicing information stored for (excluding the current PLMN). The UE shall not delete the default configured NSSAI. Additionally, the UE shall update the network slicing information for the current PLMN (if received) as specified above in bullets a), b) and c):

[TS 24.501 clause 5.4.4.1]

The purpose of this procedure is to:

a) allow the AMF to update the UE configuration for access and mobility management-related parameters decided and provided by the AMF by providing new parameter information within the command; or

b) request the UE to perform a registration procedure for mobility and periodic registration update towards the network to update access and mobility management-related parameters decided and provided by the AMF (see subclause 5.5.1.3).

This procedure is initiated by the network and can only be used when the UE has an established 5GMM context, and the UE is in 5GMM-CONNECTED mode. When the UE is in 5GMM-IDLE mode, the AMF may use the paging or notification procedure to initiate the generic UE configuration update procedure. The AMF can request a confirmation response in order to ensure that the parameter has been updated by the UE.

This procedure shall be initiated by the network to assign a new 5G-GUTI to the UE after a successful service request procedure invoked as a response to a paging request from the network and before the release of the N1 NAS signalling connection. If the service request procedure was triggered due to 5GSM downlink signalling pending, the procedure for assigning a new 5G-GUTI can be initiated by the network after the transport of the 5GSM downlink signalling.

The following parameters are supported by the generic UE configuration update procedure without the need to request the UE to perform the registration procedure for mobility and periodic registration update:

a) 5G-GUTI;

b) TAI list;

c) Service area list;

d) Network identity and time zone information (Full name for network, short name for network, local time zone, universal time and local time zone, network daylight saving time);

e) LADN information;

f) Rejected NSSAI;

g) Network slicing indication;

h) Operator-defined access category definitions; and

i) SMS indication.

The following parameters can be sent to the UE with or without a request to perform the registration procedure for mobility and periodic registration update:

a) Allowed NSSAI; or

b) Configured NSSAI.

The following parameter is sent to the UE with a request to perform the registration procedure for mobility and periodic registration update:

a) MICO indication.

The following parameters are sent over 3GPP access only:

a) LADN information;

b) MICO indication;

c) TAI list; and

d) Service area list.

The following parameters are managed and sent per access type i.e., independently over 3GPP access or non 3GPP access:

a) Allowed NSSAI; and

b) Rejected NSSAI (when the NSSAI is rejected for the current registration area).

The following parameters are managed commonly and sent over 3GPP access or non 3GPP access:

a) 5G-GUTI;

b) Network identity and time zone information;

c) Rejected NSSAI (when the NSSAI is rejected for the current PLMN);

d) Configured NSSAI; and

e) SMS indication.



Figure 5.4.4.1.1: Generic UE configuration update procedure

[TS 24.501 clause 5.4.4.2]

The AMF shall initiate the generic UE configuration update procedure by sending the CONFIGURATION UPDATE COMMAND message to the UE.

The AMF shall in the CONFIGURATION UPDATE COMMAND message either:

a) include one or more of the following parameters: 5G-GUTI, TAI list, allowed NSSAI that may include the mapped S-NSSAI(s), LADN information, service area list, MICO indication NITZ information, configured NSSAI that may include the mapped S-NSSAI(s), rejected NSSAI, network slicing indication, operator-defined access category definitions or SMS indication;

b) include the Configuration update indication IE with the Registration requested bit set to "registration requested"; or

c) include a combination of both a) and b).

If an acknowledgement from the UE is requested, the AMF shall indicate "acknowledgement requested" in the Acknowledgement bit of the Configuration update indication IE in the CONFIGURATION UPDATE COMMAND message and shall start timer T3555. Acknowledgement shall be requested for all parameters except when only NITZ is included.

To initiate parameter re-negotiation between the UE and network, the AMF shall indicate "registration requested" in the Registration requested bit of the Configuration update indication IE in the CONFIGURATION UPDATE COMMAND message.

If a new allowed NSSAI information or AMF re-configuration of supported S-NSSAIs requires an AMF relocation, the AMF shall indicate "registration requested" in the Registration requested bit of the Configuration update indication IE and include the Allowed NSSAI IE in the CONFIGURATION UPDATE COMMAND message.

If the AMF includes a new configured NSSAI in the CONFIGURATION UPDATE COMMAND message and the new configured NSSAI requires an AMF relocation as specified in 3GPP TS 23.501 [8], the AMF shall indicate "registration requested" in the Registration requested bit of the Configuration update indication IE in the message.

If the AMF indicates "registration requested" in the Registration requested bit of the Configuration update indication IE, acknowledgement shall be requested.

If changes to the allowed NSSAI require the UE to initiate a registration procedure, but the AMF is unable to determine an allowed NSSAI for the UE as specified in 3GPP TS 23.501 [8], the CONFIGURATION UPDATE COMMAND message shall indicate "registration requested" in the Registration requested bit of the Configuration update indication IE, and shall not contain any other parameters.

If the AMF needs to update the LADN information, the AMF shall include the LADN information in the LADN information IE of the CONFIGURATION UPDATE COMMAND message.

During an established 5GMM context, the network may send none, one, or more CONFIGURATION UPDATE COMMAND messages to the UE. If more than one CONFIGURATION UPDATE COMMAND message is sent, the messages need not have the same content.

[TS 24.501 clause 5.4.4.3]

Upon receiving the CONFIGURATION UPDATE COMMAND message, the UE shall stop timer T3346 if running and use the contents to update appropriate information stored within the UE.

If "acknowledgement requested" is indicated in the Acknowledgement bit of the Configuration update indication IE in the CONFIGURATION UPDATE COMMAND message, the UE shall send a CONFIGURATION UPDATE COMPLETE message.

If the UE receives a new 5G-GUTI in the CONFIGURATION UPDATE COMMAND message, the UE shall consider the new 5G-GUTI as valid, the old 5G-GUTI as invalid, stop timer T3519 if running, and delete any stored SUCI; otherwise, the UE shall consider the old 5G-GUTI as valid. The UE shall provide the 5G-GUTI to the lower layer of 3GPP access if the CONFIGURATION UPDATE COMMAND message is sent over the non-3GPP access, and the UE is in 5GMM-REGISTERED in both 3GPP access and non-3GPP access in the same PLMN.

If the UE receives a new TAI list in the CONFIGURATION UPDATE COMMAND message, the UE shall consider the new TAI list as valid and the old TAI list as invalid; otherwise, the UE shall consider the old TAI list as valid.

If the UE receives a new service area list in the CONFIGURATION UPDATE COMMAND message, the UE shall consider the new service area list as valid and the old service area list as invalid; otherwise, the UE shall consider the old service area list, if any, as valid.

If the UE receives new NITZ information in the CONFIGURATION UPDATE COMMAND message, the UE considers the new NITZ information as valid and the old NITZ information as invalid; otherwise, the UE shall consider the old NITZ information as valid.

If the UE receives a LADN information IE in the CONFIGURATION UPDATE COMMAND message, the UE shall consider the old LADN information as invalid and the new LADN information as valid, if any; otherwise, the UE shall consider the old LADN information as valid.

If the UE receives a new allowed NSSAI for the associated access type in the CONFIGURATION UPDATE COMMAND message, the UE shall consider the new allowed NSSAI as valid for the associated access type, store the allowed NSSAI for the associated access type as specified in subclause 4.6.2.2 and consider the old allowed NSSAI for the associated access type as invalid; otherwise, the UE shall consider the old Allowed NSSAI as valid for the associated access type.

If the UE receives a new configured NSSAI in the CONFIGURATION UPDATE COMMAND message, the UE shall consider the new configured NSSAI for the registered PLMN as valid and the old configured NSSAI for the registered PLMN as invalid; otherwise, the UE shall consider the old configured NSSAI for the registered PLMN as valid The UE shall store the new configured NSSAI as specified in subclause 4.6.2.2.

If the UE receives the Network slicing indication IE in the CONFIGURATION UPDATE COMMAND message with the Network slicing subscription change indication set to "Network slicing subscription changed", the UE shall delete the network slicing information for each and every PLMN except for the current PLMN as specified in subclause 4.6.2.2.

If the UE receives Operator-defined access category definitions IE in the CONFIGURATION UPDATE COMMAND message and the Operator-defined access category definitions IE contains one or more operator-defined access category definitions, the UE shall delete any operator-defined access category definitions stored for the RPLMN and shall store the received operator-defined access category definitions for the RPLMN. If the UE receives the Operator-defined access category definitions IE in the CONFIGURATION UPDATE COMMAND message and the Operator-defined access category definitions IE contains no operator-defined access category definitions, the UE shall delete any operator-defined access category definitions stored for the RPLMN. If the CONFIGURATION UPDATE COMMAND message does not contain the Operator-defined access category definitions IE, the UE shall not delete the operator-defined access category definitions stored for the RPLMN.

If the UE receives the SMS indication IE in the CONFIGURATION UPDATE COMMAND message with the SMS availability indication set to:

a) "SMS over NAS not available", the UE shall consider that SMS over NAS transport is not allowed by the network; and

b) "SMS over NAS available", the UE may request the use of SMS over NAS transport by performing a registration procedure for mobility and periodic registration update as specified in subclause 5.5.1.3, after the completion of the generic UE configuration update procedure.

If the CONFIGURATION UPDATE COMMAND message indicates "registration requested" in the Registration requested bit of the Configuration update indication IE and:

a) contains no other parameters or contains at least one of the following parameters: a new allowed NSSAI, a new configured NSSAI or the Network slicing subscription change indication, and:

1) an emergency PDU session exists, the UE shall, after the completion of the generic UE configuration update procedure and the release of the emergency PDU session, release the existing N1 NAS signalling connection, and start a registration procedure for mobility and periodic registration update as specified in subclause 5.5.1.3; or

2) no emergency PDU Session exists, the UE shall, after the completion of the generic UE configuration update procedure and the release of the existing N1 NAS signalling connection, start a registration procedure for mobility and periodic registration update as specified in subclause 5.5.1.3; or

b) an MICO indication is included without a new allowed NSSAI or a new configured NSSAI, the UE shall, after the completion of the generic UE configuration update procedure, start a registration procedure for mobility and registration update as specified in subclause 5.5.1.3 to re-negotiate MICO mode with the network.

The UE receiving the rejected NSSAI in the CONFIGURATION UPDATE COMMAND message takes the following actions based on the rejection cause in the rejected NSSAI:

"S-NSSAI not available in the current PLMN"

The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current PLMN as specified in subclause 4.6.2.2 and not attempt to use this S-NSSAI in the current PLMN until switching off the UE or the UICC containing the USIM is removed.

"S-NSSAI not available in the current registration area"

The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current registration area as specified in subclause 4.6.2.2 and not attempt to use this S-NSSAI in the current registration area until switching off the UE, the UE moving out of the current registration area or the UICC containing the USIM is removed.

[TS 24.501 clause 5.5.1.2.2]

The subset of allowed NSSAI provided in the requested NSSAI consists of one or more S-NSSAIs in the allowed NSSAI for the current PLMN.

NOTE 3: How the UE selects the subset of configured NSSAI or allowed NSSAI to be provided in the requested NSSAI is implementation specific. The UE can take preferences indicated by the upper layers (e.g. policies, applications) into account.

NOTE 4: The number of S-NSSAI(s) included in the requested NSSAI cannot exceed eight.

If the UE initiates an initial registration for emergency services or needs to prolong the established NAS signalling connection after the completion of the initial registration procedure (e.g. due to uplink signalling pending), the UE shall set the Follow-on request indicator to 1.

[TS 24.501 clause 5.5.1.3.2]

For a REGISTRATION REQUEST message with a 5GS registration type IE indicating "mobility registration updating", UE shall include the requested NSSAI containing the S-NSSAI(s) corresponding to the slices to which the UE intends to register with and shall include the mapped S-NSSAI(s) for the requested NSSAI, if available, in the REGISTRATION REQUEST message. If the UE has allowed NSSAI or configured NSSAI for the current PLMN, the requested NSSAI shall be either:

a) the configured NSSAI for the current PLMN, or a subset thereof as described below, if the UE has no allowed NSSAI for the current PLMN;

b) the allowed NSSAI for the current PLMN, or a subset thereof as described below, if the UE has an allowed NSSAI for the current PLMN; or

c) the allowed NSSAI for the current PLMN, or a subset thereof as described below, plus one or more S-NSSAIs from the configured NSSAI for which no corresponding S-NSSAI is present in the allowed NSSAI and those are neither in the rejected NSSAI for the current PLMN nor in the rejected NSSAI for the current registration area.

If the UE has neither allowed NSSAI for the current PLMN nor configured NSSAI for the current PLMN and has a default configured NSSAI, the UE shall:

a) include the S-NSSAI(s) in the Requested NSSAI IE of the REGISTRATION REQUEST message using the default configured NSSAI; and

b) include the Network slicing indication IE with the Default configured NSSAI indication bit set to "Requested NSSAI created from default configured NSSAI" in the REGISTRATION REQUEST message.

If the UE has no allowed NSSAI for the current PLMN, no configured NSSAI for the current PLMN, and no default configured NSSAI, the UE shall not include a requested NSSAI in the REGISTRATION REQUEST message.

The subset of configured NSSAI provided in the requested NSSAI consists of one or more S-NSSAIs in the configured NSSAI applicable to this PLMN, if the S-NSSAI is neither in the rejected NSSAIs for the current PLMN nor in the rejected NSSAI for the current registration area.

The subset of allowed NSSAI provided in the requested NSSAI consists of one or more S-NSSAIs in the allowed NSSAI for this PLMN.

NOTE 3: How the UE selects the subset of configured NSSAI or allowed NSSAI to be provided in the requested NSSAI is implementation specific. The UE can take preferences indicated by the upper layers (e.g. policies, applications) into account.

NOTE 4: The number of S-NSSAI(s) included in the requested NSSAI cannot exceed eight.

9.1.4.1.3 Test description

9.1.4.1.3.1 Pre-test conditions

System Simulator:

- NGC Cell A configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in 38.508-1 [4] belongs to Home PLMN and set as serving cell;

- NGC Cell G configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in 38.508-1 [4] and set as Non-Suitable “Off” cell.

- System information combination NR-4 as defined in TS 38.508[4] clause 4.4.3.1.2 is used.

UE:

- UE is configured with NSSAI associated with HPLMN and with 5G-GUTI assigned.

- The UE is equipped with a USIM configuration as defined in TS 38.508-1 [4] Table 6.4.1-22.

Preamble:

- The UE is in state 3N-A on NGC cell A according to TS 38.508-1 [4].

9.1.4.1.3.2 Test procedure sequence

Table 9.1.4.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS transmits a CONFIGURATION UPDATE COMMAND message including a new 5G-GUTI. | <-- | CONFIGURATION UPDATE COMMAND | - | - |
| 2 | Check: Does UE transmit a CONFIGURATION UPDATE COMPLETE message? | --> | CONFIGURATION UPDATE COMPLETE | 1 | P |
| 3 | The SS transmits an *RRCRelease* message. | - | - | - | - |
| 4 | The SS transmits a *Paging* message with the new 5G-GUTI. | - | - | - | - |
| 5-11 | Steps 2 to 8 of the generic procedure for NR\_RRC\_CONNECTED specified in TS 38.508-1 [4] subclause 4.5.4.2-3 are performed. | - | - | 1 | P |
| 12 | The SS transmits a CONFIGURATION UPDATE COMMAND message including NITZ information. | <-- | CONFIGURATION UPDATE COMMAND | - | - |
| 13 | Check: Does the UE transmit a CONFIGURATION UPDATE COMPLETE message within the expiry of T3555? | --> | CONFIGURATION UPDATE COMPLETE | 2 | F |
| 14 | Check: Using MMI/AT command verify the NITZ update on the UE. | - | - | 2 | P |
| 15 | Switch off procedure in RRC\_Connected specified in TS 38.508-1 [4] subclause 4.9.6.3 is performed. | - | - | - | - |
| 16 | The UE is switched On. | - | - | - | - |
| 17-30 | Steps 1 to13 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 [4] subclause 4.5.2 are performed. | - | - | - | - |
| 31 | The SS transmits a REGISTRATION ACCEPT message including Configured NSSAI. | <-- | REGISTRATION ACCEPT | - | - |
| 31A – 31E | Steps 15 to 19a1 of the generic procedure for NR RRC IDLE as specified in TS 38.508-1 [4] subclause 4.5.2.2-2 with *'connected without release'* are performed.  Note: All PDU session are associated with the S-NSSAI-2. | - | - | - | - |
| 32 | The SS transmits a CONFIGURATION UPDATE COMMAND message including registration requested IE. | <-- | CONFIGURATION UPDATE COMMAND | - | - |
| 32A | The UE transmits a CONFIGURATION UPDATE COMPLETE message. | --> | CONFIGURATION UPDATE COMPLETE | - | - |
| 32B | SS releases the RRC connection. | - | - | - | - |
| 33 | Check: Does UE transmit a REGISTRATION REQUEST message with registration type value set to “Mobility” and including the Requested NSSAI? | --> | REGISTRATION REQUEST | 3 | P |
| 34-42 | Void. | - | - | - | - |
| 43 | The SS transmits a REGISTRATION ACCEPT message including Allowed NSSAI. | <-- | REGISTRATION ACCEPT | - | - |
| 44 | The UE transmits an *ULInformationTransfer* message and a REGISTRATION COMPLETE message. | --> | REGISTRATION COMPLETE | - | - |
| 44A | The SS transmits an *RRCRelease* message. | - | - | - | - |
| 45 | Check: Using MMI/AT command (+C5GNSSAIRDP) verify the update of allowed NSSAI. (Note 1) | - | - | 3 | P |
| 45A – 45H | Steps 1 to 8 of the generic procedure for NR RRC\_CONNECTED specified in TS 38.508-1 [4] subclause 4.5.4.2-3 are performed. | - | - | - | - |
| 46 | The SS transmits a CONFIGURATION UPDATE COMMAND message including a new allowed NSSAI list. | <-- | CONFIGURATION UPDATE COMMAND | - | - |
| 47 | The UE transmits a CONFIGURATION UPDATE COMPLETE message. | --> | CONFIGURATION UPDATE COMPLETE | - | - |
| 48 | Check: Using MMI/AT command (+C5GNSSAIRDP) verify the update of allowed NSSAI. (Note 1) | - | - | 4 | P |
| 48A | SS releases the RRC connection. | - | - | - | - |
| 49 | The SS configures NGC Cell A as the "Non-suitable “Off” cell" and NGC Cell G as the "Serving cell". | - | - | - | - |
| 50-52 | Steps 2-4 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| - | EXCEPTION: Steps 53A1 to 53A9 are performed if 5GS registration type is set as Initial Registration in step 52 | - | - | - | - |
| 53A1-53A9 | Steps 5 to 13 of the generic test procedure in TS 38.508-1 [4] Table 4.5.2.2-2 are performed on NGC Cell G. | - | - | - | - |
| 53a1 -63 | Void | - | - | - | - |
| 64 | The SS transmits a REGISTRATION ACCEPT message including Allowed and Configured NSSAIs. | <-- | REGISTRATION ACCEPT | - | - |
| - | EXCEPTION: Steps 65a1 to 65b describe behaviour that depends on events happening prior to their execution; the "lower case letter" identifies a step sequence that take place if a specific prior event takes place. | - | - | - | - |
| 65a1-65a5a1 | IF 5GS registration type is set as Initial Registration in step 52, THEN Steps 15 to 19a1 of the generic test procedure in TS 38.508-1 [4] Table 4.5.2.2-2 are performed on NGC Cell G. | - | - | - | - |
| 65b | IF 5GS registration type is set as Mobility Registration in step 52, THEN UE transmits an ULInformationTransfer message and a REGISTRATION COMPLETE message on NGC Cell G. | --> | REGISTRATION COMPLETE | - | - |
| 65 | Void. | - | - | - | - |
| 66 | The SS transmits a CONFIGURATION UPDATE COMMAND message with Network slicing subscription changed. | <-- | CONFIGURATION UPDATE COMMAND | - | - |
| 67 | The UE transmits a CONFIGURATION UPDATE COMPLETE message. | --> | CONFIGURATION UPDATE COMPLETE | - | - |
| 67A | Void | - | - | - | - |
| 67B | SS releases the RRC connection. | - | - | - | - |
| 68 | Check: Using MMI/AT command (+C5GNSSAIRDP) verify the update of allowed NSSAI. (Note 1) | - | - | 5 | P |
| 68A- 68H | Steps 1 to 8 of the NR RRC\_CONNECTED procedure in TS 38.508-1 [4] Table 4.5.4.2-3 are executed. | - | - | - | - |
| 69 | The SS transmits NSSAI DELETE REQUEST message to delete the Default Configured NSSAI list. | <-- | NSSAI DELETE REQUEST | - | - |
| 70 | UE transmits NSSAI DELETE RESPONSE message. | --> | NSSAI DELETE RESPONSE | - | - |
| 71 | The SS transmits an RRCRelease message. | <-- | - | - | - |
| Note 1: The UE responds to the AT command and may return the allowed S-NSSAI(s) in any order. | | | | | |

9.1.4.1.3.3 Specific message contents

Table 9.1.4.1.3.3-1: CONFIGURATION UPDATE COMMAND (step 1, Table 9.1.4.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-19 | | | |
| Information Element | Value/remark | Comment | Condition |
| Configuration update indication | 0001 | Acknowledgement (ACK) requested |  |
| 5G-GUTI | Other than the default value |  |  |

Table 9.1.4.1.3.3-2: CONFIGURATION UPDATE COMMAND (step 12, Table 9.1.4.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-19 | | | |
| Information Element | Value/remark | Comment | Condition |
| Full name for network | "C63A9BED0CB7CB31D98C56B3DD70" O | "FullName12345678", Note 1 |  |
| Short name for network | "5367B85D8EC966" O | "SName123", Note 1 |  |
| Local time zone | "40" O | "GMT+1", Note 1, Note 2 |  |
| Universal time and local time zone | "xx211331832540" O | "<Current Year> 31 December 13:38:52 GMT+1", Note 1, Note 2, Note 3 |  |
| Network daylight saving time | "01" O | "+1 hour adjustment for Daylight Saving Time", Note 1 |  |
| Note 1: Hard coded values have been chosen to allow for consistent/comparable SS behaviour.  Note 2: Daylight Saving Time is included in the Local Time Zone.  Note 3: Current Year is derived by the SS. | | | |

Table 9.1.4.1.3.3-3: REGISTRATION ACCEPT (step 31, Table 9.1.4.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result value | ‘001’B | 3GPP access |  |
| Configured NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000010’B | SST |  |
| SST | ‘00000001’B | 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 3 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000011’B | 3 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.1.4.1.3.3-4: CONFIGURATION UPDATE COMMAND (step 32, Table 9.1.4.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-19 | | | |
| Information Element | Value/remark | Comment | Condition |
| Configuration update indication | 001 | Registration and Acknowledgement (ACK) requested |  |

Table 9.1.4.1.3.3-5: REGISTRATION REQUEST (step 33, Table 9.1.4.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘010’B |  | MOBILITY |
| Requested NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 (Note 1) |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 3 (Note 1) |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000011’B | 3 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Note 1: the Requested NSSAI IE may include either S-NSSAI value 2, or S-NSSAI value 3, or S-NSSAI value 2 and S-NSSAI value 3. | | | |

Table 9.1.4.1.3.3-6: REGISTRATION ACCEPT (step 43, Table 9.1.4.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result value | ‘001’B | 3GPP access |  |
| Allowed NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 3 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000011’B | 3 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.1.4.1.3.3-7: CONFIGURATION UPDATE COMMAND (step 46, Table 9.1.4.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-19 | | | |
| Information Element | Value/remark | Comment | Condition |
| Configuration update indication | 0001 | Acknowledgement (ACK) requested |  |
| Allowed NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.1.4.1.3.3-8: REGISTRATION ACCEPT (step 64, Table 9.1.4.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result value | ‘001’B | 3GPP access |  |
| Configured NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 3 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000011’B | 3 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.1.4.1.3.3-9: CONFIGURATION UPDATE COMMAND (step 66, Table 9.1.4.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-19 | | | |
| Information Element | Value/remark | Comment | Condition |
| Configuration update indication | 0001 | Acknowledgement (ACK) requested |  |
| Network slicing indication | 0001 | Network slicing subscription changed |  |

Table 9.1.4.1.3.3-10: NSSAI DELETE REQUEST (step 69, Table 9.1.4.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.509 Table 6.7.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol discriminator | 1111 |  |  |
| Skip indicator | 0000 |  |  |
| Message type | ‘10100110’B |  |  |
| Delete NSSAI type | ‘00000001’B | Delete Configured NSSAI |  |
| Configured NSSAI | 00000000 |  |  |

Table 9.1.4.1.3.3-11: NSSAI DELETE RESPONSE (step 70, Table 9.1.4.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.509 Table 6.7.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol discriminator | 1111 |  |  |
| Skip indicator | 0000 |  |  |
| Message type | ‘10100111’B |  |  |

#### 9.1.4.2 UAS / Generic UE configuration update / Revocation

9.1.4.2.1 Test Purpose (TP)

(1)

**with** { the UE in 5GMM-REGISTERED state and successfully authenticated for UAS services through UUAA-MM procedure }

**ensure that** {

**when** { the network informs UE about UUAA revocation with CONFIGURATION UPDATE COMMAND and initiates PDU session release with PDU SESSION RELEASE COMMAND for PDU sessions related to UAS services }

**then** { the UE acknowledges UUAA revocation with CONFIGURATION UPDATE COMPLETE message and completes the PDU session release with PDU SESSION RELEASE COMPLETE message }

}

(2)

**with** { the UE in 5GMM-REGISTERED state and notified about revocation and successfully released PDU sessions related to UAS services }

**ensure that** {

**when** { the network initiates UE deregistration with DEREGISTRATION REQUEST }

**then** { the UE completes the de-registration procedure with DEREGISTRATION ACCEPT message }

}

9.1.4.2.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clauses 4.22.2, 5.4.4.2, 5.4.4.3, 5.5.2.1 and 5.5.2.3.1. Unless otherwise stated these are Rel-17 requirements.

[TS 24.501, clause 4.22.2]

The 5GS supports the USS UAV Authorization and Authentication (UUAA) procedure for a UE supporting UAS services. Depending on operator policy or regulatory requirements, the UUAA-MM procedure can be performed by the UE and the AMF at a registration procedure as specified in subclause 5.5.1.2 or the UUAA-SM procedure can be performed by the UE and the SMF at a PDU session establishment procedure as specified in subclause 6.4.1.2. The UE shall support UUAA-MM and UUAA-SM, and the network shall support UUAA-SM and may optionally support UUAA-MM. The UUAA procedure needs to be performed by 5GS with USS successfully before the connectivity for UAS services is established.

During the registration procedure as described in subclause 5.5.1.2, the UE supporting UAS services provides CAA-level UAV ID to the AMF, and the AMF may trigger the UUAA-MM procedure. If the UE supporting UAS services does not provide CAA-level UAV ID to the AMF and the network is configured to perform UUAA-MM at registration procedure, the AMF may accept the registration request and shall mark in the UE's 5GMM context that the UE is not allowed to request UAS services. If the UE wants to use the UAS services by providing the CAA-Level UAV ID later on, the UE shall perform the registration procedure for mobility and periodic registration update.

When a UE supporting UAS services requests to establish a PDU session as described in subclause 6.4.1.2 for USS communication, the UE provides CAA-level UAV ID to the network, and the SMF may trigger the UUAA-SM procedure based on the DNN and S-NSSAI combination for aerial services according to the user's subscription data and the CAA-level UAV ID provided by the UE.

…

If the UUAA is revoked, the PDU session related to the UAS services shall be released by the SMF. Based on operator policy, the AMF may decide to keep the UE registered or trigger a de-registration procedure.

…

[TS 24.501, clause 5.4.4.2]

…

During an established 5GMM context, the network may send none, one, or more CONFIGURATION UPDATE COMMAND messages to the UE. If more than one CONFIGURATION UPDATE COMMAND message is sent, the messages need not have the same content.

…If the AMF needs to deliver to the UE the UUAA revocation notification received from the UAS-NF, the AMF shall include the service-level-AA response with SLAR set to "Service level authentication and authorization was not successful or service level authorization is revoked" in the Service-level-AA container IE of the CONFIGURATION UPDATE COMMAND message.

…

[TS 24.501, clause 5.4.4.3]

Upon receiving the CONFIGURATION UPDATE COMMAND message, the UE shall stop timer T3346 if running and use the contents to update appropriate information stored within the UE.

If "acknowledgement requested" is indicated in the Acknowledgement bit of the Configuration update indication IE in the CONFIGURATION UPDATE COMMAND message, the UE shall send a CONFIGURATION UPDATE COMPLETE message.

…

If the CONFIGURATION UPDATE COMMAND message includes the service-level-AA response in the Service-level-AA container IE with the SLAR field set to "Service level authentication and authorization was not successful or service level authorization is revoked", the UE shall forward the service-level-AA response to the upper layers, so the UUAA authorization data is deleted as specified in 3GPP TS 33.256 [24B].

…

[TS 24.501, clause 5.5.2.1]

The de-registration procedure is used:

…

h) by the network to inform the UE supporting UAS service that it is deregistered for UAS services in 5GS.

[TS 24.501, clause 5.5.2.3.1]

The network initiates the de-registration procedure by sending a DEREGISTRATION REQUEST message to the UE (see example in figure 5.5.2.3.1.1).

NOTE 1: If the AMF performs a local de-registration, it will inform the UE with a 5GMM messages (e.g. SERVICE REJECT message or REGISTRATION REJECT message) with 5GMM cause #10 "implicitly de-registered" only when the UE initiates a 5GMM procedure.

The network may include a 5GMM cause IE to specify the reason for the DEREGISTRATION REQUEST message. The network shall start timer T3522. The network shall indicate whether re-registration is needed or not in the De-registration type IE. The network shall also indicate via the access type whether the de-registration procedure is:

a) for 3GPP access only;

b) for non-3GPP access only; or

c) for 3GPP access, non-3GPP access or both when the UE is registered in the same PLMN for both accesses.

…

If the network de-registration is triggered due to:

…

b) an UUAA revocation notification received from the UAS-NF for a UE supporting UAS service requesting UAS services; or

…

then the network shall set the 5GMM cause value in the DEREGISTRATION REQUEST message to #79 "UAS services not allowed".

NOTE 3: If the UE supporting UAS service has requested other services than UAS services, or if there are other ongoing network slice-specific authentication and authorization on pending NSSAIs, it is then an operator policy or configuration decision whether to keep the UE supporting UAS service registered to the network, but that UE supporting UAS services is not allowed to access UAS services via 5GS as specified in 3GPP TS 23.256 [6AB].

…

The AMF shall trigger the SMF to release locally the PDU session(s) over the indicated access(es), if any, for the UE and enter state 5GMM-DEREGISTERED-INITIATED. If a PDU session is associated with one or more multicast MBS sessions, the SMF shall consider the UE as removed from the associated multicast MBS sessions.



Figure 5.5.2.3.1.1: Network-initiated de-registration procedure

9.1.4.2.3 Test description

9.1.4.2.3.1 Pre-test conditions

System Simulator:

- NGC Cell A.

UE:

- None.

Preamble:

- The UE is in state 3N-A on NGC Cell A according to TS 38.508-1 [4] and successfully authenticated for aerial services through UUAA-MM.

9.1.4.2.3.2 Test procedure sequence

Table 9.1.4.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS transmits CONFIGURATION UPDATE COMMAND including service-level-AA response with SLAR field set to "Service level authentication and authorization was not successful or service level authorization is revoked". | <-- | CONFIGURATION UPDATE COMMAND | - | - |
| 2 | Check: Does the UE transmit CONFIGURATION UPDATE COMPLETE message? | --> | CONFIGURATION UPDATE COMPLETE | 1 | P |
| 3 | The SS transmits an *RRCReconfiguration* message and a PDU SESSION RELEASE COMMAND including 5GSM cause #29 “user authentication or authorization failed” | <-- | NR RRC: *RRCReconfiguration*  5GSM: PDU SESSION RELEASE COMMAND | - | - |
| - | EXCEPTION: Depending upon UE implementation, step 4 and 5 can occur in any order | - | - | - | - |
| 4 | The UE transmits a *RRCReconfigurationComplete* | --> | NR RRC: *RRCReconfigurationComplete* | - | - |
| 5 | Check: Does the UE complete PDU session release procedure by sending PDU SESSION RELEASE COMPLETE? | --> | 5GSM: PDU SESSION RELEASE COMPLETE | 1 | P |
| 6 | The SS transmits a DEREGISTRATION REQUEST message with 5GMM cause #79 “UAS services not allowed”. | <-- | DEREGISTRATION REQUEST | - | - |
| 7 | Check: Does the UE transmit a DEREGISTRATION ACCEPT message? | --> | DEREGISTRATION ACCEPT | 2 | P |

9.1.4.2.3.3 Specific message contents

Table 9.1.4.2.3.3-1: CONFIGURATION UPDATE COMMAND (step 1, table 9.1.4.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 38.508-1 table 4.7.1-19 | | | |
| Information Element | | Value/remark | Comment | Condition |
| Service-level-AA container | |  |  |  |
| Length of Service-level-AA container contents | | ‘00000011’B | Service-level-AA response is a type 4 IE with length of 3 octets. |  |
| Service-level-AA container contents | |  |  |  |
| Type of service-level-AA parameter | | ‘00110000’B | Service-level-AA response. |  |
| Length of service-level-AA parameter | | ‘00000001’B | Service-level-AA response value length is 1 octet. |  |
| Value of service-level-AA parameter | | ‘00000010’B | Service level authorization is revoked. |  |

Table 9.1.4.2.3.3-2: CONFIGURATION UPDATE COMPLETE (step 2, table 9.1.4.2.3.2-1)

|  |
| --- |
| Derivation Path: 38.508-1 clause 4.7.1-20 |

Table 9.1.4.2.3.3-3: PDU SESSION RELEASE COMMAND (step 3, table 9.1.4.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 38.508-1 table 4.7.2-14 | | | |
| Information Element | | Value/remark | Comment | Condition |
| PDU session ID | | The same ID that was allocated for UAS services in the preamble. |  |  |
| 5GSM cause | | ‘0001 1101’B | user authentication or authorization failed |  |

Table 9.1.4.2.3.3-4: *RRCReconfiguration* (step 3, Table 9.1.4.2.3.2-1)

|  |
| --- |
| Derivation Path: TS 38.508-1 [4] Table 4.9.21.3-1 |

Table 9.1.4.2.3.3-5: *RRCReconfigurationComplete*  (step 4, Table 9.1.4.2.3.2-1)

|  |
| --- |
| Derivation Path: TS 38.508-1 [4] Table 4.6.1-14 |

Table 9.1.4.2.3.3-6: PDU SESSION RELEASE COMPLETE (step 5, Table 9.1.4.2.3.2-1)

|  |
| --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.2-15 |

Table 9.1.4.2.3.3-7: DEREGISTRATION REQUEST (step 6, Table 9.1.6.2.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-14 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GMM cause | ‘01001111’B | UAS services not allowed |  |

Table 9.1.4.2.3.3-8: DEREGISTRATION ACCEPT (step 7, Table 9.1.6.2.3.3.2-1)

|  |
| --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-15 |

### 9.1.5 Registration

#### 9.1.5.1 Initial registration

##### 9.1.5.1.1 Initial registration / Success / 5G-GUTI reallocation, last visited TAI

9.1.5.1.1.1 Test Purpose (TP)

(1)

**with** { the UE is 5GMM-REGISTERED state with no valid 5G-GUTI but available SUCI }

**ensure that** {

**when** { the UE is switched off and switched on }

**then** { the UE sends a REGISTRATION REQUEST message including the SUCI in the 5GS mobile identity IE }

}

(2)

**with** { the UE is 5GMM-REGISTERED state with a cell belong to a non-equivalent PLMN with assigned 5G-GUTI and last visited registered TAI }

**ensure that** {

**when** { the UE is switched off and switched on with a cell belong to another PLMN }

**then** { the UE sends a REGISTRATION REQUEST message including the 5G-GUTI assigned by the last PLMN in the 5GS mobile identity IE and the last visited registered TAI }

}

(3)

**with** { the UE is 5GMM-REGISTERED state with a cell belong to an equivalent PLMN with assigned 5G-GUTI }

**ensure that** {

**when** { the UE is switched off and switched on with a cell belong to another PLMN }

**then** { the UE sends a REGISTRATION REQUEST message including the 5G-GUTI assigned by the equivalent PLMN in the 5GS mobile identity IE }

}

(4)

**with** { the UE is 5GMM-REGISTERED state with an assigned 5G-GUTI }

**ensure that** {

**when** { the UE is switched off **and** switched on with a cell belong to the same PLMN }

**then** { the UE sends a REGISTRATION REQUEST message including the 5G-GUTI assigned by the last registered PLMN in the 5GS mobile identity IE }

}

9.1.5.1.1.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501 clauses 5.5.1.2.2 and 5.5.1.2.4. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.5.1.2.2]

The UE initiates the registration procedure for initial registration by sending a REGISTRATION REQUEST message to the AMF, starting timer T3510. If timer T3502 is currently running, the UE shall stop timer T3502. If timer T3511 is currently running, the UE shall stop timer T3511.

During initial registration the UE handles the 5GS mobile identity IE in the following order:

b) if the UE holds a valid 5G-GUTI that was previously assigned, over 3GPP access or non-3GPP access, by the same PLMN with which the UE is performing the registration, the UE shall indicate the 5G-GUTI in the 5GS mobile identity IE;

c) if the UE holds a valid 5G-GUTI that was previously assigned, over 3GPP access or non-3GPP access, by an equivalent PLMN, the UE shall indicate the 5G-GUTI in the 5GS mobile identity IE;

d) if the UE holds a valid 5G-GUTI that was previously assigned, over 3GPP access or non-3GPP, by any other PLMN, the UE shall indicate the 5G-GUTI in the 5GS mobile identity IE;

e) if a SUCI is available the UE shall include the SUCI in the 5GS mobile identity IE; and

…

If the SUCI is included in the 5GS mobile identity IE and the timer T3519 is not running, the UE shall start timer T3519 and store the value of the SUCI sent in the REGISTRATION REQUEST message. The UE shall include the stored SUCI in the REGISTRATION REQUEST message while timer T3519 is running.

…

If the last visited registered TAI is available, the UE shall include the last visited registered TAI in the REGISTRATION REQUEST message.

9.1.5.1.1.3 Test description

9.1.5.1.1.3.1 Pre-test conditions

System Simulator:

- NGC Cell A, NGC Cell C and NGC Cell H are configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in TS 38.508-1 [4].

UE:

- None.

Preamble:

- The UE is in test state 0N-B according to TS 38.508-1 [4].

9.1.5.1.1.3.2 Test procedure sequence

Table 9.1.5.1.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U – S | Message |  |  |
| 1 | The SS configures:  - NGC Cell A as the "Serving cell".  - NGC Cell H and NGC Cell C as the "Non-Suitable "off" cell". | - | - | - | - |
| 2 | The UE is switched on. | - | - | - | - |
| - | The following messages are to be observed on NGC Cell A unless explicitly stated otherwise. | - | - | - | - |
| 3-5 | The UE establishes RRC connection by executing steps 2-4 of Table 4.5.2.2-2 in TS 38.508-1 [4]. | - | - | - | - |
| 6 | SS transmits an REGISTRATION REJECT message with the 5GMM cause IE setting as “Illegal UE”.  NOTE1: 5G-GUTI-1 should be deleted, then UE has no valid 5G-GUTI but available SUCI now. | <-- | REGISTRATION REJECT | - | - |
| 7 | The generic test procedure in TS 38.508-1 [4] Table 4.9.6.4-1 of Switch off procedure in State DEREGISTERED are performed. |  |  |  |  |
| 8 | The UE is brought back to operation or the USIM is inserted. |  |  |  |  |
| 9-11 | The UE establishes RRC connection by executing steps 2-4 of Table 4.5.2.2-2 in TS 38.508-1 [4]. | - | - | - | - |
| 12 | Check: Does the UE transmit an REGISTRATION REQUEST message including the SUCI in the 5GS mobile identity IE? | --> | REGISTRATION REQUEST | 1 | P |
| 13-21 | Steps 5-13 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 22 | SS transmits an REGISTRATION ACCEPT message with a new assigned 5G-GUTI-2. | <-- | REGISTRATION ACCEPT | - | - |
| 23-27a1 | Steps 15-19a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed with ‘*connected without release’*. | - | - | - | - |
| 28 | The generic test procedure in TS 38.508-1 [4] Table 4.9.6.3-1 of Switch off procedure in RRC\_CONNECTED are performed. | - | - | - | - |
| 29 | The SS configures:  - NGC Cell H as the "Serving cell".  - NGC Cell A and NGC Cell C as a "Non-Suitable "off" cell". | - | - | - | - |
| 30 | The UE is brought back to operation or the USIM is inserted. | - | - | - | - |
| - | The following messages are to be observed on NGC Cell H unless explicitly stated otherwise. | - | - | - | - |
| 31-33 | The UE establishes RRC connection by executing steps 2-4 of Table 4.5.2.2-2 in TS 38.508-1 [4]. | - | - | - | - |
| 34 | Check: Does the UE transmit an REGISTRATION REQUEST message including the 5G-GUTI-2 assigned by the last PLMN in the 5GS mobile identity IE and the last visited registered TAI? | --> | REGISTRATION REQUEST | 2 | P |
| 35-43 | Steps 5-13 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 44 | SS transmits an REGISTRATION ACCEPT message with a new assigned 5G-GUTI-3 and the PLMN of NGC Cell A as Equivalent PLMNs. | <-- | REGISTRATION ACCEPT | - | - |
| 45-49a1 | Steps 15-19a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed with ‘*connected without release’*. | - | - | - | - |
| 50 | The generic test procedure in TS 38.508-1 [4] Table 4.9.6.3-1 of Switch off procedure in RRC\_CONNECTED is performed. | - | - | - | - |
| 51 | The SS configures:  - NGC Cell A as the "Serving cell".  - NGC Cell H and NGC Cell C as a "Non-Suitable "off" cell". | - | - | - | - |
| 52 | The UE is brought back to operation or the USIM is inserted. | - | - | - | - |
| - | The following messages are to be observed on NGC Cell A unless explicitly stated otherwise. | - | - | - | - |
| 53-55 | The UE establishes an RRC connection by executing steps 2-4 of Table 4.5.2.2-2 in TS38.508-1 [4]. | - | - | - | - |
| 56 | Check: Does the UE transmit an REGISTRATION REQUESTmessage including the 5G-GUTI-3 assigned by the equivalent PLMN in the 5GS mobile identity IE? | --> | REGISTRATION REQUEST | 3 | P |
| 57-65 | Steps 5-13 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 66 | SS transmits an REGISTRATION ACCEPT message with a new assigned 5G-GUTI-4. | <-- | REGISTRATION ACCEPT | - | - |
| 67-71a1 | Steps 15-19a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed with ‘*connected without release’*. | - | - | - | - |
| 72 | The generic test procedure in TS 38.508-1 [4] Table 4.9.6.3-1 of Switch off procedure in RRC\_CONNECTED is performed. | - | - | - | - |
| 73 | The SS configures:  - NGC Cell C as the "Serving cell".  - NGC Cell A and NGC Cell H as a "Non-Suitable off cell". | - | - | - | - |
| 74 | The UE is brought back to operation or the USIM is inserted. | - | - | - | - |
| - | The following messages are to be observed on NGC Cell C unless explicitly stated otherwise. | - | - | - | - |
| 75-77 | The UE establishes an RRC connection by executing steps 2-4 of Table 4.5.2.2-2 in TS38.508-1 [4]. | - | - | - | - |
| 78 | Check: Does the UE transmit an REGISTRATION REQUESTmessage including the 5G-GUTI-4 assigned by last registered PLMN in the 5GS mobile identity IE? | --> | REGISTRATION REQUEST | 4 | P |
| 79-94a1 | Steps 5-20a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |

9.1.5.1.1.3.3 Specific message contents

Table 9.1.5.1.1.3.3-1: Message REGISTRATION REJECT (step 6, Table 9.1.5.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-9 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GMM cause | '0000 0011'B | Illegal UE |  |

Table 9.1.5.1.1.3.3-2: Message REGISTRATION REQUEST (step 12, Table 9.1.5.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type | '001'B | Initial registration |  |
| 5GS mobile identity | SUCI | The SUCI of UE |  |

Table 9.1.5.1.1.3.3-3: Message REGISTRATION ACCEPT (step 22, Table 9.1.5.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-7 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5G-GUTI | 5G-GUTI-2 |  |  |

Table 9.1.5.1.1.3.3-4: Message REGISTRATION REQUEST (step 34, Table9.1.5.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type | '001'B | Initial registration |  |
| 5GS mobile identity | 5G-GUTI-2 |  |  |
| Last visited registered TAI | TAI-1 | TAI of NGC Cell A |  |

Table 9.1.5.1.1.3.3-5: Message REGISTRATION ACCEPT (step 44, Table 9.1.5.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-7 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5G-GUTI | 5G-GUTI-3 |  |  |
| Equivalent PLMNs | The PLMN ID of NGC Cell A |  |  |

Table 9.1.5.1.1.3.3-6: Message REGISTRATION REQUEST (step 56, Table 9.1.5.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type | '001'B | Initial registration |  |
| 5GS mobile identity | 5G-GUTI-3 |  |  |
| Last visited registered TAI | TAI-8 | TAI of NGC Cell H |  |

Table 9.1.5.1.1.3.3-7: Message REGISTRATION ACCEPT (step 66, Table 9.1.5.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-7 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5G-GUTI | 5G-GUTI-4 |  |  |

Table 9.1.5.1.1.3.3-8: Message REGISTRATION REQUEST (step 78, Table 9.1.5.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type | '001'B | Initial registration |  |
| 5GS mobile identity | 5G-GUTI-4 |  |  |
| Last visited registered TAI | TAI-1 | TAI of NGC Cell A |  |

##### 9.1.5.1.2 Initial registration / 5GS services / Equivalent PLMN list handling

9.1.5.1.2.1 Test Purpose (TP)

(1)

**with** { The UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { UE receives a REGISTRATION ACCEPT with a new set of Equivalent PLMNs, then after Switch OFF and Switch ON }

**then** { The UE deletes the old equivalent PLMN list and uses the new equivalent PLMN list }

}

(2)

**with** { The UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { UE receives a REGISTRATION ACCEPT that does not include Equivalent PLMNs, then after Switch OFF and Switch ON }

**then** { UE deletes the old equivalent PLMN list }

}

(3)

**with** { The UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { the UE receives a REGISTRATION ACCEPT that includes equivalent PLMN list, and the UE detects that an entry in the equivalent PLMN list is also present in forbidden PLMN list }

**then** { UE deletes the entry in equivalent PLMN list that is also present in forbidden PLMN list }

}

9.1.5.1.2.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clauses 5.5.1.2.4 and 5.5.1.3.4. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.5.1.2.4]

…

The AMF may also include a list of equivalent PLMNs in the REGISTRATION ACCEPT message. Each entry in the list contains a PLMN code (MCC+MNC). The UE shall store the list as provided by the network, and if the initial registration procedure is not for emergency services, the UE shall remove from the list any PLMN code that is already in the list of "forbidden PLMNs". In addition, the UE shall add to the stored list the PLMN code of the registered PLMN that sent the list. The UE shall replace the stored list on each receipt of the REGISTRATION ACCEPT message. If the REGISTRATION ACCEPT message does not contain a list, then the UE shall delete the stored list.

…

[TS 24.501, clause 5.5.1.3.4]

…

The AMF may also include a list of equivalent PLMNs in the REGISTRATION ACCEPT message. Each entry in the list contains a PLMN code (MCC+MNC). The UE shall store the list as provided by the network, and if there is no emergency PDU session established, the UE shall remove from the list any PLMN code that is already in the list of "forbidden PLMNs". If the UE is not registered for emergency services and there is an emergency PDU session established, the UE shall remove from the list of equivalent PLMNs any PLMN code present in the "forbidden PLMNs list" when the emergency PDU session is released. In addition, the UE shall add to the stored list the PLMN code of the registered PLMN that sent the list. The UE shall replace the stored list on each receipt of the REGISTRATION ACCEPT message. If the REGISTRATION ACCEPT message does not contain a list, then the UE shall delete the stored list.

…

9.1.5.1.2.3 Test description

9.1.5.1.2.3.1 Pre-test conditions

System Simulator:

- NGC Cell A and NGC Cell E and NGC Cell F are configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in TS 38.508-1 [4].

- NGC Cell F is configured with NR frequency NRf3.

- System information combination NR-4 as defined in TS 38.508 [4] clause 4.4.3.1.2 is used.

UE:

None.

Preamble:

- The UE is in state Switched OFF (State 0-A) as per TS 38.508-1 [4] Table 4.4A.2-0.

9.1.5.1.2.3.2 Test procedure sequence

Table 9.1.5.1.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS configures:  - NGC Cell F as the "Serving cell".  - NGC Cell E as the "Non-Suitable "off" cell".  - NGC Cell A as the “Non-Suitable “off" cell". | - | - | - | - |
| 2 | The UE is Switched ON |  | - |  |  |
| - | The following messages are to be observed on NGC Cell F unless explicitly stated otherwise |  | - |  |  |
| 3-14 | Steps 2-13 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 15 | SS transmits a REGISTRATION ACCEPT message with PLMN ID of NGC Cell A included in the Equivalent PLMNs IE | <-- | REGISTRATION ACCEPT | - | - |
| 16-20a1 | Steps 15-19a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 21 | The UE is switched off by executing generic procedure in Table 4.9.6.3-1 in TS 38.508-1 [4] | - | - | - | - |
| 22 | The UE is Switched ON | - | - | - | - |
| 23-34 | Steps 2-13 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 35 | SS transmits a REGISTRATION ACCEPT message with PLMN ID of NGC Cell E included in the Equivalent PLMNs IE | <-- | REGISTRATION ACCEPT | - | - |
| 36-40a1 | Steps 15-19a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 41 | The UE is switched off by executing generic procedure in Table 4.9.6.3-1 in TS 38.508-1 [4]. | - | - | - | - |
| 42 | The SS configures:  - NGC CelFl as the "Non-Suitable "off" cell".  - NGC Cell E as the "Suitable neighbour cell".  - NGC Cell A as the "Serving cell". | - | - | - | - |
| 43 | The UE is Switched ON. | - | - | - | - |
| - | The following messages are to be observed on NGC Cell E unless explicitly stated otherwise | - | - | - | - |
| 44-62a1 | Steps 2-20a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | 1 | P |
| 63 | The UE is switched off by executing generic procedure in Table 4.9.6.1-1 in TS 38.508-1 [4]. | - | - | - | - |
| 63A | The SS configures:  - NGC Cell F as the "Serving cell".  - NGC Cell E as the "Non-Suitable "off" cell".  - NGC Cell A as the "Suitable neighbour cell". | - | - | - | - |
| 64 | The UE is Switched ON | - | - | - | - |
| - | The following messages are to be observed on NGC Cell A unless explicitly stated otherwise | - | - | - | - |
| 64A | Steps 2-19a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | 2 | P |
| 64B | The UE is switched off by executing generic procedure in Table 4.9.6.3-1 in TS 38.508-1 [4]. | - | - | - | - |
| 64C | The SS configures:  - NGC Cell A as the "Non-Suitable "off" cell". | - | - | - | - |
| 64D | The UE is Switched ON. | - | - | - | - |
| 65-76 | Steps 2-13 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | 2 | P |
| 76A | Void. | - | - | - | - |
| 77 | SS transmits a REGISTRATION REJECT with cause #11 (PLMN not allowed) | <-- | REGISTRATION REJECT | - | - |
| 78 | The SS releases the RRC connection | - | - |  |  |
| 79 | The SS configures:  - NGC Cell A as the "Serving cell".  - NGC Cell E as the “Non-Suitable "off" cell ".  - NGC Cell F as the “Non-Suitable "off" cell ". | - | - | - | - |
| - | The following messages are to be observed on NGC Cell A unless explicitly stated otherwise | - | - | - | - |
| 80-93 | Steps 2-13 of Table 4.5.5.2.2- 2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 94 | SS transmits a REGISTRATION ACCEPT message with PLMN ID of NGC Cell E and NGC Cell F included in the Equivalent PLMNs IE | <-- | REGISTRATION ACCEPT | - | - |
| 95-99a1 | Steps 15-19a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 100 | The UE is switched off by executing generic procedure in Table 4.9.6.3-1 in TS 38.508-1 [4]. | - | - | - | - |
| 101 | The SS configures:  - NGC Cell A as the “Non-Suitable "off" cell ".  - NGC Cell E as the "Suitable neighbour cell".  - NGC Cell F as the “Serving cell". | - | - | - | - |
| - | The following messages are to be observed on NGC Cell E unless explicitly stated otherwise | - | - | - | - |
| 102 | The UE is Switched ON | - | - | - | - |
| 103-121a1 | Steps 2-20a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | 3 | P |
| 122 | The UE is switched off by executing generic procedure in Table 4.9.6.1-1 in TS 38.508-1 [4]. | - | - | - | - |
| 123 | The SS configures:  - NGC Cell A as the “Non-Suitable "off" cell ".  - NGC Cell E as the "Non-Suitable "off" cell ".  - NGC Cell F as the “Serving cell". | - | - | - | - |
| 124 | The UE is Switched ON | - | - | - | - |
| - | The user is prompted to manually select PLMN of NGC Cell F | - | - | - | - |
| - | The following messages are to be observed on NGC Cell F unless explicitly stated otherwise | - | - | - | - |
| 125-143a1 | Steps 2-20a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 144 | The user sets the UE in Automatic PLMN selection mode. | - | - | - | - |
| 145 | Wait for 300s to allow the UE to switch to automatic PLMN selection mode. | - | - | - | - |

9.1.5.1.2.3.3 Specific message contents

Table 9.1.5.1.2.3.3-1: REGISTRATION ACCEPT (step 15 Table 9.1.5.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| Equivalent PLMNs | MCC/MNC=MCC/MNC in USIM | PLMN ID of NGC Cell A |  |

Table 9.1.5.1.2.3.3-2: REGISTRATION ACCEPT (step 35 Table 9.1.5.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| Equivalent PLMNs | MCC=002, MNC=101 | PLMN ID of NGC Cell E |  |

Table 9.1.5.1.2.3.3-3: REGISTRATION ACCEPT (step 94 Table 9.1.5.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| Equivalent PLMNs | MCC=003, MNC=101 and MCC=002, MNC=101 | PLMN ID of NGC Cell F and PLMN ID of NGC Cell E |  |

Table 9.1.5.1.2.3.3-4: REGISTRATION REJECT (step 77 Table 9.1.5.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM Cause | ‘0000 1011’B | PLMN not allowed |  |

##### 9.1.5.1.3 Initial registration / 5GS services / NSSAI handling

9.1.5.1.3.1 Test Purpose (TP)

(1)

**with** { UE has sent a REGISTRATION REQUEST message including Requested NSSAI}

**ensure that** {

**when** { UE receives REGISTRATION ACCEPT message with Allowed NSSAI }

**then** { UE shall replace any stored allowed NSSAI for the current PLMN with new allowed NSSAI for the current PLMN }

}

(2)

**with** { UE has sent a REGISTRATION REQUEST message including Requested NSSAI}

**ensure that** {

**when** { UE receives REGISTRATION ACCEPT message with Rejected NSSAI with reject cause “S-NSSAI not available in the current PLMN” }

**then** { UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current PLMN and not attempt to use the Rejected NSSAI in the current PLMN until switching off the UE or the UICC containing the USIM is removed }

}

(3)

**with** { UE receives REGISTRATION ACCEPT message with Rejected NSSAI with reject cause “S-NSSAI not available in the current PLMN” }

**ensure that** {

**when** { UE has been switched off, then switched on }

**then** { UE shall delete the stored Rejected NSAAI and shall send the NSSAI in Requested NSSAI IE of the REGISTRATION REQUEST message as per the configured and Allowed NSSAI for current PLMN }

}

(4)

**with** { UE has sent a REGISTRATION REQUEST message including Requested NSSAI}

**ensure that** {

**when** { UE receives REGISTRATION ACCEPT message with Rejected NSSAI with reject cause “S-NSSAI not available in the current registration area” }

**then** { UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current PLMN and registration area combination and not attempt to use the Rejected NSSAI in the current registration area until switching off the UE, the UE moving out of the current registration area or the UICC containing the USIM is removed }

}

(5)

**with** { UE receives REGISTRATION ACCEPT message with Rejected NSSAI with reject cause “S-NSSAI not available in the current registration area” }

**ensure that** {

**when** { UE has been moved out of the current registration area }

**then** { UE shall delete the stored Rejected NSAAI for the current PLMN as well as registration area combination and shall send the NSSAI in Requested NSSAI IE of the REGISTRATION REQUEST message as per the configured and Allowed NSSAI for current PLMN }

}

9.1.5.1.3.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501 [22], clause 5.5.1.2.2 and 5.5.1.2.4. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501 clause 5.5.1.2.2]

The UE shall include the requested NSSAI containing the S-NSSAI(s) corresponding to the slice(s) to which the UE intendsto register and shall include themapped S-NSSAI(s) for the requested NSSAI, if available, in the REGISTRATION REQUEST message. If the UE has allowed NSSAI or configured NSSAI for the current PLMN, the requested NSSAI shall be either:

a) the configured NSSAI for the current PLMN, or a subset thereof as described below, if the UE has no allowed NSSAI for the current PLMN;

b) the allowed NSSAI for the current PLMN, or a subset thereof as described below, if the UE has an allowed NSSAI for the current PLMN; or

c) the allowed NSSAI for the current PLMN, or a subset thereof as described below, plus one or more S-NSSAIs from the configured NSSAI for which no corresponding S-NSSAI is present in the allowed NSSAI and those are neither in the rejected NSSAI for the current PLMN nor in the rejected NSSAI for the current area.

If the UE has neither allowed NSSAI for the current PLMN nor configured NSSAI for the current PLMN and has a default configured NSSAI, the UE shall:

a) include the S-NSSAI(s) in the Requested NSSAI IE of the REGISTRATION REQUEST message using the default configured NSSAI; and

b) include the Network slicing indication IE with the Default configured NSSAI indication bit set to "Requested NSSAI created from default configured NSSAI" in the REGISTRATION REQUEST message.

If the UE has no allowed NSSAI for the current PLMN, no configured NSSAI for the current PLMN, and no default configured NSSAI, the UE shall not include a requested NSSAI in the REGISTRATION message.

The subset of configured NSSAI provided in the requested NSSAI consists of one or more S-NSSAIs in the configured NSSAI applicable to the current PLMN, if the S-NSSAI is neither in the rejected NSSAI for the current PLMN nor in the rejected NSSAI for the current PLMN and registration area combination.

The subset of allowed NSSAI provided in the requested NSSAI consists of one or more S-NSSAIs in the allowed NSSAI for the current PLMN.

NOTE 3: How the UE selects the subset of configured NSSAI or allowed NSSAI to be provided in the requested NSSAI is implementation specific. The UE can take preferences indicated by the upper layers(e.g. policies,application) into account.

NOTE 4: The number of S-NSSAI(s) included in the requested NSSAI cannot exceed eight.

[TS 24.501 clause 5.5.1.2.4]

The AMF shall include the allowed NSSAI for the current PLMN and shall include the mapped S-NSSAI for the allowed NSSAI containedfrom the UE if available, in the REGISTRATION ACCEPT message if the UE included the requested NSSAI in the REGISTRATION REQUEST message and the AMF allows one or more S-NSSAIs in the requested NSSAI. The AMF may also include rejected NSSAI in the REGISTRATION ACCEPT message. Rejected NSSAI contains S-NSSAI(s) which was included in the requested NSSAI but rejected by the network associated with rejection cause(s).

The AMF may include a new configured NSSAI for the current PLMN in the REGISTRATION ACCEPT message if:

a) the REGISTRATION REQUEST message did not include the requested NSSAI;

b) the REGISTRATION REQUEST message included the requested NSSAI containing an S-NSSAI that is not valid in the serving PLMN; or

c) the REGISTRATION REQUEST message included the Network slicing indication IE with the Default configured NSSAI indication bit set to "Requested NSSAI created from default configured NSSAI".

If a new configured NSSAI for the current PLMN is included in the REGISTRATION ACCEPT message, the AMF shall also include the mapped NSSAI(s) for the configured NSSAI for the current PLMN if available in the REGISTRATION ACCEPT message. In this case the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3.

The AMF shall include the Network slicing indication IE with the Network slicing subscription change indication set to "Network slicing subscription changed" in the REGISTRATION ACCEPT message if the UDM has indicated that the subscription data for network slicing has changed. In this case the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3.

The UE receiving the rejected NSSAI in the REGISTRATION ACCEPT message takes the following actions based on the rejection cause in the rejected NSSAI:

"S-NSSAI not available in the current PLMN"

The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current PLMN as specified in subclause 4.6.2.2 and not attempt to use this S-NSSAI in the current PLMN until switching off the UE or the UICC containing the USIM is removed.

"S-NSSAI not available in the current registration area"

The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current registration area as specified in subclause 4.6.2.2 and not attempt to use this S-NSSAI in the current registration area until switching off the UE, the UE moving out of the current registration area or the UICC containing the USIM is removed.

If the UE did not include the requested NSSAI in the REGISTRATION REQUEST message or none of the requested NSSAI are present in the subscribed S-NSSAIs, and one or more subscribed S-NSSAIs (containing one or more S-NSSAIs each of which may be associated with a new S-NSSAI) marked as default are available, the AMF shall put the subscribed S-NSSAIs marked as default in the allowed NSSAI of the REGISTRATION ACCEPT message. The AMF shall determine a registration area such that all S-NSSAIs of the allowed NSSAI are available in the registration area.

9.1.5.1.3.3 Test description

9.1.5.1.3.3.1 Pre-test conditions

System Simulator:

- NGC Cell A belongs to Home PLMN and TAI-1 and set as serving cell;

- NGC Cell B belongs to Home PLMN and TAI-2 and set as Non-Suitable “Off” cell.

- NGC Cell C belongs to Home PLMN and TAI-3 and set as Non-Suitable “Off” cell.

UE:

- UE is previously registered on NGC Cell A using default message contents according to TS 38.508-1 [4];

- Empty URSP Configuration.

Preamble:

- The UE is in state Switched OFF (state 0N-B) according to TS 38.508-1 [4].

9.1.5.1.3.3.2 Test procedure sequence

Table 9.1.5.1.3.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2 | Check: Does UE transmit a REGISTRATION REQUEST message? | --> | REGISTRATION REQUEST | - | - |
| 3-11 | Steps 5 to 13 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 12 | The SS transmits a REGISTRATION ACCEPT message including Allowed NSSAI and Configured NSSAI. | <-- | REGISTRATION ACCEPT | - | - |
| 13-18 | Steps 15 to 20a1 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 19 | Switch off procedure in RRC\_IDLE specified in TS 38.508-1 subclause 4.9.6.1 is performed. | - | - | - | - |
| 20 | The UE is brought back to operation or the USIM is inserted. | - | - | - | - |
| 21 | Check: Does UE transmit a REGISTRATION REQUEST message including Requested NSSAI? | --> | REGISTRATION REQUEST | 1 | P |
| 22-30 | Steps 5 to 13 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 31 | The SS transmits a REGISTRATION ACCEPT message including Allowed NSSAI and Rejected NSSAI. | <-- | REGISTRATION ACCEPT | - | - |
| 32-37 | Steps 15 to 20a1 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 38 | The SS configures NGC Cell A as a “Non-suitable “Off” cell” and NGC Cell C as the “Serving cell”. | - | - | - | - |
| 39 | Check: Does UE transmit a REGISTRATION REQUEST message including Requested NSSAI on NGC Cell C? | --> | REGISTRATION REQUEST | 2 | P |
| 40-48 | Void. | - | - | - | - |
| 49 | The SS transmits a REGISTRATION ACCEPT message including Allowed NSSAI. | <-- | REGISTRATION ACCEPT | - | - |
| 50 | The UE transmits a REGISTRATION COMPLETE message. | --> | REGISTRATION COMPLETE | - | - |
| 51 | The SS transmits an *RRCRelease* message. | - | - | - | - |
| 52 | Check: Is S-NSSAI=2 in the Rejected NSSAI list with cause “S-NSSAI not available in the current PLMN” associated with current PLMN using AT/MMI? | - | - | 2 | P |
| 53 | Switch off procedure in RRC\_IDLE specified in TS 38.508-1 subclause 4.9.6.1 is performed. | - | - | - | - |
| 54 | The UE is brought back to operation or the USIM is inserted. | - | - | - | - |
| 55 | Check: Does UE transmit a REGISTRATION REQUEST message including Requested NSSAI? | --> | REGISTRATION REQUEST | 3 | P |
| 56-64 | Steps 5 to13 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 65 | The SS transmits a REGISTRATION ACCEPT message including Allowed NSSAI and Rejected NSSAI. | <-- | REGISTRATION ACCEPT | - | - |
| 66-71a1 | Steps 15 to 20a1 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| - | EXCEPTION: Step 71Aa1 describes behaviour depending on UE implementation; the "lower case letter" identifies a step sequence that take place if the UE performs a specific action. | - | - | - | - |
| 71Aa1 | If pc\_noOf\_PDUsNewConnection > 0 THEN generic procedure for NR RRC\_IDLE Extension specified in TS 38.508-1 subclause Table 4.5.2.2-4 are performed. | - | - | - | - |
| 72 | Check: Is S-NSSAI=2 removed from the Rejected NSSAI list associated with current PLMN? | - | - | 3 | P |
| 72A | Check: Is S-NSSAI=1 in the Rejected NSSAI list with cause “S-NSSAI not available in the current registration area” associated with current PLMN and registration area combination using AT/MMI? | - | - | 4 | P |
| 73 | The SS configures NGC Cell C as the "Non-suitable “Off” cell" and NGC Cell B as the "Serving cell". | - | - | - | - |
| 74 | Wait for 34s for FR1 or 130s for FR2 to allow UE to recognise the change, then the generic test procedure in TS 38.508-1 Table 4.9.4.2.2-1 is performed to indicate that UE camp on Cell B. (Note 1). | - | - | - | - |
| 75-86 | Void | - | - | - | - |
| 87 | Check: Is S-NSSAI=1 in the Rejected NSSAI list with cause “S-NSSAI not available in the current registration area” associated with current PLMN and registration area combination using AT/MMI? | - | - | 4 | P |
| 88 | The SS configures NGC Cell B as the "Non-suitable “Off” cell" and NGC Cell A as the "Serving cell". | - | - | - | - |
| 89 | Check: Does UE transmit a REGISTRATION REQUEST message including Requested NSSAI? | --> | REGISTRATION REQUEST | 5 | P |
| 90-98 | Void | - | - | - | - |
| 99 | The SS transmits a REGISTRATION ACCEPT message including Allowed NSSAI. | <-- | REGISTRATION ACCEPT | - | - |
| 100 | The UE transmits a REGISTRATION COMPLETE message. | --> | REGISTRATION COMPLETE | - | - |
| 101 | The SS transmits an *RRCRelease* message. | - | - | - | - |
| 102 | Check: Is S-NSSAI=1 removed from the Rejected NSSAI list associated with current PLMN and registration area combination? | - | - | 5 | P |
| Note 1: The wait time for reselection to a newly detected intra frequency cell is selected to cover Tdetect,NR\_Intra (25\*1280ms=32s for FR1 and 25\*4\*1280ms=128s for FR2) + TSI-NR (1.28s for FR1 and FR2) = 33.28s rounded up to 34s for FR1 and 129.28s rounded up to 130s for FR2. | | | | | |

9.1.5.1.3.3.3 Specific message contents

Table 9.1.5.1.3.3.3-0: REGISTRATION ACCEPT (preamble, Table 9.1.5.1.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| Allowed NSSAI |  |  |  |
| Allowed NSSAI IEI |  | NSSAI value 1 |  |
| Length of Allowed NSSAI | '0000 0010'B | 2 octets |  |
| Length of S-NSSAI contents | '00000001'B | SST |  |
| SST | '00000001'B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Configured NSSAI |  |  |  |
| Configured NSSAI IEI |  | NSSAI value 1 |  |
| Length of Configured NSSAI | '0000 0010'B | 2 octets |  |
| Length of S-NSSAI contents | '00000001'B | SST |  |
| SST | '00000001'B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.1.5.1.3.3.3-1: REGISTRATION REQUEST (step 2, Table 9.1.5.1.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘001’B | Initial registration |  |
| Requested NSSAI |  | Note |  |
| S-NSSAI IEI |  | S-NSSAI value 1 | Note |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Note: S-NSSAI =1 will be always included from the allowed NSSAI list associated with PLMN of NCG Cell A by the UE. See TS 24.501 clause 5.5.1.2.1 | | | |

Table 9.1.5.1.3.3.3-2: REGISTRATION ACCEPT (step 12, Table 9.1.5.1.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result value | ‘001’B | 3GPP access |  |
| Allowed NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Configured NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.1.5.1.3.3.3-3: PDU SESSION ESTABLISHMENT ACCEPT (step 14 , Table 9.1.5.1.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 clause 4.7.2-2 | | | |
| Information Element | Value/remark | Comment | Condition |
| S-NSSAI |  |  |  |
| Length of S-NSSAI contents | ‘0000 0001’B | SST |  |
| SST | ‘0000 0010’B | SST value 2 |  |

Table 9.1.5.1.3.3.3-4: REGISTRATION REQUEST (step 21, Table 9.1.5.1.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘001’B | Initial registration |  |
| Requested NSSAI |  | Note |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 | Note |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Note: S-NSSAI =2 will be always included by the UE from the allowed NSSAI list associated with PLMN of NCG Cell A but may include S-NSSAI =1 from Configured NSSAI list associated with PLMN of NCG Cell A. See TS 24.501 sub-clause 5.5.1.2.1 | | | |

Table 9.1.5.1.3.3.3-5: REGISTRATION ACCEPT (step 31, Table 9.1.5.1.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result value | ‘001’B | 3GPP access |  |
| Allowed NSSAI |  | Note |  |
| S-NSSAI IEI |  | S-NSSAI value 1 | Note |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Rejected NSSAI |  |  |  |
| Rejected S-NSSAI-1 |  | Rejected S-NSSAI value 1 |  |
| Cause value | ‘0000’B | S-NSSAI not available in the current PLMN |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Note: If UE has requested only S-NSSAI =2 in step 21 and S-NSSAI =2 is added in the Rejected NSSAI list by the SS then AMF/SS can include default subscribed S-NSSAIs in the allowed NSSAI of REGISTRATION ACCEPT message, see TS 24.501 sub-clause 5.5.1.2.4. | | | |

Table 9.1.5.1.3.3.3-6: REGISTRATION REQUEST (step 39, Table 9.1.5.1.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘010’B | mobility registration updating |  |
| Requested NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.1.5.1.3.3.3-7: REGISTRATION ACCEPT (step 49, Table 9.1.5.1.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result value | ‘001’B | 3GPP access |  |
| Allowed NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.1.5.1.3.3.3-8: REGISTRATION REQUEST (step 55, Table 9.1.5.1.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘001’B | Initial registration |  |
| Requested NSSAI |  | Note |  |
| S-NSSAI IEI |  | S-NSSAI value 1 | Note |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Note: S-NSSAI =1 will be always included by the UE from the allowed NSSAI list associated with PLMN of NCG Cell C but may include S-NSSAI =2 from Configured NSSAI list associated with PLMN of NCG Cell C. See TS 24.501 sub-clause 5.5.1.2.1 | | | |

Table 9.1.5.1.3.3.3-9: REGISTRATION ACCEPT (step 65, Table 9.1.5.1.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result value | ‘001’B | 3GPP access |  |
| TAI list |  |  |  |
| Type of list | ‘01’B | list of TACs belonging to one PLMN, with consecutive TAC values |  |
| Number of elements | ‘00001’B | 2 Elements |  |
| TAC | PLMN =MCC/MNC  stored in EFIMSI  TAC 1 = 2 | TAI-2, TAI-3 |  |
| Allowed NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Rejected NSSAI |  |  |  |
| Rejected S-NSSAI-1 |  | Rejected S-NSSAI value 1 |  |
| Cause value | ‘0001’B | S-NSSAI not available in the current registration area |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Note: If UE has requested only S-NSSAI =1 in step 55 and S-NSSAI =1 is added in the Rejected NSSAI list by the SS then AMF/SS can include default subscribed S-NSSAIs in the allowed NSSAI of REGISTRATION ACCEPT message, see TS 24.501 sub-clause 5.5.1.2.4. | | | |

Table 9.1.5.1.3.3.3-10: PDU SESSION ESTABLISHMENT ACCEPT (step 67 , Table 9.1.5.1.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 clause 4.7.2-2 | | | |
| Information Element | Value/remark | Comment | Condition |
| S-NSSAI |  |  |  |
| Length of S-NSSAI contents | ‘0000 0001’B | SST |  |
| SST | ‘0000 0010’B | SST value 2 |  |

Table 9.1.5.1.3.3.3-11: Void

Table 9.1.5.1.3.3.3-12: Void

Table 9.1.5.1.3.3.3-13: REGISTRATION REQUEST (step 89, Table 9.1.5.1.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘010’B | mobility registration updating |  |
| Requested NSSAI |  | Note |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Note: S-NSSAI =2 will be always included by the UE from the allowed NSSAI list associated with PLMN of NCG Cell A but may include S-NSSAI =1 from Configured NSSAI list associated with PLMN of NCG Cell A. See TS 24.501 sub-clause 5.5.1.2.1 | | | |

Table 9.1.5.1.3.3.3-14: REGISTRATION ACCEPT (step 99, Table 9.1.5.1.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result value | ‘001’B | 3GPP access |  |
| Allowed NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 | Note |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Note: SS will send allowed NSSAIs based on the Requested NSSAIs sent by UE in step 89. | | | |

##### 9.1.5.1.3a Initial registration / 5GS services / NSSAI handling / NSSAI storage

9.1.5.1.3a.1 Test Purpose (TP)

(1)

**with** { UE is switched off with a valid USIM inserted }

**ensure that** {

**when** { UE has configured NSSAI associated with HPLMN, configured NSSAI associated with a current PLMN with mapping to the Configured NSSAI for the HPLMN and UE is powered up or switched on }

**then** { UE transmits REGISTRATION REQUEST message with Requested NSSAI using the configured NSSAI associated with current PLMN and mapping of each S-NSSAI of the requested NSSAI to the S-NSSAIs of the configured NSSAI for the HPLMN }

}

(2)

**with** { UE is switched off with a valid USIM inserted }

**ensure that** {

**when** { UE has neither allowed NSSAI for the current PLMN nor configured NSSAI for the current PLMN and has a default configured NSSAI and UE is powered up or switched on }

**then** { UE transmits REGISTRATION REQUEST message with Requested NSSAI using the default configured NSSAI and also includes Network slicing indication IE with the Default configured NSSAI indication bit set to "Requested NSSAI created from default configured NSSAI" }

}

(3)

**with** { UE is switched off with a valid USIM inserted }

**ensure that** {

**when** { UE has no allowed NSSAI for the current PLMN, no configured NSSAI for the current PLMN, and no configured NSSAI not associated with a PLMN and UE is powered up or switched on }

**then** { UE transmits REGISTRATION REQUEST message and does not include a Requested NSSAI }

}

9.1.5.1.3a.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clause 5.5.1.2.2 and 5.5.1.2.4.

[TS 24.501 clause 5.5.1.2.2]

5.5.1.2.1 General

This procedure can be used by a UE for initial registration for 5GS services.

…

The UE shall include the requested NSSAI containing the S-NSSAI(s) corresponding to the slice(s) to which the UE wants to register and shall include the mapping of the requested NSSAI which is the mapping of each S-NSSAI of the requested NSSAI to the S-NSSAI(s) of the HPLMN, if available, in the REGISTRATION REQUEST message. If the UE has allowed NSSAI or configured NSSAI for the current PLMN, the requested NSSAI shall be either:

a) the configured NSSAI for the current PLMN, or a subset thereof as described below, if the UE has no allowed NSSAI for the current PLMN;

b) the allowed NSSAI for the current PLMN, or a subset thereof as described below, if the UE has an allowed NSSAI for the current PLMN; or

c) the allowed NSSAI for the current PLMN, or a subset thereof as described below, plus one or more S-NSSAIs from the configured NSSAI for which no corresponding S-NSSAI is present in the allowed NSSAI and those are neither in the rejected NSSAI for the current PLMN nor in the rejected NSSAI for the current PLMN and registration area combination.

If the UE has neither allowed NSSAI for the current PLMN nor configured NSSAI for the current PLMN and has a default configured NSSAI, the UE shall:

a) include the S-NSSAI(s) in the Requested NSSAI IE of the REGISTRATION REQUEST message using the default configured NSSAI; and

b) include the Network slicing indication IE with the Default configured NSSAI indication bit set to "Requested NSSAI created from default configured NSSAI" in the REGISTRATION REQUEST message.

If the UE has no allowed NSSAI for the current PLMN, no configured NSSAI for the current PLMN, and no default configured NSSAI, the UE shall not include a requested NSSAI in the REGISTRATION message.

The subset of configured NSSAI provided in the requested NSSAI consists of one or more S-NSSAIs in the configured NSSAI applicable to the current PLMN, if the S-NSSAI is neither in the rejected NSSAI for the current PLMN nor in the rejected NSSAI for the current PLMN and registration area combination.

The subset of allowed NSSAI provided in the requested NSSAI consists of one or more S-NSSAIs in the allowed NSSAI for the current PLMN.

NOTE 3: How the UE selects the subset of configured NSSAI or allowed NSSAI to be provided in the requested NSSAI is implementation.

NOTE 4: The number of S-NSSAI(s) included in the requested NSSAI cannot exceed eight.

[TS 24.501 clause 5.5.1.2.4]

The AMF shall include the allowed NSSAI for the current PLMN and shall include the mapping of each S-NSSAI of the allowed NSSAI to the S-NSSAI(s) of the HPLMN contained in the requested NSSAI from the UE if available, in the REGISTRATION ACCEPT message if the UE included the requested NSSAI in the REGISTRATION REQUEST message and the AMF allows one or more S-NSSAIs in the requested NSSAI. The AMF may also include rejected NSSAI in the REGISTRATION ACCEPT message. Rejected NSSAI contains S-NSSAI(s) which was included in the requested NSSAI but rejected by the network associated with rejection cause(s).

The AMF may include a new configured NSSAI for the current PLMN in the REGISTRATION ACCEPT message if:

a) the REGISTRATION REQUEST message did not include the requested NSSAI;

b) the REGISTRATION REQUEST message included the requested NSSAI containing an S-NSSAI that is not valid in the serving PLMN; or

c) the REGISTRATION REQUEST message included the Network slicing indication IE with the Default configured NSSAI indication bit set to "Requested NSSAI created from default configured NSSAI".

If a new configured NSSAI for the current PLMN is included in the REGISTRATION ACCEPT message, the AMF shall also include the mapping of the configured NSSAI for the current PLMN the S-NSSAI(s) of the to HPLMN if available in the REGISTRATION ACCEPT message. In this case the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3.

The AMF shall include the Network slicing indication IE with the Network slicing subscription change indication set to "Network slicing subscription changed" in the REGISTRATION ACCEPT message if the UDM has indicated that the subscription data for network slicing has changed. In this case the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3.

The UE receiving the rejected NSSAI in the REGISTRATION ACCEPT message takes the following actions based on the rejection cause in the rejected NSSAI:

"S-NSSAI not available in the current PLMN"

The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current PLMN as specified in subclause 4.6.2.2 and not attempt to use this S-NSSAI in the current PLMN until switching off the UE or the UICC containing the USIM is removed.

"S-NSSAI not available in the current registration area"

The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current PLMN and registration area combination as specified in subclause 4.6.2.2 and not attempt to use this S-NSSAI in the current registration area until switching off the UE, the UE moving out of the current registration area or the UICC containing the USIM is removed.

If the UE did not include the requested NSSAI in the REGISTRATION REQUEST message or none of the requested NSSAI are present in the subscribed S-NSSAIs, and one or more subscribed S-NSSAIs (containing one or more S-NSSAIs each of which may be associated with a new S-NSSAI) marked as default are available, the AMF shall put the subscribed S-NSSAIs marked as default in the allowed NSSAI of the REGISTRATION ACCEPT message. The AMF shall determine a registration area such that all S-NSSAIs of the allowed NSSAI are available in the registration area.

9.1.5.1.3a.3 Test description

9.1.5.1.3a.3.1 Pre-test conditions

System Simulator:

- NGC Cell G is configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in 38.508-1 [4] except that frequency NRf1 replaces NRf2.

- NGC Cell G belongs to VPLMN, TAI-7 and set as serving cell.

UE:

- None

Preamble:

- The UE is in state Switched OFF (state 0N-B) according to TS 38.508-1 [4] and camped on NGC Cell A HPLMN.

9.1.5.1.3a.3.2 Test procedure sequence

Table 9.1.5.1.3a.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on. |  |  | - | - |
| 2 | The UE transmits REGISTRATION REQUEST message on NGC Cell G. | --> | REGISTRATION REQUEST | - | - |
| 3-11 | Steps 5 to 13 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2.2-2 are performed. | - | - | - | - |
| 12 | The SS transmits REGISTRATION ACCEPT message including Configured and Allowed NSSAI lists. | <-- | REGISTRATION ACCEPT | - | - |
| 13 -18 | Steps 15 to 20a1 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2.2-2 are performed with ‘*connected without release’*. | - | - | - | - |
| 19 | The SS transmits NSSAI DELETE REQUEST message to delete the Allowed NSSAI list for all PLMNs (MCC-MNC =000-000) and for 3GPP access so UE has only configured NSSAI. | <-- | NSSAI DELETE REQUEST | - | - |
| 20 | UE transmits NSSAI DELETE RESPONSE message. | --> | NSSAI DELETE RESPONSE | - | - |
| 21 | The SS transmits an *RRCRelease* message. | - | - | - | - |
| 22 | Switch off procedure in RRC\_Idle specified in TS 38.508-1 subclause 4.9.6.1 is performed. | - | - | - | - |
| 23 | The UE is brought back to operation or the USIM is inserted. | - | - | - | - |
| 24 | Check: Does UE transmit a REGISTRATION REQUEST message including Requested NSSAI? | --> | REGISTRATION REQUEST | 1 | P |
| 25-33 | Steps 5 to13 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2.2-2 are performed. | - | - | - | - |
| 34 | The SS transmits a REGISTRATION ACCEPT message including Allowed NSSAI. | <-- | REGISTRATION ACCEPT | - | - |
| 35-40 | Steps 15 to 20a1 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2.2-2 are performed with ‘*connected without release’*. | - | - | - | - |
| 41 | The SS transmits NSSAI DELETE REQUEST message to delete the Default Configured NSSAI list. | <-- | NSSAI DELETE REQUEST | - | - |
| 42 | UE transmits NSSAI DELETE RESPONSE message. | --> | NSSAI DELETE RESPONSE | - | - |
| 43 | Use AT command and set Default Configured NSSAI to 1 & 2. | - | - | - | - |
| 44 | The SS transmits NSSAI DELETE REQUEST message to delete the Configured NSSAI list for all PLMNs (MCC-MNC =000-000). | <-- | NSSAI DELETE REQUEST | - | - |
| 45 | UE transmits NSSAI DELETE RESPONSE message. | --> | NSSAI DELETE RESPONSE | - | - |
| 46 | The SS transmits NSSAI DELETE REQUEST message to delete the Allowed NSSAI list for all PLMNs (MCC-MNC =000-000). | <-- | NSSAI DELETE REQUEST | - | - |
| 47 | UE transmits NSSAI DELETE RESPONSE message. | --> | NSSAI DELETE RESPONSE | - | - |
| 48 | The SS transmits an *RRCRelease* message. | - | - | - | - |
| 49 | Switch off procedure in RRC\_Idle specified in TS 38.508-1 subclause 4.9.6.1 is performed | - | - | - | - |
| 50 | The UE is brought back to operation or the USIM is inserted. | - | - | - | - |
| 51 | Check: Does UE transmit a REGISTRATION REQUEST message including Requested NSSAI? | --> | REGISTRATION REQUEST | 2 | P |
| 52- 60 | Steps 5 to 13 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2.2-2 are performed*.* | - | - | - | - |
| 61 | The SS transmits a REGISTRATION ACCEPT message including Allowed NSSAI. | <-- | REGISTRATION ACCEPT | - | - |
| 62-67 | Steps 15 to 20a1 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2.2-2 are performed with ‘*connected without release’*. | - | - | - | - |
| 68 | The SS transmits NSSAI DELETE REQUEST message to delete the Default Configured NSSAI list. | <-- | NSSAI DELETE REQUEST | - | - |
| 69 | UE transmits NSSAI DELETE RESPONSE message. | --> | NSSAI DELETE RESPONSE | - | - |
| 70 | The SS transmits NSSAI DELETE REQUEST message to delete the Configured NSSAI list for all PLMNs (MCC-MNC =000-000). | <-- | NSSAI DELETE REQUEST | - | - |
| 71 | UE transmits NSSAI DELETE RESPONSE message. | --> | NSSAI DELETE RESPONSE | - | - |
| 72 | The SS transmits NSSAI DELETE REQUEST message to delete the Allowed NSSAI list for all PLMNs (MCC-MNC =000-000). | <-- | NSSAI DELETE REQUEST | - | - |
| 73 | UE transmits NSSAI DELETE RESPONSE message. | --> | NSSAI DELETE RESPONSE | - | - |
| 74 | The SS transmits an *RRCRelease* message. | - | - | - | - |
| 75 | Switch off procedure in RRC\_Idle specified in TS 38.508-1 subclause 4.9.6.1 is performed. | - | - | - | - |
| 76 | The UE is brought back to operation or the USIM is inserted. | - | - | - | - |
| 77 | Check: Does UE transmit a REGISTRATION REQUEST message not including Requested NSSAI? | --> | REGISTRATION REQUEST | 3 | P |
| 78-93 | Steps 5 to 20a1of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2.2-2 are performed. | - | - | - | - |

9.1.5.1.3a.3.3 Specific message contents

Table 9.1.5.1.3a.3.3-1: REGISTRATION ACCEPT (Preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result value | ‘001’B | 3GPP access |  |
| Allowed NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Configured NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.1.5.1.3a.3.3-2: REGISTRATION ACCEPT (step 12, Table 9.1.5.1.3a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result value | ‘001’B | 3GPP access |  |
| Allowed NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000100’B | 4 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Configured NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000010’B | SST and mapped configured SST |  |
| SST | ‘00000100’B | 4 |  |
| SD | Not Present |  |  |
| Mapped configured SST | ‘00000001’B | 1 |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000010’B | SST and mapped configured SST |  |
| SST | ‘00000101’B | 5 |  |
| SD | Not Present |  |  |
| Mapped configured SST | ‘00000010’B | 2 |  |
| Mapped configured SD | Not Present |  |  |

Table 9.1.5.1.3a.3.3-2A: PDU SESSION ESTABLISHMENT ACCEPT (step 14 , Table 9.1.5.1.3a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 clause 4.7.2-2 | | | |
| Information Element | Value/remark | Comment | Condition |
| S-NSSAI |  |  |  |
| Length of S-NSSAI contents | ‘0000 0001’B | SST |  |
| SST | ‘0000 0100’B | SST value 4 |  |

Table 9.1.5.1.3a.3.3-3: NSSAI DELETE REQUEST (step 19, Table 9.1.5.1.3a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.509 Table 6.7.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol discriminator | 1111 |  |  |
| Skip indicator | 0000 |  |  |
| Message type | ‘10000110’ |  |  |
| Delete NSSAI type | ‘00000010’ | Delete Allowed NSSAI |  |
| Allowed NSSAI | 000000 | All PLMNs (3 Octets) |  |
|  | 00 | 3GPP access |  |

Table 9.1.5.1.3a.3.3-4: NSSAI DELETE RESPONSE (step 20, Table 9.1.5.1.3a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.509 Table 6.7.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol discriminator | 1111 |  |  |
| Skip indicator | 0000 |  |  |
| Message type | ‘10100111’ |  |  |

Table 9.1.5.1.3a.3.3-5: REGISTRATION REQUEST (step 24, Table 9.1.5.1.3a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘001’B | Initial registration |  |
| Requested NSSAI |  | Note |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000010’B | SST and mapped configured SST |  |
| SST | ‘00000100’B | 4 |  |
| SD | Not Present |  |  |
| Mapped configured SST | ‘00000001’B | 1 |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000010’B | SST and mapped configured SST |  |
| SST | ‘00000101’B | 5 |  |
| SD | Not Present |  |  |
| Mapped configured SST | ‘00000010’B | 2 |  |
| Mapped configured SD | Not Present |  |  |
| Note: UE may include S-NSSAI 4 or 5 or both 4 and 5 from the configured NSSAI list associated with NGC cell G. | | | |

Table 9.1.5.1.3a.3.3-6: REGISTRATION ACCEPT (step 34, Table 9.1.5.1.3a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result value | ‘001’B | 3GPP access |  |
| Allowed NSSAI |  | Note |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000010’B | SST and mapped configured SST |  |
| SST | ‘00000100’B | 4 |  |
| SD | Not Present |  |  |
| Mapped configured SST | ‘00000001’B | 1 |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000010’B | SST and mapped configured SST |  |
| SST | ‘00000101’B | 5 |  |
| SD | Not Present |  |  |
| Mapped configured SST | ‘00000010’B | 2 |  |
| Mapped configured SD | Not Present |  |  |
| Note: SS will send Allowed NSSAIs based on the Requested NSSAI sent by UE in step 24. | | | |

Table 9.1.5.1.3a.3.3-6A: PDU SESSION ESTABLISHMENT ACCEPT (step 36, Table 9.1.5.1.3a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 clause 4.7.2-2 | | | |
| Information Element | Value/remark | Comment | Condition |
| S-NSSAI |  |  |  |
| Length of S-NSSAI contents | ‘0000 0010’B | SST |  |
| SST | ‘0000 0100’B | SST value 4 |  |
| Mapped configured SST | ‘00000001’B | mapped configured SST value 1 |  |

Table 9.1.5.1.3a.3.3-7: NSSAI DELETE REQUEST (step 41, Table 9.1.5.1.3a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.509 Table 6.7.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol discriminator | 1111 |  |  |
| Skip indicator | 0000 |  |  |
| Message type | ‘10000110’ |  |  |
| Delete NSSAI type | ‘00000000’ | Delete Default Configured NSSAI |  |

Table 9.1.5.1.3a.3.3-8: NSSAI DELETE RESPONSE (step 42, Table 9.1.5.1.3a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.509 Table 6.7.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol discriminator | 1111 |  |  |
| Skip indicator | 0000 |  |  |
| Message type | ‘10100111’ |  |  |

Table 9.1.5.1.3a.3.3-9: NSSAI DELETE REQUEST (step 44, Table 9.1.5.1.3a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.509 Table 6.7.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol discriminator | 1111 |  |  |
| Skip indicator |  |  |  |
| Message type | ‘10000110’ |  |  |
| Delete NSSAI type | ‘00000001’ | Delete Configured NSSAI |  |
| Configured NSSAI | 00000000 | All PLMNs |  |

Table 9.1.5.1.3a.3.3-10: NSSAI DELETE RESPONSE (step 45, Table 9.1.5.1.3a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.509 Table 6.7.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol discriminator | 1111 |  |  |
| Skip indicator | 0000 |  |  |
| Message type | ‘10100111’ |  |  |

Table 9.1.5.1.3a.3.3-11: NSSAI DELETE REQUEST (step 46, Table 9.1.5.1.3a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.509 Table 6.7.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol discriminator | 1111 |  |  |
| Skip indicator | 0000 |  |  |
| Message type | ‘10000110’ |  |  |
| Delete NSSAI type | ‘00000010’ | Delete Allowed NSSAI |  |
| Allowed NSSAI | 000000 | All PLMNs (3 Octets) |  |
|  | 00 | 3GPP access |  |

Table 9.1.5.1.3a.3.3-12: NSSAI DELETE RESPONSE (step 47, Table 9.1.5.1.3a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.509 Table 6.7.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol discriminator | 1111 |  |  |
| Skip indicator | 0000 |  |  |
| Message type | ‘10100111’ |  |  |

Table 9.1.5.1.3a.3.3-13: REGISTRATION REQUEST (step 51, Table 9.1.5.1.3a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘001’B | Initial registration |  |
| Requested NSSAI |  | Note |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Network slicing indication |  |  |  |
| Default configured NSSAI indication | 1 | Requested NSSAI created from default configured NSSAI |  |
| Note: UE may include either 1 or 2 or both 1 and 2 NSSAIs. | | | |

Table 9.1.5.1.3a.3.3-14: REGISTRATION ACCEPT (step 61, Table 9.1.5.1.3a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result value | ‘001’B | 3GPP access |  |
| Allowed NSSAI |  | Note |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000010’B | SST and mapped configured SST |  |
| SST | ‘00000001’B | 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | ‘00000001’B |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000010’B | SST and mapped configured SST |  |
| SST | ‘00000010’B | 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | ‘00000010’B |  |  |
| Mapped configured SD | Not Present |  |  |
| Note: SS will send Allowed NSSAIs based on the Requested NSSAI sent by UE in Step 51 | | | |

Table 9.1.5.1.3a.3.3-15: NSSAI DELETE REQUEST (step 68, Table 9.1.5.1.3a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.509 Table 6.7.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol discriminator | 1111 |  |  |
| Skip indicator | 0000 |  |  |
| Message type | ‘10000110’ |  |  |
| Delete NSSAI type | ‘00000000’ | Delete Default Configured NSSAI |  |

Table 9.1.5.1.3a.3.3-16: NSSAI DELETE RESPONSE (step 69, Table 9.1.5.1.3a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.509 Table 6.7.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol discriminator | 1111 |  |  |
| Skip indicator | 0000 |  |  |
| Message type | ‘10100111’ |  |  |

Table 9.1.5.1.3a.3.3-17: NSSAI DELETE REQUEST (step 70, Table 9.1.5.1.3a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.509 Table 6.7.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol discriminator | 1111 |  |  |
| Skip indicator | 0000 |  |  |
| Message type | ‘10000110’ |  |  |
| Delete NSSAI type | ‘00000001’ | Delete Configured NSSAI |  |
| Configured NSSAI | 000000 | All PLMNs (3 Octets) |  |

Table 9.1.5.1.3a.3.3-18: NSSAI DELETE RESPONSE (step 71, Table 9.1.5.1.3a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.509 Table 6.7.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol discriminator | 1111 |  |  |
| Skip indicator | 0000 |  |  |
| Message type | ‘10100111’ |  |  |

Table 9.1.5.1.3a.3.3-19: NSSAI DELETE REQUEST (step 72, Table 9.1.5.1.3a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.509 Table 6.7.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol discriminator | 1111 |  |  |
| Skip indicator | 0000 |  |  |
| Message type | ‘10000110’ |  |  |
| Delete NSSAI type | ‘00000010’ | Delete Allowed NSSAI |  |
| Allowed NSSAI | 000000 | All PLMNs (3 Octets) |  |
|  | 00 | 3GPP access |  |

Table 9.1.5.1.3a.3.3-20: NSSAI DELETE RESPONSE (step 73, Table 9.1.5.1.3a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.509 Table 6.7.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol discriminator | 1111 |  |  |
| Skip indicator | 0000 |  |  |
| Message type | ‘10100111’ |  |  |

Table 9.1.5.1.3a.3.3-21: REGISTRATION REQUEST (step 77, Table 9.1.5.1.3a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘001’B | Initial registration |  |
| Requested NSSAI | Not Present |  |  |

##### 9.1.5.1.4 Initial registration / 5GS services / MICO mode / TAI list handling

9.1.5.1.4.1 Test Purpose (TP)

(1)

**with** { The UE is in 5GMM-DEREGISTERED state and is switched off }

**ensure that** {

**when** { the UE supports MICO mode and requests the use of MICO mode }

**then** { the UE includes the MICO indication IE in the REGISTRATION REQUEST message }

}

(2)

**with** { The UE has received REGISTRATION ACCEPT message }

**ensure that** {

**when** { the REGISTRATION ACCEPT message included MICO indication IE indicating “all PLMN registration area allocated” }

**then** { the UE treats all TAIs in the current PLMN as a registration area and deletes its old TAI list }

}

(3)

**with** { The UE detecting a better NG cell in same PLMN }

**ensure that** {

**when** { the UE treats all TAIs in the current PLMN as a registration area and has deleted its old TAI list as a result of REGISTRATION ACCEPT message included MICO indication IE indicating “all PLMN registration area allocated” }

**then** { the UE does not perform the REGISTRATION procedure for mobility }

}

(4)

**with** { The UE detecting a better NG cell in a different PLMN }

**ensure that** {

**when** { the UE transmits the REGISTRATION REQUEST }

**then** { the UE sets the IE 5GS registration type to “mobility registration updating” and performs a REGISTRATION procedure for Mobility }

}

9.1.5.1.4.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 38.304, clause 4.1 and TS 24.501, clause 5.5.1.2.2, clause 5.5.1.2.4 and clause 5.3.6. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.5.1.2.2]

…

If the UE supports MICO mode and requests the use of MICO mode, then the UE shall include the MICO indication IE in the REGISTRATION REQUEST message.

…

[TS 24.501, clause 5.5.1.2.4]

…

The AMF shall include the MICO indication IE in the REGISTRATION ACCEPT message only if the MICO indication IE was included in the REGISTRATION REQUEST message, the AMF supports and accepts the use of MICO mode. If the AMF supports and accepts the use of MICO mode, the AMF may indicate "all PLMN registration area allocated" in the MICO indication IE in the REGISTRATION ACCEPT message. If "all PLMN registration area allocated" is indicated in the MICO indication IE, the AMF shall not assign and include the TAI list in the REGISTRATION ACCEPT message. If the REGISTRATION ACCEPT message included an MICO indication IE indicating "all PLMN registration area allocated", the UE shall treat all TAIs in the current PLMN as a registration area and delete its old TAI list.

…

[TS 24.501, clause 5.3.6]

…

The UE may deactivate MICO mode and activate the AS layer at any time. Upon deactivating MICO mode, the UE may initiate 5GMM procedures (e.g. for the transfer of mobile originated signalling or user data).

…

[TS 38.304, clause 4.1]

…

When the UE is in RRC\_IDLE state, upper layers may deactivate AS layer when MICO mode is activated as specified in TS 24.501 [14]. When MICO mode is activated, the AS configuration (e.g. priorities provided by dedicated signalling) is kept and all running timers continue to run but the UE need not perform any idle mode tasks. If a timer expires while MICO mode is activated it is up to the UE implementation whether it performs the corresponding action immediately or the latest when MICO mode is deactivated. When MICO mode is deactivated, the UE shall perform all idle mode tasks.

…

9.1.5.1.4.3 Test description

9.1.5.1.4.3.1 Pre-test conditions

System Simulator:

- NGC Cell A, NGC Cell C and NGC Cell E are configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in TS 38.508-1 [4].

UE:

None.

Preamble:

- The UE is in state Switched OFF (State 0N-B) as per TS 38.508-1 [4] Table 4.4A.2-0.

9.1.5.1.4.3.2 Test procedure sequence

Table 9.1.5.1.4.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 0 | The SS configures:  - NGC Cell A as the "Non-suitable “Off” cell.  - NGC Cell C as the "Non-suitable "Off" cell".  - NGC Cell E as the "Non-suitable "Off" cell". | - | - | - | - |
| 1 | The UE is switched ON. | - | - | - | - |
| 2 | The user requests enabling of MICO mode by MMI or AT command. | - | - | - | - |
| 3 | The SS configures:  - NGC Cell A as the "Serving cell".  - NGC Cell C as the "Non-suitable "Off" cell".  - NGC Cell E as the "Non-suitable "Off" cell". | - | - | - | - |
| 4-6 | The UE establishes an RRC connection by executing steps 2–4 of Table 4.5.2.2-2 in TS 38.508-1 [4]. | - | - | - | - |
| 7 | Check: Does the UE transmit a REGISTRATION REQUEST message including IE MICO indication? | --> | REGISTRATION REQUEST | 1 | P |
| 8-16 | Steps 5-13 of Table 4.5.2.2-2 of the generic procedure in TS 38508-1 [4] are performed. | - | - | - | - |
| 17 | The SS transmits a REGISTRATION ACCEPT message that includes IE MICO indication. | <-- | REGISTRATION ACCEPT | - | - |
| 17A | The UE transmits a REGISTRATION COMPLETE message. | --> | REGISTRATION COMPLETE | - | - |
| - | EXCEPTION: Steps 17Aa1 is performed if pc\_noOf\_PDUsSameConnection > 0. | - | - | - | - |
| 17Aa1 | The generic procedure for UE-requested PDU session establishment, specified in subclause 4.5A.2, takes place performing establishment of UE-requested PDU session(s) with ExpectedNumberOfNewPDUSessions = pc\_noOf\_PDUsSameConnection. | - | - | - | - |
| 17B | Void | - | - | - | - |
| 18 | The SS releases the RRC Connection. | - | - | - | - |
| 19 | The SS configures:  - NGC Cell A as the "Non-suitable “Off” cell".  - NGC Cell C as the "Serving cell".  - NGC Cell E as the "Non-suitable “Off” cell". | - | - | - | - |
| 20 | Check: Does the UE transmit a RRCSetupRequest on NGC Cell C?  This is checked for 60s? | --> | NR RRC: RRCSetupRequest | 2, 3 | F |
| 21 | The SS configures:  - NGC Cell A as the "Non-suitable “Off” cell".  - NGC Cell C as the "Non-suitable “Off” cell".  - NGC Cell E as the "Serving cell". | - | - | - | - |
| - | The following messages are to be observed on NGC Cell E unless explicitly stated otherwise. | - | - | - | - |
| 21A | Void |  |  |  |  |
| 21B | Start T1= 10s | - | - | - | - |
| - | EXCEPTION: Steps 21Ca1 to 21Cb5 describe the behaviour depending on UE implementation; the "lower case letter" identifies a step sequence that takes place if the UE performs a specific action. | - | - | - | - |
| 21Ca1- 21Ca3 | The UE establishes an RRC connection by executing steps 2–4 of Table 4.5.2.2-2 in TS 38.508-1 [4]. | - | - | - | - |
| 21Ca4 | Stop Timer T1 | - | - | - | - |
| 21Cb1 | Timer T1 expires | - | - | - | - |
| 21Cb2 | Cause the UE to request connectivity to an PDU session (Note 1) | - | - | - | - |
| 21Cb3-21Cb5 | The UE establishes an RRC connection by executing steps 2–4 of Table 4.5.2.2-2 in TS 38.508-1 [4]. | - | - | - | - |
| 22-24 | Void |  |  |  |  |
| 25 | Check: Does the UE transmit a REGISTRATION REQUEST message with IE 5GS registration type set to “mobility registration updating”? | --> | REGISTRATION REQUEST | 4 | P |
| 26-27 | Steps 4–5 of Table 4.9.5.2.2-1 in TS 38.508-1 [4] are performed. | - | - | - | - |
| - | EXCEPTION : Step 28a is performed only IF Step 21Cb2 is performed. | - | - | - | - |
| 28a | The PDU session establishment procedure as specified in TS 38.508-1 [4] subclause 4.5A.2 take place. | - | - | - | - |
| Note 1: The request of connectivity to an additional PDU session may be performed by MMI or AT command +CGACT. | | | | | |

9.1.5.1.4.3.3 Specific message contents

Table 9.1.5.1.4.3.3-1: REGISTRATION REQUEST (step 6, Table 9.1.5.1.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type |  |  |  |
| 5GS registration type value | ‘001’B | Initial registration | INITIAL |
| MICO indication | ‘0000’B |  |  |

Table 9.1.5.1.4.3.3-2: REGISTRATION ACCEPT (step 17, Table 9.1.5.1.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| MICO Indication | ‘0001’B | All PLMN registration area allocated |  |
| TAI list | Not present |  |  |

Table 9.1.5.1.4.3.3-3: REGISTRATION REQUEST (step 24, Table 9.1.5.1.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type |  |  |  |
| 5GS registration type value | ‘010’B | Mobility registration updating | MOBILITY |

##### 9.1.5.1.5 Initial registration / Abnormal / Failure after 5 attempts

9.1.5.1.5.1 Test Purpose (TP)

(1)

**with** { The UE in 5GMM-REGISTERED-INITIATED state and T3510 timer expired }

**ensure that** {

**when** { T3511 timer expires and registration attempt counter is less than 5 }

**then** { UE restarts the initial registration procedure }

}

(2)

**with** { The UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { The NAS signalling connection is released before the REGISTRATION ACCEPT or REGISTRATION REJECT message is received }

**then** { UE restarts the initial registration procedure }

}

(3)

**with** { The UE has sent initial REGISTRAION REQUEST message }

**ensure that** {

**when** { UE receives a REGISTRATION REJECT message including 5GMM cause value #95 and the UE updates the registration counter to 5 }

**then** { UE deletes 5G-GUTI, last visited TAI and ngKSI, performs a PLMN selection after timer T3502 timeout }

}

9.1.5.1.5.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clauses 5.5.1.1 5.5.1.2.7, and 10.2. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.5.1.1]

Additionally, the registration attempt counter shall be reset when the UE is in sub state 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION or 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE, and:

- a new tracking area is entered;

- timer T3502 expires; or

- timer T3346 is started.

[TS 24.501, clause 5.5.1.2.7]

The following abnormal cases can be identified:

…

c) T3510 timeout.

The UE shall abort the registration procedure for initial registration and the NAS signalling connection, if any, shall be released locally if the initial registration request is not for emergency services. The UE shall proceed as described below.

d) REGISTRATION REJECT message, other 5GMM cause values than those treated in subclause 5.5.1.2.5, and cases of 5GMM cause value #22, if considered as abnormal cases according to subclause 5.5.1.2.5.

If the registration request is not an initial registration request for emergency services, upon reception of the 5GMM causes #95, #96, #97, #99 and #111 the UE should set the registration attempt counter to 5.

The UE shall proceed as described below.

e) Lower layer failure or release of the NAS signalling connection received from lower layers before the REGISTRATION ACCEPT or REGISTRATION REJECT message is received.

The UE shall abort the registration procedure for initial registration and proceed as described below.

…

For the cases c, d and e, the UE shall proceed as follows:

Timer T3510 shall be stopped if still running.

If the registration procedure is neither an initial registration for emergency services nor for establishing an emergency PDU session with registration type not set to "emergency registration", the registration attempt counter shall be incremented, unless it was already set to 5.

If the registration attempt counter is less than 5:

- if the initial registration request is not for emergency services, timer T3511 is started and the state is changed to 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION. When timer T3511 expires the registration procedure for initial registration shall be restarted, if still required.

If the registration attempt counter is equal to 5

- the UE shall delete 5G-GUTI, TAI list, last visited TAI, list of equivalent PLMNs and ngKSI, start timer T3502 and shall set the 5GS update status to 5U2 NOT UPDATED. The state is changed to 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION or optionally to 5GMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection according to 3GPP TS 23.122 [5].

[TS 24.501, clause 10.2]

Table 10.2.1: Timers of 5GS mobility management – UE side

| TIMER NUM. | TIMER VALUE | STATE | CAUSE OF START | NORMAL STOP | ON  EXPIRY |
| --- | --- | --- | --- | --- | --- |
| T3510 | 15s | 5GMM-REGISTERED-INITIATED | Transmission of REGISTRATION REQUEST message | REGISTRATION ACCEPT message received or REGISTRATION REJECT message received | Start T3511 or T3502 as specified in subclause 5.5.1.2.7 if T3510 expired during registration procedure for initial registration.  Start T3511 or T3502 as specified in subclause 5.5.1.3.7 if T3510 expired during the registration procedure for mobility and periodic registration update |
| T3502 | Default 12 min.  NOTE 1 | 5GMM-REGISTERED | At registration failure and the attempt counter is equal to 5 | Transmission of REGISTRATION REQUEST message | Initiation of the registration procedure, if still required |
| T3511 | 10s | 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION  5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE  5GMM-REGISTERED.NORMAL-SERVICE | At registration failure due to lower layer failure, T3510 timeout or registration rejected with other 5GMM cause values than those treated in subclause 5.5.1.2.5 for initial registration or subclause 5.5.1.3.5 for mobility and periodic registration | Transmission of REGISTRATION REQUEST message  5GMM-CONNECTED mode entered (NOTE 5) | Retransmission of the REGISTRATION REQUEST, if still required |

9.1.5.1.5.3 Test description

9.1.5.1.5.3.1 Pre-test conditions

System Simulator:

- NGC Cell A is configured according to Table 6.3.2.2-1 in TS 38.508-1 [4].

UE:

None.

Preamble:

- The UE is in state 0-A according to TS 38.508-1 [4] Table 4.4A.2-0.

9.1.5.1.5.3.2 Test procedure sequence

Table 9.1.5.1.5.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS configures:  - NGC Cell A as the "Serving cell". | - | - | - | - |
| - | The following messages are to be observed on NGC Cell A unless explicitly stated otherwise. | - | - | - | - |
| 2 | The UE is switched on. | - | - | - | - |
| 3-5 | Steps 2-4 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed and the UE transmits a REGISTRATION REQUEST with IE 5GS registration type set to “initial registration”. | --> | REGISTRATION REQUEST | - | - |
| 6 | The SS waits 25 seconds (15 seconds T3510 and 10 seconds T3511). (UE’s registration attempt counter = 1) | - | - | - | - |
| 7 | Check: Does the UE transmit a REGISTRATION REQUEST message with IE 5GS registration type set to “initial registration”? | --> | REGISTRATION REQUEST | 1 | P |
| 8 | The SS releases the RRC connection. | - | - | - | - |
| 8A | The SS waits 10 seconds (T3511). (UE’s registration attempt counter = 2) |  |  |  |  |
| 9-11 | Steps 2-4 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed.  Check: Does the UE transmit a REGISTRATION REQUEST message with IE 5GS registration type set to “initial registration”? | --> | REGISTRATION REQUEST | 2 | P |
| 12-16 | Steps 5-9 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 17 | The SS transmits a REGISTRATION REJECT with cause #95 (Semantically incorrect message). (UE’s registration attempt counter = 5) | <-- | REGISTRATION REJECT | - | - |
| 17A | The SS releases the RRC connection. | - | - | - | - |
|  | EXCEPTION: Steps 17Aa1 and 17Ab1 describes behaviour that depends on the UE capability; the "lower case letter" identifies a step sequence that take place if a capability is supported |  |  |  |  |
| 17Aa1 | IF the UE transmits a REGISTRATION REQUEST message with IE 5GS registration type set to “initial registration” 10s after step 17A. | --> | REGISTRATION REQUEST | - | - |
| 17Ab1 | ELSE Check: Does the UE transmit a REGISTRATION REQUEST message with IE 5GS registration type set to “initial registration” after 12 minutes after step 17A? (UE’s registration attempt counter has been reset to 0 after expiry of T3502) | --> | REGISTRATION REQUEST | 3 | P |
| 18 | Void | - | - | - | - |
| 19-34 | Steps 5-20a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |

9.1.5.1.5.3.3 Specific message contents

Table 9.1.5.1.5.3.3-1: REGISTRATION REJECT (step 17, Table 9.1.5.1.5.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | ‘01011111’B | Cause #95 (Semantically incorrect message) |  |

Table 9.1.5.1.5.3.3-2: REGISTRATION REQUEST (step 18, Table 9.1.5.1.5.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| ngKSI |  |  |  |
| NAS key set identifier | '111'B | no key is available |  |
| TSC | Any allowed value | TSC does not apply for NAS key set identifier value "111" |  |
| 5GS mobile identity | SUCI |  |  |
| Last visited registered TAI | Not present |  |  |

Table 9.1.5.1.5.3.3-3: Void

##### 9.1.5.1.6 Initial registration / Rejected / Illegal UE

9.1.5.1.6.1 Test Purpose (TP)

(1)

**with { the UE in 5GMM-REGISTERED-INITIATED state }**

**ensure that {  
 when { the SS sends a REGISTRATION REJECT message to the UE including an appropriate 5GMM cause value #3 (Illegal UE) }**

**then { the UE deletes the stored 5G-GUTI, last visited registered TAI and ngKSI, deletes the list of equivalent PLMNs and enter state 5GMM-DEREGISTERED, the USIM is considered invalid until switching off the UE }**

**}**

9.1.5.1.6.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501 clause 5.5.1.2.5.

[TS 24.501, clause 5.5.1.2.5]

If the initial registration request cannot be accepted by the network, the AMF shall send a REGISTRATION REJECT message to the UE including an appropriate 5GMM cause value.

If the initial registration request is rejected due to general NAS level mobility management congestion control, the network shall set the 5GMM cause value to #22 "congestion" and assign a back-off timer T3346.

The UE shall take the following actions depending on the 5GMM cause value received in the REGISTRATION REJECT message.

#3 (Illegal UE); or

#6 (Illegal ME).

The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. The UE shall consider the USIM as invalid for 5GS services until switching off or the UICC containing the USIM is removed. The UE shall delete the list of equivalent PLMNs and enter the state 5GMM-DEREGISTERED.

If the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status, 4G-GUTI, TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the EPS attach request procedure is rejected with the EMM cause with the same value. The USIM shall be considered as invalid also for non-EPS services until switching off or the UICC containing the USIM is removed.

If the UE also supports the registration procedure over the other access, the UE shall in addition handle 5GMM parameters and 5GMM state for this access, as described for this 5GMM cause value.

9.1.5.1.6.3 Test description

9.1.5.1.6.3.1 Pre-test conditions

System Simulator:

- NGC Cell A is configured according to table 6.3.2.2-1 in TS 38.508-1 [4].

UE:

None.

Preamble:

- The UE is in state Switched OFF (state 0N-B) according to TS 38.508-1 [4].

9.1.5.1.6.3.2 Test procedure sequence

Table 9.1.5.1.6.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS configures:  - NGC cell A as the "Serving cell". | - | - | - | - |
| - | The following messages are to be observed on NGC Cell A unless explicitly stated otherwise. | - | - | - | - |
| 2 | The UE is switched on. | - | - | - | - |
| 3-14 | Steps 2-13 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 15 | The SS transmits a REGISTRATION REJECT message with the 5GMM cause set to 'Illegal UE' as specified. | <-- | 5GMM: REGISTRATION REJECT | - | - |
| 16 | The SS releases the RRC connection. | - | - | - | - |
| 17 | Check: Does the UE transmit an REGISTRATION REQUEST message on NGC cell A in the next 30 seconds? | --> | 5GMM: REGISTRATION REQUEST | 1 | F |
| 18 | The user initiates Registration Request by MMI or by AT command. | - | - | - | - |
| 19 | Check: Does the UE transmit the REGISTRATION REQUEST message in the next 30 seconds? | --> | 5GMM: REGISTRATION REQUEST | 1 | F |
| 20 | If possible (see ICS) switch off is performed or the USIM is removed. Otherwise the power is removed. | - | - | - | - |
| 21 | The UE is brought back to operation or the USIM is inserted. The UE is powered on or switched on. | - | - | - | - |
| 22 | Check: Does the UE transmit an REGISTRATION REQUEST message on NGC Cell A? | --> | 5GMM: REGISTRATION REQUEST | 1 | P |
| 23-38a1 | Steps 5-20a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed on NGC Cell A. | - | - | - | - |

9.1.5.1.6.3.3 Specific message contents

Table 9.1.5.1.6.3.3-1: REGISTRATION REJECT (step 15, Table 9.1.5.1.6.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 Table 4.7.1-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | '0000 0011'B | Illegal UE |  |

Table 9.1.5.1.6.3.3-2: REGISTRATION REQUEST (step 22, Table 9.1.5.1.6.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| ngKSI |  |  |  |
| NAS key set identifier | '111'B | no key is available (UE to network) |  |
| TSC | Any allowed value | TSC does not apply for NAS key set identifier value "111" |  |
| 5GS mobile identity | The valid SUCI | . |  |
| Last visited registered TAI | Not present |  |  |

##### 9.1.5.1.7 Void

##### 9.1.5.1.8 Initial registration / Rejected / Serving network not authorized

9.1.5.1.8.1 Test Purpose (TP)

(1)

**with** { The UE has sent initial REGISTRATION REQUEST message }

**ensure that** {

**when** { the UE receives a REGISTRATION REJECT with cause #73 (Serving network not authorized) }

**then** { the UE stores the PLMN identity in the "forbidden PLMN list" and does not attempt to register on a cell belong to that PLMN }

}

9.1.5.1.8.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clauses 5.5.1.2.5.

[TS 24.501, clause 5.5.1.2.5]

[Rel-15]

If the initial registration request cannot be accepted by the network, the AMF shall send a REGISTRATION REJECT message to the UE including an appropriate 5GMM cause value.

If the initial registration request is rejected due to general NAS level mobility management congestion control, the network shall set the 5GMM cause value to #22 "congestion" and assign a back-off timer T3346.

The UE shall take the following actions depending on the 5GMM cause value received in the REGISTRATION REJECT message.

#3 (Illegal UE); or

#6 (Illegal ME).

….

#73 (Serving network not authorized).

The UE shall set the 5GS update status to 5U2 NOT UPDATED, reset the registration attempt counter, store the PLMN identity in the "forbidden PLMN list" and enter state 5GMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection according to 3GPP TS 23.122 [5].

[Rel-16]

The UE shall take the following actions depending on the 5GMM cause value received in the REGISTRATION REJECT message.

#3 (Illegal UE); or

#6 (Illegal ME).

…

#73 (Serving network not authorized).

This cause value received from a cell belonging to an SNPN is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.2.7.

The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. The UE shall delete the list of equivalent PLMNs, reset the registration attempt counter, store the PLMN identity in the forbidden PLMN list as specified in subclause 5.3.13A, and enter state 5GMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection according to 3GPP TS 23.122 [5]. If the message has been successfully integrity checked by the NAS, the UE shall set the PLMN-specific attempt counter and the PLMN-specific attempt counter for non-3GPP access for that PLMN to the UE implementation-specific maximum value.

If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall in addition set the EPS update status to EU3 ROAMING NOT ALLOWED and shall delete any 4G-GUTI, last visited registered TAI, TAI list and eKSI. Additionally, the UE shall reset the attach attempt counter and enter the state EMM-DEREGISTERED.

9.1.5.1.8.3 Test description

9.1.5.1.8.3.1 Pre-test conditions

System Simulator:

- 3 NGC Cells NGC Cell E, NGC Cell I and NGC Cell A are configured as specified in TS 38.508-1 [4] table 6.3.2.2-1 and table 6.3.2.2-3.

UE:

- The UE is in Automatic PLMN selection mode.

Preamble:

- NGC Cell E is set to “Serving Cell”.

- NGC Cell I is set to “Non-suitable "Off" cell”.

- NGC Cell A is set to “Non-suitable "Off" cell”.

- The UE is in state 0N-B with a successful registration on NGC Cell E according to 38.508-1 [4].

9.1.5.1.8.3.2 Test procedure sequence

Table 9.1.5.1.8.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on | - | - | - | - |
| 2-9 | Steps 2-9 of Table 4.5.2.2-2 in TS38.508-1 [4] are performed on NGC Cell E. | - | - | - | - |
| 10 | The SS transmits a REGISTRATION REJECT with cause #73 (Serving network not authorized). | <-- | REGISTRATION REJECT | - | - |
| 11 | The SS releases the RRC connection | - | - | - | - |
| 11A | The SS configures  - NGC Cell I as “Suitable neighbour cell” | - | - | - | - |
| 12 | Check: Does the UE send in the next 30 sec a request for RRC connection establishment on Cell E or Cell I. | --> | NR RRC: RRCSetupRequest | 1 | F |
| 13 | The SS configures  - NGC Cell A as “Serving Cell” | - | - | - | - |
| 14 | Check: Does the UE perform Registration procedure on NGC Cell A as specified in TS 38.508-1 [4] subclause 4.5.2? (Note 1) | - | - | 1 | P |
| 14A | Switch off procedure in RRC\_IDLE specified in TS 38.508-1 subclause 4.9.6.1 is performed. | - | - | - | - |
| 15 | The SS configures  - NGC Cell A as “Non-suitable "Off" cell”  - NGC Cell I as “Non-suitable "Off" cell” | - | - | - | - |
| 15A | The UE is brought back to operation or the USIM is inserted. The UE is powered on or switched on. | - | - | - | - |
| 16 | Set the UE in manual PLMN selection mode or request a PLMN search. | - | - | - | - |
| 17 | The user selects the PLMN of NGC Cell E. | - | - | - | - |
| 18 | The UE performs Registration procedure on NGC Cell E as specified in TS 38.508-1 [4] subclause 4.5.2. | - | - | - | - |
| 19 | Set the UE in Automatic PLMN selection mode. | - | - | - | - |
| 20 | Wait for 300s to allow the UE to switch to automatic PLMN selection mode. | - | - | - | - |
| Note 1: For Rel-16 or later Releases UE, the REGISTRATION REQUEST message shall be sent without integrity protection. | | | | | |

9.1.5.1.8.3.3 Specific message contents

Table 9.1.5.1.8.3.3-1: REGISTRATION REJECT (step 10 Table 9.1.5.1.8.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | ‘01001001’B | Cause #73 (Serving network not authorized) |  |

##### 9.1.5.1.9 Initial registration / Abnormal / Change of cell into a new tracking area

9.1.5.1.9.1 Test Purpose (TP)

(1)

with { the UE in 5GMM-REGISTERED-INITIATED state }

**ensure that {  
 when** { the UE changes into a new tracking area before UE receives the REGISTRATION ACCEPT message }

**then** { the UE shall abort the registration procedure for initial registration and re-initiate it immediately }

}

9.1.5.1.9.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clause 5.5.1.2.7.

[TS 24.501, clause 5.5.1.2.7]

The following abnormal cases can be identified:

…

h) Change of cell into a new tracking area.

If a cell change into a new tracking area occurs before the registration procedure for initial registration is completed, the registration procedure for initial registration shall be aborted and re-initiated immediately. If a tracking area border is crossed when the REGISTRATION ACCEPT message has been received but before a REGISTRATION COMPLETE message is sent, the registration procedure for initial registration shall be re-initiated. If a 5G-GUTI was allocated during the registration procedure, this 5G-GUTI shall be used in the registration procedure.

9.1.5.1.9.3 Test description

9.1.5.1.9.3.1 Pre-test conditions

System Simulator:

- NGC Cell A is configured according to Table 6.3.2.2-1 in TS 38.508-1 [4].

- The defaultPagingCycle in SIB1 of NGC Cell A shall be set as rf32.

UE:

- the UE is previously registered on NGC, and when on NGC, the UE is last authenticated and registered on NGC cell A using default message contents according to TS 38.508-1 [4].

Preamble:

- The UE is in state Switched OFF (state 0N-B) according to TS 38.508-1 [4].

9.1.5.1.9.3.2 Test procedure sequence

Table 9.1.5.1.9.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Void | - | - | - | - |
| 2 | The UE is switched on. | - | - | - | - |
| 3-14 | Steps 2–13 of Table 4.5.2.2-2 in TS 38.508-1 [4] are performed. | - | - | - | - |
| 15 | SS does not send REGISTRATION ACCEPT to the UE and update TAC value in SIB1. | - | - | - | - |
| 15A | Void | - | - | - | - |
| 16 | The SS notifies the UE of change of System Information on NGC Cell A by sending Short Message on PDCCH using P-RNTI. | <-- | PDCCH (DCI 1\_0): Short Message | - | - |
| 16A-28 | Void | - | - | - | - |
| 29 | Check: Does the UE transmit an REGISTRATION REQUEST message before the 15 second timer (T3510) started in step 5 expires? | - | 5GMM: REGISTRATION REQUEST | 1 | P |
| 29A1 | The SS transmits a REGISTRATION ACCEPT message. | <-- | REGISTRATION ACCEPT | - | - |
| 29A2 | The UE transmits a REGISTRATION COMPLETE message. | --> | REGISTRATION COMPLETE | - | - |
| 30 | Steps 19a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |

9.1.5.1.9.3.3 Specific message contents

Table 9.1.5.1.9.3.3-0A: SIB1 of NGC Cell A (preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-28 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| servingCellConfigCommon SEQUENCE { |  |  |  |
| pcch-Config SEQUENCE { |  |  |  |
| defaultPagingCycle | rf32 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.1.5.1.9.3.3-0: SIB1 of NGC Cell A (step 15, Table 9.1.5.1.9.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-28 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| cellAccessRelatedInfo SEQUENCE { |  |  |  |
| PLMN-IdentityInfoList SEQUENCE { |  |  |  |
| trackingAreaCode | 2 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.1.5.1.9.3.3-1: Void

Table 9.1.5.1.9.3.3-1A: Void

Table 9.1.5.1.9.3.3-2: REGISTRATION REQUEST (step 29, Table 9.1.5.1.9.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type |  | . |  |
| 5GS registration type value | '001'B | Initial registration |  |

##### 9.1.5.1.10 Initial registration / Rejected / PLMN not allowed

9.1.5.1.10.1 Test Purpose (TP)

(1)

**with** { the UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { the SS sends a REGISTRATION REJECT message to the UE including an appropriate 5GMM cause value #11 (PLMN not allowed) }

**then** { the UE deletes any 5G-GUTI, last visited registered TAI and ngKSI, deletes the list of equivalent PLMNs, stores the PLMN identity in the "forbidden PLMN list" and performs a PLMN selection }

}

9.1.5.1.10.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501 clauses 5.5.1.2.5. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.5.1.2.5]

If the initial registration request cannot be accepted by the network, the AMF shall send a REGISTRATION REJECT message to the UE including an appropriate 5GMM cause value.

…

The UE shall take the following actions depending on the 5GMM cause value received in the REGISTRATION REJECT message.

…

#11 (PLMN not allowed).

The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. The UE shall delete the list of equivalent PLMNs and reset the registration attempt counter and store the PLMN identity in the "forbidden PLMN list". The UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform a PLMN selection according to 3GPP TS 23.122 [5]. If the message has been successfully integrity checked by the NAS, the UE shall set the PLMN-specific attempt counter and the PLMN-specific attempt counter for non-3GPP access for that PLMN to the UE implementation-specific maximum value.

9.1.5.1.10.3 Test description

9.1.5.1.10.3.1 Pre-test conditions

System Simulator:

- NGC cell G and NGC cell I.

- The NGC cells are configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in 38.508-1 [4], except replacing NRf3 with NRf1;

UE:

- the UE is previously registered on NGC, and when on NGC, the UE is last authenticated and registered on NGC cell G using default message contents according to TS 38.508-1 [4];

Preamble:

- The UE is in state 0N-B according to TS 38.508-1 [4].

9.1.5.1.10.3.2 Test procedure sequence

Table 9.1.5.1.10.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U – S | Message |  |  |
| 1 | The SS configures:  - NGC Cell G as the "Serving cell".  - NGC Cell I as a "Non-Suitable Off cell". | - | - | - | - |
| 2 | Void |  |  |  |  |
|  | The following messages are to be observed on Cell G unless explicitly stated otherwise. | - | - | - | - |
| 3 | The UE is switched on. | - | - | - | - |
| 4-11 | Steps 2-9 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 12 | The SS transmits an REGISTRATION REJECT message including an appropriate 5GMM cause value #11 (PLMN not allowed). | <-- | 5GMM: REGISTRATION REJECT | - | - |
| 13 | The SS releases the RRC connection. | - | - | - | - |
| 14 | Check: Does the UE transmit an REGISTRATION REQUEST message on NGC cell G in the next 90 seconds? | --> | 5GMM: REGISTRATION REQUEST | 1 | F |
| 15 | The generic test procedure in TS 38.508-1 Table 4.9.6.4-1 of Switch off procedure in State DEREGISTERED are performed. | - | - | - | - |
| 16 | The UE is brought back to operation or the USIM is inserted. The UE is powered on or switched on. | - | - | - | - |
| 17 | Check: Does the UE transmit an REGISTRATION REQUEST message in the next 30 seconds? | --> | 5GMM: REGISTRATION REQUEST | 1 | F |
| 18 | The SS configures:  -NGC Cell G as the "Serving cell"  -NGC Cell I as a "Suitable neighbour cell". | - | - | - | - |
| 19 | Void |  |  |  |  |
| - | The following messages are to be observed on NGC Cell I unless explicitly stated otherwise. | - | - | - | - |
| 20-22 | The UE establishes RRC connection by executing steps 2-4 of Table 4.5.2.2-2 in TS 38.508-1 [4]. | - | - | - | - |
| 23 | Check: Does the UE transmit an REGISTRATION REQUEST message as specified? | --> | 5GMM: REGISTRATION REQUEST | 1 | P |
| 24-39a1 | Steps 5-19a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 40 | The generic test procedure in TS 38.508-1 Table 4.9.6.3-1 of Switch off procedure in RRC\_CONNECTED are performed. | - | - | - | - |
| 40A | The SS configures:  -NGC Cell G as the "Serving cell"  -NGC Cell I as a "Non-Suitable "off" cell ". |  |  |  |  |
| 40B | The UE is brought back to operation or the USIM is inserted. The UE is powered on or switched on. | - | - | - | - |
| 40C | The user sets the UE in manual PLMN selection mode or requests a PLMN search. | - | - | - | - |
| 41 | The user selects PLMN of NGC Cell G. | - | - | - | - |
| 42-60a1 | Steps 2 to 20a1 of the registration procedure described in TS 38.508-1 [4] subclause 4.5.2 are performed on NGC Cell G. | - | - | - | - |
| 61 | The user sets the UE in Automatic PLMN selection mode. | - | - | - | - |
| 62 | Wait for 300s to allow the UE to switch to automatic PLMN selection mode. | - | - | - | - |

9.1.5.1.10.3.3 Specific message contents

Table 9.1.5.1.10.3.3-1: Message REGISTRATION REJECT (step 12, Table 9.1.5.1.10.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4],table 4.7.1-9 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GMM cause | '00001011'B | #11 "PLMN not allowed" |  |

Table 9.1.5.1.10.3.3-2: Message REGISTRATION REQUEST (step 23, Table 9.1.5.1.10.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| ngKSI |  |  |  |
| NAS key set identifier | '111'B | no key is available (UE to network) |  |
| TSC | Any allowed value | TSC does not apply for NAS key set identifier value "111" |  |
| 5GS mobile identity | The valid SUCI | . |  |
| Last visited registered TAI | Not present |  |  |

##### 9.1.5.1.11 Initial registration / Rejected / Tracking area not allowed

9.1.5.1.11.1 Test Purpose (TP)

(1)

**with** { the UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { the SS sends a REGISTRATION REJECT message to the UE including an appropriate 5GMM cause value #12 (Tracking area not allowed)}

**then** { the UE deletes any 5G-GUTI, last visited registered TAI and ngKSI, stores the current TAI in the list of "5GS forbidden tracking areas for regional provision of service". }

}

(2)

**with** { the UE is in 5GMM-DEREGISTERED.LIMITED-SERVICE state and the TAI of the current cell belongs to the list of "forbidden tracking areas for regional provision of service"}

**ensure that** {

**when** { the UE enters a cell belonging to a tracking area not in the list of "forbidden tracking areas for regional provision of service"}

**then** { the UE attempts to registration }

}

(3)

**with** { the UE is in 5GMM-DEREGISTERED.LIMITED-SERVICE state and the list of "forbidden tracking areas for regional provision of service" contains more than one TAI}

**ensure that** {

**when** { the UE selects a cell belonging to one of the TAIs in the list of "forbidden tracking areas for regional provision of service" }

**then** { the UE does not attempt to registration }

}

(4)

**with** { the UE is switched off or the UICC containing the USIM is removed }

**ensure that** {

**when** { UE is powered on in the cell belonging to the TAI which was in the list of "forbidden tracking areas for regional provision of service" before the UE was switched off or the USIM is inserted again on that cell }

**then** { UE performs registration on that cell }

}

9.1.5.1.11.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501, clauses 5.5.1.2.5, 5.1.3.2.2.

[TS 24.501, clause 5.5.1.2.5]

If the initial registration request cannot be accepted by the network, the AMF shall send a REGISTRATION REJECT message to the UE including an appropriate 5GMM cause value.

If the initial registration request is rejected due to general NAS level mobility management congestion control, the network shall set the 5GMM cause value to #22 "congestion" and assign a back-off timer T3346.

The UE shall take the following actions depending on the 5GMM cause value received in the REGISTRATION REJECT message.

…

#12 (Tracking area not allowed).

The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete 5G-GUTI, last visited registered TAI, TAI list and ngKSI. Additionally, the UE shall reset the registration attempt counter.

The UE shall store the current TAI in the list of "5GS forbidden tracking areas for regional provision of service" and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE.

[TS 24.501, clause 5.1.3.2.2]

In order to describe the detailed UE behaviour, the 5GS update (5U) status pertaining to a specific subscriber is defined.

If the UE is not SNPN enabled or the UE is not operating in SNPN access mode (see 3GPP TS 23.501 [8]), the 5GS update status is stored in a non-volatile memory in the USIM if the corresponding file is present in the USIM, else in the non-volatile memory in the ME, as described in annex C.

If the UE is operating in SNPN access mode, the 5GS update status for each SNPN whose SNPN identity is included in the "list of subscriber data" configured in the ME (see 3GPP TS 23.122 [5]) is stored in the non-volatile memory in the ME as described in annex C.

The 5GS update status value is changed only after the execution of a registration, network-initiated de-registration, 5GS based primary authentication and key agreement, service request or paging procedure.

5U1: UPDATED

The last registration attempt was successful.

5U2: NOT UPDATED

The last registration attempt failed procedurally, e.g. no response or reject message was received from the AMF.

5U3: ROAMING NOT ALLOWED

The last registration, service request, or registration for mobility or periodic registration update attempt was correctly performed, but the answer from the AMF was negative (because of roaming or subscription restrictions).

[TS 24.501, clause 5.3.13]

The UE shall store a list of "5GS forbidden tracking areas for roaming", as well as a list of "5GS forbidden tracking areas for regional provision of service". Within the 5GS, these lists are managed independently per access type, i.e., 3GPP access or non-3GPP access. These lists shall be erased when

a) the UE is switched off or the UICC containing the USIM is removed or an entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated; and

b) periodically (with a period in the range 12 to 24 hours).

Over 3GPP access, when the lists are erased, the UE performs cell selection according to 3GPP TS 38.304 [28]. A tracking area shall be removed from the list of "5GS forbidden tracking areas for roaming", as well as the list of "5GS forbidden tracking areas for regional provision of service", if the UE receives the tracking area in the TAI list or the Service area list of "allowed tracking areas" in REGISTRATION ACCEPT message or a CONFIGURATION UPDATE COMMAND message. The UE shall not remove the tracking area from "5GS forbidden tracking areas for roaming" or "5GS forbidden tracking areas for regional provision of service" if the UE is registered for emergency services.

In N1 mode, the UE shall update the suitable list whenever a REGISTRATION REJECT, SERVICE REJECT or DEREGISTRATION REQUEST message is received with the 5GMM cause #12 "tracking area not allowed", #13 "roaming not allowed in this tracking area", or #15 "no suitable cells in tracking area".

Each list shall accommodate 40 or more TAIs. When the list is full and a new entry has to be inserted, the oldest entry shall be deleted.

9.1.5.1.11.3 Test description

9.1.5.1.11.3.1 Pre-test conditions

System Simulator:

- NGC Cell A (home PLMN) and NGC Cell B (home PLMN, another TA) are configured according to Table 6.3.2.2-1 in TS 38.508-1 [4].

- System information combination NR-2 in accordance with TS 38.508-1 [4] sub-clause 4.4.3.1.2 is used in NGC Cell A and NGC Cell B.

- The UE is last authenticated and registered on NGC Cell A.

Preamble:

- The UE is in state Switched OFF (state 0N-B) according to TS 38.508-1 [4].

9.1.5.1.11.3.2 Test procedure sequence

Table 9.1.5.1.11.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS configures:  - NGC Cell A as the "Serving cell ".  - NGC Cell B as “Non-suitable "Off" cell”. | - | - | - | - |
| 2 | The UE is switched on. | - | - | - | - |
| 3-14 | Steps 2-13 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 15 | The SS transmits a REGISTRATION REJECT message, 5GMM cause value = #12 "Tracking area not allowed". | <-- | REGISTRATION REJECT | - | - |
| 16 | The SS releases the RRC connection. | - | - | - | - |
| 17 | Check: Does the UE transmit the REGISTRATION REQUEST message on NGC Cell A in the next 30 seconds? | --> | REGISTRATION REQUEST | 1 | F |
| 18 | The SS reconfigures:  - NGC cell B as the "Serving cell".  - NGC cell A as a "Non-suitable "Off" cell". | - | - | - | - |
| 19 | Check: Does the UE transmit the REGISTRATION REQUEST message on NGC Cell B? | --> | REGISTRATION REQUEST | 1,2 | P |
| 20-26 | Steps 5 to 11 from procedure in TS 38.508-1 [4] Table 4.5.2.2-2 are performed. | - | - | - | - |
| 27 | The SS transmits a REGISTRATION REJECT message, 5GMM cause value = #12 " "Tracking area not allowed". | <-- | REGISTRATION REJECT | - | - |
| 28 | The SS releases the RRC connection. | - | - | - | - |
| 28A | The SS reconfigures:  - NGC cell A as a "Suitable neighbour intra-frequency cell". | - | - | - | - |
| 29 | Check: Does the UE transmit the REGISTRATION REQUEST message in the next 30 seconds on NGC Cell A or NGC Cell B? | --> | REGISTRATION REQUEST | 1,3 | F |
| 30 | Switch off UE in State Deregistered as described in TS38.508-1 [4] subclause 4.9.6.4. | - | - | - | - |
| 31 | The SS reconfigures:  - NGC cell A as the "Serving cell".  - NGC cell B as “Non-suitable "Off" cell". | - | - | - | - |
| 32 | Switch on UE. | - | - | - | - |
| 33 | Check: Does the UE transmit a REGISTRATION REQUEST message on NGC Cell A? | --> | REGISTRATION REQUEST | 4 | P |
| 34-49a1 | Steps 5-20a1 of Table 4.5.2.2-2 in TS38.508-1 [4] are performed. | - | - | - | - |

9.1.5.1.11.3.3 Specific message contents

Table 9.1.5.1.11.3.3-1: REGISTRATION REJECT (step 15, step 27, Table 9.1.5.1.11.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] table 4.7.1-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | ‘00001100’B | #12 “Tracking area not allowed” |  |

Table 9.1.5.1.11.3.3-2: REGISTRATION REQUEST (step 19, step33, Table 9.1.5.1.11.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| ngKSI |  |  |  |
| NAS key set identifier | '111'B | no key is available |  |
| TSC | Any allowed value | TSC does not apply for NAS key set identifier value "111" |  |
| 5GS mobile identity | The valid SUCI | Only SUCI is available. |  |
| Last visited registered TAI | Not present |  |  |

##### 9.1.5.1.12 Initial registration / Rejected / Roaming not allowed in this tracking area

9.1.5.1.12.1 Test Purpose (TP)

(1)

**with** { the UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { the SS sends a REGISTRATION REJECT message to the UE including an appropriate 5GMM cause value #13 (Roaming not allowed in this tracking area)

**then** { the UE deletes any 5G-GUTI, last visited registered TAI and ngKSI, deletes the list of equivalent PLMNs, stores the current TAI in the list of "5GS forbidden tracking areas for roaming" }

}

(2)

**with** { the initial registration request cannot be accepted by the network }

**ensure that** {

**when** { the SS sends a REGISTRATION REJECT message to the UE including an appropriate 5GMM cause value #13 (Roaming not allowed in this tracking area)}

**then** { The UE performs a PLMN selection }

}

(3)

**with** { the UE is in 5GMM-DEREGISTERED.LIMITED-SERVICE or 5GMM-DEREGISTERED.PLMN-SEARCH state and the TAI of the current cell belongs to the list of "forbidden tracking areas for roaming"}

**ensure that** {

**when** { the UE enters a cell belonging to a tracking area not in the list of "forbidden tracking areas for roaming"}

**then** { the UE attempts to registration }

}

(4)

**with** { the UE is in 5GMM-DEREGISTERED.LIMITED-SERVICE or 5GMM-DEREGISTERED.PLMN-SEARCH state and the list of "forbidden tracking areas for roaming" contains more than one TAI}

**ensure that** {

**when** { the UE selects a cell belonging to one of the TAIs in the list of "forbidden tracking areas for roaming" }

**then** { the UE does not attempt to registration }

}

(5)

**with** { the UE is switched off or the UICC containing the USIM is removed }

**ensure that** {

**when** { UE is powered on in the cell belonging to the TAI which was in the list of "forbidden tracking areas for roaming" before the UE was switched off or the USIM is inserted again on that cell }

**then** { UE performs registration on that cell }

}

9.1.5.1.12.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501 clauses 5.5.1.2.5, 5.1.3.2.1, 5.1.3.2.2, TS 23.122 clauses 3.1.

[TS 24.501, clause 5.5.1.2.5]

If the initial registration request cannot be accepted by the network, the AMF shall send a REGISTRATION REJECT message to the UE including an appropriate 5GMM cause value.

If the initial registration request is rejected due to general NAS level mobility management congestion control, the network shall set the 5GMM cause value to #22 "congestion" and assign a back-off timer T3346.

The UE shall take the following actions depending on the 5GMM cause value received in the REGISTRATION REJECT message.

…

#13 (Roaming not allowed in this tracking area).

The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete 5G-GUTI, last visited registered TAI, TAI list and ngKSI. Additionally, the UE shall delete the list of equivalent PLMNs and reset the registration attempt counter.

The UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE or optionally 5GMM-DEREGISTERED.PLMN-SEARCH. The UE shall perform a PLMN selection according to 3GPP TS 23.122 [5].

…

[TS 24.501, clause 5.1.3.2.1.3.3]

The sub state 5GMM-DEREGISTERED.LIMITED-SERVICE is chosen in the UE, when it is known that a selected cell for 3GPP access or TA for non-3GPP access is unable to provide normal service (e.g. the selected cell over 3GPP access is in a forbidden PLMN or is in a forbidden tracking area or TA for non-3GPP access is forbidden).

[TS 24.501, clause 5.1.3.2.1.3.5]

The sub state 5GMM-DEREGISTERED.PLMN-SEARCH is chosen in the UE, if the UE is searching for PLMNs. This sub state is left either when a cell has been selected (the new sub state is NORMAL-SERVICE or LIMITED-SERVICE) or when it has been concluded that no cell is available at the moment (the new sub state is NO-CELL-AVAILABLE).

This sub state is not applicable to non-3GPP access.

[TS 24.501, clause 5.1.3.2.2]

In order to describe the detailed UE behaviour, the 5GS update (5U) status pertaining to a specific subscriber is defined.

If the UE is not SNPN enabled or the UE is not operating in SNPN access mode (see 3GPP TS 23.501 [8]), the 5GS update status is stored in a non-volatile memory in the USIM if the corresponding file is present in the USIM, else in the non-volatile memory in the ME, as described in annex C.

If the UE is operating in SNPN access mode, the 5GS update status for each SNPN whose SNPN identity is included in the "list of subscriber data" configured in the ME (see 3GPP TS 23.122 [5]) is stored in the non-volatile memory in the ME as described in annex C.

The 5GS update status value is changed only after the execution of a registration, network-initiated de-registration, 5GS based primary authentication and key agreement, service request or paging procedure.

5U1: UPDATED

The last registration attempt was successful.

5U2: NOT UPDATED

The last registration attempt failed procedurally, e.g. no response or reject message was received from the AMF.

5U3: ROAMING NOT ALLOWED

The last registration, service request, or registration for mobility or periodic registration update attempt was correctly performed, but the answer from the AMF was negative (because of roaming or subscription restrictions).

[TS 23.122, clause 3.1]

The tracking area is added to the list of "5GS forbidden tracking areas for roaming" which is stored in the MS. The MS shall then search for a suitable cell in the same PLMN but belonging to a tracking area which is not in the "5GS forbidden tracking areas for roaming" list.

9.1.5.1.12.3 Test description

9.1.5.1.12.3.1 Pre-test conditions

System Simulator:

- NGC cell C (MCC/MNC=MCC/MNC in USIM), NGC cell E (visited PLMN, mcc=002, mnc=101) and NGC cell I (visited PLMN, mcc=002, mnc=101, another TA) are configured are configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in TS 38.508-1 [4], except replacing NRf3 with NRf2.

UE:

- The UE is last authenticated and registered on NGC Cell E.

Preamble:

- The UE is in state Switched OFF (state 0N-B) according to TS 38.508-1 [4] Table 4.4A.2-0.

9.1.5.1.12.3.2 Test procedure sequence

Table 9.1.5.1.12.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS configures:  - NGCCell E as the "Serving cell".  - Other NGC cells as "Non-suitable "Off" cell". | - | - | - | - |
| 2 | The UE is switched on. | - | - | - | - |
| 3-14 | Steps 2-13 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 15 | The SS transmits a REGISTRATION REJECT message, 5GMM cause value = #13 " roaming not allowed in this tracking area ". | <-- | REGISTRATION REJECT | - | - |
| 16 | The SS releases the RRC connection. | - | - | - | - |
| 17 | Check: Does the UE transmit the REGISTRATION REQUEST message on NGC Cell E in the next 30 seconds? | --> | REGISTRATION REQUEST | 1 | F |
| 18 | The SS reconfigures:  - NGC cell I as the "Serving cell".  - NGC cell E as a " Non-suitable "Off" cell",  - NGC cell C as "Non-suitable "Off" cell". | - | - | - | - |
| 19 | Check: Does the UE transmit the REGISTRATION REQUEST message on NGC Cell I? | --> | REGISTRATION REQUEST | 1,3 | P |
| 20-26 | Steps 5 to 11 from procedure in TS 38.508-1 [4] Table 4.5.2.2-2 are performed. | - | - | - | - |
| 27 | The SS transmits a REGISTRATION REJECT message, 5GMM cause value = #13 " roaming not allowed in this tracking area ". | <-- | REGISTRATION REJECT | - | - |
| 28 | The SS releases the RRC connection. | - | - | - | - |
| 29 | Check: Does the UE transmit the REGISTRATION REQUEST message in the next 30 seconds on NGC cell I? | --> | REGISTRATION REQUEST | 4 | F |
| 30 | Switch off UE in State Deregistered as described in TS38.508-1 [4] subclause 4.9.6.4. | - | - | - | - |
| 31 | The SS reconfigures:  - NGC cell E as the "Serving cell".  - Other NGC cells as "Non-suitable "Off" cell". | - | - | - | - |
| 32 | Switch on UE. | - | - | - | - |
| 33 | Check: Does the UE transmit the REGISTRATION REQUEST message on NGC Cell E? | --> | REGISTRATION REQUEST | 5 | P |
| 34-42 | Steps 5 to 13 from procedure in TS 38.508-1 [4] Table 4.5.2.2-2 are performed. | - | - | - | - |
| 43 | The SS transmits a REGISTRATION REJECT message, 5GMM cause value = #13 " roaming not allowed in this tracking area ". | <-- | REGISTRATION REJECT | - | - |
| 44 | The SS releases the RRC connection. | - | - | - | - |
| 45 | The SS reconfigures:  - NGC Cell C as the "Serving cell",  - Other NGC cells as "Non-suitable "Off" cell". | - | - | - | - |
| 46 | Check: Does the UE transmit the REGISTRATION REQUEST message on NGC Cell C? | --> | REGISTRATION REQUEST | 2 | P |
| 47-62a1 | Steps 5–20a1 of Table 4.5.2.2-2 in TS38.508-1 [4] are performed. | - | - | - | - |

9.1.5.1.12.3.3 Specific message contents

Table 9.1.5.1.12.3.3-1: REGISTRATION REJECT (step 15, step 27, step 43, Table 9.1.5.1.12.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] table 4.7.1-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | ‘00001101’B | #13 "roaming not allowed in this tracking area" |  |

Table 9.1.5.1.12.3.3-2: REGISTRATION REQUEST (step 19, step 33, step 46, Table 9.1.5.1.12.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| ngKSI |  |  |  |
| NAS key set identifier | '111'B | no key is available |  |
| TSC | Any allowed value | TSC does not apply for NAS key set identifier value "111" |  |
| 5GS mobile identity | The valid SUCI | Only SUCI is available. |  |
| Last visited registered TAI | Not present |  |  |

##### 9.1.5.1.13 Initial registration / Rejected / No suitable cells in tracking area

9.1.5.1.13.1 Test Purpose (TP)

(1)

**with** { the UE has sent initial REGISTRAION REQUEST message }

**ensure that** {

**when** { the UE receives a REGISTRATION REJECT with cause #15 (No suitable cells in tracking area)}

**then** { the UE sets the 5GS update status to 5U3 ROAMING NOT ALLOWED and delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI }

}

(2)

**with** { the UE is in 5GMM-DEREGISTERED.LIMITED-SERVICE state and the current TAI in the list of "forbidden tracking areas for roaming"}

**ensure that** {

**when** { the UE re-selects a cell that belongs to the TAI where UE was rejected }

**then** { the UE does not attempt to perform registration}

}

(3)

**with** { the UE has sent initial REGISTRAION REQUEST message }

**ensure that** {

**when** { the UE receives a REGISTRATION REJECT with cause #15 (No suitable cells in tracking area)}

**then** { the UE searches for a suitable cell in another tracking area }

}

9.1.5.1.13.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clauses 5.5.1.2.5. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.5.1.2.5]

If the initial registration request cannot be accepted by the network, the AMF shall send a REGISTRATION REJECT message to the UE including an appropriate 5GMM cause value.

If the initial registration request is rejected due to general NAS level mobility management congestion control, the network shall set the 5GMM cause value to #22 "congestion" and assign a back-off timer T3346.

The UE shall take the following actions depending on the 5GMM cause value received in the REGISTRATION REJECT message.

#3 (Illegal UE); or

#6 (Illegal ME).

….

#15 (No suitable cells in tracking area);

The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, TAI list and ngKSI. Additionally, the UE shall reset the registration attempt counter.

The UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE. The UE shall search for a suitable cell in another tracking area according to 3GPP TS 38.304 [15].

9.1.5.1.13.3 Test description

9.1.5.1.13.3.1 Pre-test conditions

System Simulator:

- 3 cells, NGC Cell A and NGC Cell B belonging to TAI-1, NGC Cell C is in TAI-2. All Cells in the same PLMN.

UE:

- None.

Preamble:

- The UE is switched OFF.

- NGC Cell A is set to “Serving Cell”.

- NGC Cell B is set to “Non-suitable "Off" cell”.

- NGC Cell C is set to “Non-suitable "Off" cell”.

9.1.5.1.13.3.2 Test procedure sequence

Table 9.1.5.1.13.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on | - | - | - | - |
| 2-9 | Steps 2-9 of Table 4.5.2.2-2 in TS38.508-1 [4] are performed on NGC Cell A. | - | - | - | - |
| 10 | The SS transmits a REGISTRATION REJECT with cause #15 (No suitable cells in tracking area). | <-- | REGISTRATION REJECT | - | - |
| 11 | The SS releases the RRC connection | - | - | - | - |
| 12 | Check: Does the UE transmit a REGISTRATION REQUEST message on NGC Cell A in the next 30 seconds? | --> | REGISTRATION REQUEST | 1 | F |
| 12A | The SS configures  - NGC Cell B as “Serving Cell”  - NGC Cell A and Cell C as “Non-suitable "Off" cell” |  |  |  |  |
| 12B | Check: Does the UE transmit a REGISTRATION REQUEST message on NGC Cell B in the next 30 seconds? | --> | REGISTRATION REQUEST | 2 | F |
| 13 | The SS configures  - NGC Cell C as “Serving Cell”  - NGC Cell A and Cell B as “Non-suitable "Off" cell” | - | - | - | - |
| 14 | Check: Does the UE transmit a REGISTRATION REQUEST message on NGC Cell C? | --> | REGISTRATION REQUEST | 3 | P |
| 15-29 | Steps 5-19a1 of Table 4.5.2.2-2 in TS38.508-1 [4] are performed. | - | - | - | - |

9.1.5.1.13.3.3 Specific message contents

Table 9.1.5.1.13.3.3-1: REGISTRATION REJECT (step 10 Table 9.1.5.1.13.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | ‘00001111’B | Cause #15(No suitable cells in tracking area) |  |

Table 9.1.5.1.13.3.3-2: REGISTRATION REQUEST (step 14 Table 9.1.5.1.13.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| ngKSI |  |  |  |
| NAS key set identifier | ‘111’B | "No key is available" |  |
| 5GS mobile identity |  |  |  |
| Type of identity | ‘001’B | 5GS mobile identity is SUCI, 5G-GUTI has been deleted after receiving REGISTRATION REJECT at step 10. |  |
| Last visited registered TAI | Not present | TAI has been deleted after receiving REGISTRATION REJECT at step 10. |  |

Table 9.1.5.1.13.3.3-3: Void

##### 9.1.5.1.14 Initial registration / Rejected / Congestion / Abnormal / T3346

9.1.5.1.14.1 Test Purpose (TP)

(1)

**with** { The UE has sent initial REGISTRAION REQUEST message }

**ensure that** {

**when** { UE receives a REGISTRATION REJECT with cause #22 (Congestion) with T3346 included and the UE is NOT configured for High Priority Access in the selected PLMN }

**then** { UE does not start the Initial registration until T3346 expires }

}

(2)

**with** { The UE has received initial REGISTRATION REJECT with T3346 included }

**ensure that** {

**when** { upon expiry of T3346 }

**then** { UE starts the Initial registration procedure }

}

(3)

**Void**

(4)

**with** { The UE has received initial REGISTRATION REJECT with T3346 included }

**ensure that** {

**when** { the timer T3346 is running and the UE detects a cell better than serving cell on a PLMN other than serving cells PLMN (S criterion for detected cell > S criterion for serving cell }

**then** { UE starts the Initial registration procedure on the detected cell }

}

(5)

**with** { The UE has received initial REGISTRATION REJECT with T3346 included }

**ensure that** {

**when** { the timer T3346 is running and the UE detects a cell better than serving cell on same PLMN as serving cell (S criterion for detected cell > S criterion for serving cell)}

**then** { UE starts the Initial registration procedure on the detected cell after T3346 expiry }

}

9.1.5.1.14.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clauses 5.2.2.3.3, 5.5.1.2.5 and 5.5.1.2.7. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.5.1.2.5]

If the initial registration request cannot be accepted by the network, the AMF shall send a REGISTRATION REJECT message to the UE including an appropriate 5GMM cause value.

If the initial registration request is rejected due to general NAS level mobility management congestion control, the network shall set the 5GMM cause value to #22 "congestion" and assign a back-off timer T3346.

The UE shall take the following actions depending on the 5GMM cause value received in the REGISTRATION REJECT message.

#3 (Illegal UE);

#6 (Illegal ME); or

….

#22 (Congestion).

If the T3346 value IE is present in the REGISTRATION REJECT message and the value indicates that this timer is neither zero nor deactivated, the UE shall proceed as described below; otherwise it shall be considered as an abnormal case and the behaviour of the UE for this case is specified in subclause 5.5.1.2.7.

The UE shall abort the initial registration procedure, set the 5GS update status to 5U2 NOT UPDATED and enter state 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION.

The UE shall stop timer T3346 if it is running.

If the REGISTRATION REJECT message is integrity protected, the UE shall start timer T3346 with the value provided in the T3346 value IE.

If the REGISTRATION REJECT message is not integrity protected, the UE shall start timer T3346 with a random value from the default range specified in 3GPP TS 24.008 [12].

The UE stays in the current serving cell and applies the normal cell reselection process. The initial registration procedure is started if still needed when timer T3346 expires or is stopped.

#27 (N1 mode not allowed).

The UE capable of S1 mode shall disable the N1 mode capability for both 3GPP access and non-3GPP access (see subclause 4.9).

Other values are considered as abnormal cases. The behaviour of the UE in those cases is specified in subclause 5.5.1.2.7.

[TS 24.501, clause 5.5.1.2.7]

The following abnormal cases can be identified:

a) Timer T3346 is running.

The UE shall not start the registration procedure for initial registration unless:

1) the UE is a UE configured for high priority access in selected PLMN; or

2) the UE needs to perform the registration procedure for initial registration for emergency services.

The UE stays in the current serving cell and applies the normal cell reselection process.

NOTE 1: It is considered an abnormal case if the UE needs to initiate a registration procedure for initial registration while timer T3346 is running independent on whether timer T3346 was started due to an abnormal case or a non-successful case.

[TS 24.501, clause 5.2.2.3.3]

The UE in 3GPP access:

a) …

b) …

c) shall initiate an initial registration procedure when entering a new PLMN, if timer T3346 is running and the new PLMN is not equivalent to the PLMN where the UE started timer T3346, the PLMN identity of the new cell is not in the forbidden PLMN lists and the tracking area is not in one of the lists of 5GS forbidden tracking areas;

9.1.5.1.14.3 Test description

9.1.5.1.14.3.1 Pre-test conditions

System Simulator:

- NGC Cell A, NGC Cell B and NGC Cell E are configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in TS 38.508-1 [4].

- System information combination NR-2 as defined in TS 38.508 [4] clause 4.4.3.1.2 is used.

UE:

None.

Preamble:

- The UE is in state Switched OFF (State 0-A) as per TS 38.508-1 [4] Table 4.4A.2-0.

9.1.5.1.14.3.2 Test procedure sequence

Table 9.1.5.1.14.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 0 | The SS configures:  - NGC Cell A as the "Non-suitable “Off” cell".  - NGC Cell B as the "Non-suitable "Off" cell".  - NGC Cell E as the "Serving cell". | - |  | - |  |
| 0A | The UE is Switched/Powerd ON | - | - | - | - |
| 1-12 | Steps 2-13 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - |  | - | - |
| 13 | SS transmits a REGISTRATION REJECT message with cause #22 (Congestion) and T3346 set to 3 minutes.  (Note 1) | <-- | REGISTRATION REJECT | - | - |
| 14 | The SS releases the RRC connection | - |  | - | - |
| 15 | Check: Does the UE transmit a RRCSetupRequest on NGC Cell E within T3346 of Step 13?  (Note 1) | --> | NR RRC: RRCSetupRequest | 1 | F |
| 16 | Check: Does the UE transmit a REGISTRATION REQUEST on NGC Cell E | --> | 5GMM: REGISTRATION REQUEST | 2 | P |
| 17-25 | Void |  |  |  |  |
| 26 | SS transmits a REGISTRATION REJECT message with cause #22 (Congestion) and T3346 set to 3 minutes.  (Note 1) | <-- | REGISTRATION REJECT | - | - |
| 27 | The SS releases the RRC connection | - |  |  |  |
| 28 | The SS configures:  - NGC Cell A as the "Non-suitable "Off" cell".  - NGC Cell B as the "Serving cell".  - NGC Cell E as the "Non-suitable "Off" cell". |  |  |  |  |
| 29 | Check: Does the UE transmit a REGISTRATION REQUEST on NGC Cell B within T3346 of Step 26? (Note 1) | --> | 5GMM: REGISTRATION REQUEST | 4 | P |
| 30-31 | Void | - | - | - | - |
| 32-38 | Steps 5-11 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. |  |  |  |  |
| 39 | SS transmits a REGISTRATION REJECT message with cause #22 (Congestion) and T3346 set to 3 minutes.  (Note 1) | <-- | REGISTRATION REJECT | - | - |
| 40 | The SS releases the RRC connection | - |  | - | - |
| 41 | The SS configures:  - NGC Cell A as the "Serving cell".  - NGC Cell B as the "Non-suitable "Off" cell".  - NGC Cell E as the "Non-suitable "Off" cell". |  |  |  |  |
| 42 | Check: Does the UE transmit a RRCSetupRequest on NGC Cell A within T3346 of Step 39?  (Note 1) | --> | NR RRC: RRCSetupRequest | 5 | F |
| 43 | Check: Does the UE transmit a REGISTRATION REQUEST on NGC Cell A | --> | 5GMM: REGISTRATION REQUEST | 5 | P |
| 44-74b1 | Void | - | - | - | - |
| 75-90a1 | Steps 5-20a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| Note 1: T3346 is set to 3 minutes. This is checked for 3 minutes less tolerance. | | | | | |

9.1.5.1.14.3.3 Specific message contents

Table 9.1.5.1.14.3.3-1: REGISTRATION REJECT (steps 13, 26, 39 Table 9.1.5.1.14.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | ‘00010110’B | Cause #22 (Congestion) |  |
| T3346 Value | ‘00100011’B | 3 minutes |  |

Table 9.1.5.1.14.3.3-2: Void

##### 9.1.5.1.15 Initial registration / Success / Extended and spare fields in CAG information list

9.1.5.1.15.1 Test Purpose (TP)

**with** { UE is powered on and has sent a REGISTRATION REQUEST message }

**ensure that** {

**when** { UE receives extended and spare fields in CAG information list IE in REGISTRATION ACCEPT that it does not comprehend }

**then** { the UE ignores the contents of these octets and transmits REGISTRATION COMPLETE }

}

9.1.5.1.15.2 Conformance requirements

References: the conformance requirements covered in the current TC are specified in TS 24.007 [40], clause 11.2.2.1, and TS 24.501 [22] clauses 5.5.1.2.2, 5.5.1.2.3, and 5.5.1.2.4. Unless otherwise stated these are Rel-15 requirements.

[TS 24.007, clause 11.2.2.1]

According to this description method, the IE is presented in its maximum format, i.e., T, TV, TLV or TLV-E, in a picture representing the bits in a table, each line representing an octet. Bits appear in the occidental order, i.e., from left of the page to right of the page, and from top of the page to bottom of the page.

Boxes so delimited contains typically the field name, possibly an indication of which bits in the field are in the box, and possibly a value (e.g., for spare bits).

A specific method can be used in the IE description to describe a branching structure, i.e., a structure variable according to the value of particular fields in the IE. This design is unusual outside type 4 and type 6 IEs, and as, a design rule, should be used only in type 4 and type 6 IEs.

a) The octet number of an octet within the IE is defined typically in the table. It consists of a positive integer, possibly of an additional letter, and possibly of an additional asterisk, see clause f). The positive integer identifies one octet or a group of octets.

b) Each octet group is a self-contained entity. The internal structure of an octet group may be defined in alternative ways.

…

f) Optional octets are marked with asterisks (\*). As a design rule, the presence or absence of an optional octet should be determinable from information in the IE and preceding the optional octet. Care should be taken not to introduce ambiguities with optional octets.

g) At the end of the IE, additional octets may be added in later versions of the protocols also without using the mechanisms defined in c) and d). Equipment shall be prepared to receive such additional octets; the contents of these octets shall be ignored. However the length indicated in the formal description of the messages and of the individual information elements only takes into account this version of the protocols.

[TS 24.501, clause 5.5.1.2.2]

The UE in state 5GMM-DEREGISTERED shall initiate the registration procedure for initial registration by sending a REGISTRATION REQUEST message to the AMF,

a) when the UE performs initial registration for 5GS services;

b) when the UE performs initial registration for emergency services;

c) when the UE performs initial registration for SMS over NAS; and

d) when the UE moves from GERAN to NG-RAN coverage or the UE moves from a UTRAN to NG-RAN coverage.

with the following clarifications to initial registration for emergency services:

a) the UE shall not initiate an initial registration for emergency services over the current access, if the UE is already registered for emergency services over the non-current access, unless the initial registration has to be initiated to perform handover of an existing emergency PDU session from the non-current access to the current access; and

NOTE 1: Transfer of an existing emergency PDU session between 3GPP access and non-3GPP access is needed e.g. if the UE determines that the current access is no longer available.

b) the UE can only initiate an initial registration for emergency services over non-3GPP access if it cannot register for emergency services over 3GPP access.

The UE initiates the registration procedure for initial registration by sending a REGISTRATION REQUEST message to the AMF, starting timer T3510. If timer T3502 is currently running, the UE shall stop timer T3502. If timer T3511 is currently running, the UE shall stop timer T3511.

During initial registration the UE handles the 5GS mobile identity IE in the following order:

a) Void

b) if the UE holds a valid 5G-GUTI that was previously assigned, over 3GPP access or non-3GPP access, by the same PLMN with which the UE is performing the registration, the UE shall indicate the 5G-GUTI in the 5GS mobile identity IE;

c) if the UE holds a valid 5G-GUTI that was previously assigned, over 3GPP access or non-3GPP access, by an equivalent PLMN, the UE shall indicate the 5G-GUTI in the 5GS mobile identity IE;

d) if the UE holds a valid 5G-GUTI that was previously assigned, over 3GPP access or non-3GPP, by any other PLMN, the UE shall indicate the 5G-GUTI in the 5GS mobile identity IE;

e) if a SUCI is available the UE shall include the SUCI in the 5GS mobile identity IE; and

f) if the UE does not hold a valid 5G-GUTI or SUCI, and is initiating the registration procedure for emergency services, the PEI shall be included in the 5GS mobile identity IE.

If the SUCI is included in the 5GS mobile identity IE and the timer T3519 is not running, the UE shall start timer T3519 and store the value of the SUCI sent in the REGISTRATION REQUEST message. The UE shall include the stored SUCI in the REGISTRATION REQUEST message while timer T3519 is running.

If the UE is operating in the dual-registration mode and it is in EMM state EMM-REGISTERED, the UE shall include the UE status IE with the EMM registration status set to "UE is in EMM-REGISTERED state".

NOTE 2: Inclusion of the UE status IE with this setting corresponds to the indication that the UE is "moving from EPC" as specified in 3GPP TS 23.502 [9].

If the last visited registered TAI is available, the UE shall include the last visited registered TAI in the REGISTRATION REQUEST message.

If the UE requests the use of SMS over NAS, the UE shall include the 5GS update type IE in the REGISTRATION REQUEST message with the SMS requested bit set to "SMS over NAS supported". When the 5GS update type IE is included in the REGISTRATION REQUEST for reasons other than requesting the use of SMS over NAS, and the UE does not need to register for SMS over NAS, the UE shall set the SMS requested bit of the 5GS update type IE to "SMS over NAS not supported" in the REGISTRATION REQUEST message.

If the UE supports MICO mode and requests the use of MICO mode, then the UE shall include the MICO indication IE in the REGISTRATION REQUEST message.

If the UE needs to use the UE specific DRX parameters, the UE shall include the Requested DRX parameters IE in the REGISTRATION REQUEST message.

If the UE needs to request LADN information for specific LADN DNN(s) or indicates a request for LADN information as specified in 3GPP TS 23.501 [8], the UE shall include the LADN indication IE in the REGISTRATION REQUEST message and:

- request specific LADN DNNs by including a LADN DNN value in the LADN indication IE for each LADN DNN for which the UE requests LADN information; or

- to indicate a request for LADN information by not including any LADN DNN value in the LADN indication IE.

The UE shall include the requested NSSAI containing the S-NSSAI(s) corresponding to the slice(s) to which the UE intends to register with and shall include the mapped S-NSSAI(s) for the requested NSSAI, if available, in the REGISTRATION REQUEST message. If the UE has allowed NSSAI or configured NSSAI for the current PLMN, the requested NSSAI shall be either:

a) the configured NSSAI for the current PLMN, or a subset thereof as described below, if the UE has no allowed NSSAI for the current PLMN;

b) the allowed NSSAI for the current PLMN, or a subset thereof as described below, if the UE has an allowed NSSAI for the current PLMN; or

c) the allowed NSSAI for the current PLMN, or a subset thereof as described below, plus one or more S-NSSAIs from the configured NSSAI for which no corresponding S-NSSAI is present in the allowed NSSAI and those are neither in the rejected NSSAI for the current PLMN nor in the rejected NSSAI for the current registration area.

If the UE has neither allowed NSSAI for the current PLMN nor configured NSSAI for the current PLMN and has a default configured NSSAI, the UE shall:

a) include the S-NSSAI(s) in the Requested NSSAI IE of the REGISTRATION REQUEST message using the default configured NSSAI; and

b) include the Network slicing indication IE with the Default configured NSSAI indication bit set to "Requested NSSAI created from default configured NSSAI" in the REGISTRATION REQUEST message.

If the UE has no allowed NSSAI for the current PLMN, no configured NSSAI for the current PLMN, and no default configured NSSAI, the UE shall not include a requested NSSAI in the REGISTRATION message.

The subset of configured NSSAI provided in the requested NSSAI consists of one or more S-NSSAIs in the configured NSSAI applicable to the current PLMN, if the S-NSSAI is neither in the rejected NSSAI for the current PLMN nor in the rejected NSSAI for the current registration area.

The subset of allowed NSSAI provided in the requested NSSAI consists of one or more S-NSSAIs in the allowed NSSAI for the current PLMN.

NOTE 3: How the UE selects the subset of configured NSSAI or allowed NSSAI to be provided in the requested NSSAI is implementation specific. The UE can take preferences indicated by the upper layers (e.g. policies, applications) into account.

NOTE 4: The number of S-NSSAI(s) included in the requested NSSAI cannot exceed eight.

If the UE initiates an initial registration for emergency services or needs to prolong the established NAS signalling connection after the completion of the initial registration procedure (e.g. due to uplink signalling pending), the UE shall set the Follow-on request indicator to 1.

If the UE supports S1 mode, the UE shall:

- set the S1 mode bit to "S1 mode supported" in the 5GMM capability IE of the REGISTRATION REQUEST message;

- include the S1 UE network capability IE in the REGISTRATION REQUEST message; and

- if the UE supports sending an ATTACH REQUEST message containing a PDN CONNECTIVITY REQUEST message with request type set to "handover" to transfer a PDU session from N1 mode to S1 mode, set the HO attach bit to "attach request message containing PDN connectivity request with request type set to handover to transfer PDU session from N1 mode to S1 mode supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

If the UE supports the LTE positioning protocol (LPP) in N1 mode as specified in 3GPP TS 36.355 [26], the UE shall set the LPP bit to "LPP in N1 mode supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

If the UE has one or more stored UE policy sections identified by a UPSI with the PLMN ID part indicating the HPLMN or the selected PLMN, the UE shall include the UE STATE INDICATION message (see annex D) in the Payload container IE of the REGISTRATION REQUEST message.

If the UE does not have a valid 5G NAS security context, the UE shall send the REGISTRATION REQUEST message without including the NAS message container IE. The UE shall set the Payload container type IE to "UE policy container" and include the entire REGISTRATION REQUEST message (i.e. containing cleartext IEs and non-cleartext IEs, if any) in the NAS message container IE that is sent as part of the SECURITY MODE COMPLETE message as described in subclauses 4.4.6 and 5.4.2.3.

NOTE 1: In this version of the protocol, the UE can only include the Payload container IE in the REGISTRATION REQUEST message to carry a payload of type "UE policy container".

If the UE has a valid 5G NAS security context and the UE needs to send non-cleartext IEs, the UE shall send a REGISTRATION REQUEST message including the NAS message container IE as described in subclause 4.4.6. If the UE does not need to send non-cleartext IEs, the UE shall send a REGISTRATION REQUEST message without including the NAS message container IE.

If the REGISTRATION REQUEST message includes a NAS message container IE, the AMF shall process the REGISTRATION REQUEST message that is obtained from the NAS message container IE as described in subclause 4.4.6.



Figure 5.5.1.2.2.1: Registration procedure for initial registration

[TS 24.501, clause 5.5.1.2.3]

The network may initiate 5GMM common procedures, e.g. the identification, authentication and security procedures during the registration procedure, depending on the information received in the REGISTRATION REQUEST message.

During a registration procedure with 5GS registration type IE set to "emergency registration", if the AMF is configured to support emergency registration for unauthenticated SUCIs, the AMF may choose to skip the authentication procedure even if no 5G NAS security context is available and proceed directly to the execution of the security mode control procedure.

[TS 24.501, clause 5.5.1.2.4]

During a registration procedure with 5GS registration type IE set to "emergency registration", the AMF shall not check for mobility and access restrictions, regional restrictions or subscription restrictions, when processing the REGISTRATION REQUEST message.

If the initial registration request is accepted by the network, the AMF shall send a REGISTRATION ACCEPT message to the UE.

For each of the information elements: 5GMM capability, S1 UE network capability, and UE security capability, the AMF shall store all octets received from the UE in the REGISTRATION REQUEST message, up to the maximum length defined for the respective information element.

NOTE 1: This information is forwarded to the new AMF during inter-AMF handover or to the new MME during inter-system handover to S1 mode.

The AMF shall assign and include a TAI list as a registration area the UE is registered to in the REGISTRATION ACCEPT message. The UE, upon receiving a REGISTRATION ACCEPT message, shall delete its old TAI list and store the received TAI list. If the REGISTRATION REQUEST message was received over non-3GPP access, the AMF shall include only the N3GPP TAI in the TAI list.

NOTE 2: The N3GPP TAI is operator-specific.

The AMF may include service area restrictions in the Service area list IE in the REGISTRATION ACCEPT message. The UE, upon receiving a REGISTRATION ACCEPT message with the service area restrictions shall act as described in subclause 5.3.5.

The AMF may also include a list of equivalent PLMNs in the REGISTRATION ACCEPT message. Each entry in the list contains a PLMN code (MCC+MNC). The UE shall store the list as provided by the network, and if the initial registration procedure is not for emergency services, the UE shall remove from the list any PLMN code that is already in the list of "forbidden PLMNs". In addition, the UE shall add to the stored list the PLMN code of the registered PLMN that sent the list. The UE shall replace the stored list on each receipt of the REGISTRATION ACCEPT message. If the REGISTRATION ACCEPT message does not contain a list, then the UE shall delete the stored list.

If the initial registration procedure is not for emergency services, and if the PLMN identity of the registered PLMN is a member of the list of "forbidden PLMNs", any such PLMN identity shall be deleted from the corresponding list(s).

If the Service area list IE is not included in the REGISTRATION ACCEPT message, any tracking area in the registered PLMN and its equivalent PLMN(s) in the registration area is considered as an allowed tracking area as described in subclause 5.3.5.

If the REGISTRATION REQUEST message contains the LADN indication IE, based on the LADN indication IE, UE subscription information, UE location and local configuration about LADN and:

- if the LADN indication IE includes requested LADN DNNs, the UE subscribed DNN list includes the requested LADN DNNs or the wildcard DNN, and the LADN service area of the requested LADN DNN has an intersection with the current registration area, the AMF shall determine the requested LADN DNNs included in the LADN indication IE as LADN DNNs for the UE;

- if no requested LADN DNNs included in the LADN indication IE and the wildcard DNN is included in the UE subscribed DNN list, the AMF shall determine the LADN DNN(s) configured in the AMF whose LADN service area has an intersection with the current registration area as LADN DNNs for the UE; or

- if no requested LADN DNNs included in the LADN indication IE and the wildcard DNN is not included in the UE subscribed DNN list, the AMF shall determine the LADN DNN(s) included in the UE subscribed DNN list whose LADN service area has an intersection with the current registration area as LADN DNNs for the UE.

If the LADN indication IE is not included in the REGISTRATION REQUEST message, the AMF shall determine the LADN DNN(s) included in the UE subscribed DNN list whose service area has an intersection with the current registration area as LADN DNNs for the UE, except for the wildcard DNN included in the UE subscribed DNN list.

The AMF shall include the LADN information which consists of the determined LADN DNNs for the UE and LADN service area(s) available in the current registration area in the LADN information IE of the REGISTRATION ACCEPT message.

The UE, upon receiving the REGISTRATION ACCEPT message with the LADN information, shall store the received LADN information. If there exists one or more LADN DNNs which are included in the LADN indication IE of the REGISTRATION REQUEST message and are not included in the LADN information IE of the REGISTRATION ACCEPT message, the UE considers such LADN DNNs as not available in the current registration area.

The 5G-GUTI reallocation shall be part of the initial registration procedure. During the initial registration procedure, if the AMF has not allocated a new 5G-GUTI by the generic UE configuration update procedure, the AMF shall include in the REGISTRATION ACCEPT message the new assigned 5G-GUTI together with the assigned TAI list.

If a 5G-GUTI or the SOR transparent container IE is included in the REGISTRATION ACCCEPT message, the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3.

If the Operator-defined access category definitions IE or the Extended emergency number list IE is included in the REGISTRATION ACCCEPT message, the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3.

The AMF shall include the MICO indication IE in the REGISTRATION ACCEPT message only if the MICO indication IE was included in the REGISTRATION REQUEST message, the AMF supports and accepts the use of MICO mode. If the AMF supports and accepts the use of MICO mode, the AMF may indicate "all PLMN registration area allocated" in the MICO indication IE in the REGISTRATION ACCEPT message. If "all PLMN registration area allocated" is indicated in the MICO indication IE, the AMF shall not assign and include the TAI list in the REGISTRATION ACCEPT message. If the REGISTRATION ACCEPT message included an MICO indication IE indicating "all PLMN registration area allocated", the UE shall treat all TAIs in the current PLMN as a registration area and delete its old TAI list.

The AMF shall include the T3512 value IE in the REGISTRATION ACCEPT message only if the REGISTRATION REQUEST message was sent over the 3GPP access.

The AMF shall include the non-3GPP de-registration timer value IE in the REGISTRATION ACCEPT message only if the REGISTRATION REQUEST message was sent for the non-3GPP access.

Upon receipt of the REGISTRATION ACCEPT message, the UE shall reset the registration attempt counter, enter state 5GMM-REGISTERED and set the 5GS update status to 5U1 UPDATED.

If the REGISTRATION ACCEPT message included a T3512 value IE, the UE shall use the value in the T3512 value IE as periodic registration update timer (T3512).

If the REGISTRATION ACCEPT message included a non-3GPP de-registration timer value IE, the UE shall use the value in non-3GPP de-registration timer value IE as non-3GPP de-registration timer.

If the REGISTRATION ACCEPT message contained a 5G-GUTI, the UE shall return a REGISTRATION COMPLETE message to the AMF to acknowledge the received 5G-GUTI, stop timer T3519 if running, and delete any stored SUCI. The UE shall provide the 5G-GUTI to the lower layer of 3GPP access if the REGISTRATION ACCEPT message is sent over the non-3GPP access, and the UE is in 5GMM-REGISTERED in both 3GPP access and non-3GPP access in the same PLMN.

If the REGISTRATION ACCEPT message contains the Network slicing indication IE with the Network slicing subscription change indication set to "Network slicing subscription changed", or contains a configured NSSAI IE with a new configured NSSAI for the current PLMN and optionally the mapped S-NSSAI(s) for the configured NSSAI for the current PLMN, the UE shall return a REGISTRATION COMPLETE message to the AMF to acknowledge the successful update of the network slicing information.

If the REGISTRATION ACCEPT message contains the Operator-defined access category definitions IE or the Extended emergency number list IE or both, the UE shall return a REGISTRATION COMPLETE message to the AMF to acknowledge reception of the operator-defined access category definitions or the extended local emergency numbers list or both.

Upon receiving a REGISTRATION COMPLETE message, the AMF shall stop timer T3550 and change to state 5GMM-REGISTERED. The 5G-GUTI, if sent in the REGISTRATION ACCEPT message, shall be considered as valid.

9.1.5.1.15.3 Test description

9.1.5.1.15.3.1 Pre-test conditions

System Simulator:

- NGC Cell A

UE:

- The UE is configured to initiate 5GS registration.

- The UE is previously registered on NGC Cell A using default message contents according to TS 38.508-1 [4].

Preamble:

- The UE is in state Switched OFF (state 0N-B) according to TS 38.508-1 [4].

9.1.5.1.15.3.2 Test procedure sequence

Table 9.1.5.1.15.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2-14 | Steps 1-13 of the generic procedure for NR RRC\_IDLE as specified in TS 38.508-1 [4] Table 4.5.2.2-2 are performed. | - | - | - | - |
| 15 | The SS transmits REGISTRATION ACCEPT with additional octets included that the UE does not comprehend. | <-- | REGISTRATION ACCEPT | - | - |
| 16 | Check: Does the UE transmit a REGISTRATION COMPLETE message? | --> | REGISTRATION COMPLETE | 1 | P |
| 17a1-18a1 | Steps 19a1-20a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |

9.1.5.1.15.3.3 Specific message contents

Table 9.1.5.1.15.3.3-1: Message REGISTRATION ACCEPT (step 15, Table 9.1.5.1.15.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| CAG information list | ‘0111 0101 0000 0000 0000 0000’B | A CAG list with zero entries (i.e. only octets 1, 2, and 3 are present, octet 1 is equal to the CAG information list IEI of 0x75, and the length of CAG information list contents as represented by octets 2 and 3 is equal to 0).  This octet was defined in Rel-16, and so to a Rel-15 UE it appears as an extended octet that it does not understand. Because CAG as a feature is also not defined prior to Rel-16, no procedures will be triggered by sending a blank CAG list to a Rel-15 UE. | Rel-15 |

##### 9.1.5.1.16 Initial Registration / Success / MUSIM

9.1.5.1.16.1 Test Purpose (TP)

(1)

**with** { The MUSIM UE is switched-off with two valid USIMs inserted }

**ensure that** {

**when** { The UE is powered on }

**then** { MUSIM UE transmits REGISTRATION REQUEST message and sets one or more MUSIM feature bits in 5GMM capability IE to "supported" individually with cell1 and cell2 which belong to different PLMNs (i.e. NAS signalling connection release, paging indication for voice services, reject paging request, paging restriction) }

}

9.1.5.1.16.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: 3GPP TS 24.501, clauses 4.25 and 5.5.1.2.2. Unless otherwise stated these are Rel-17 requirements.

[TS 24.501, clause 4.25]

A network and a MUSIM UE may support one or more of the MUSIM features (i.e. the N1 NAS signalling connection release, the paging indication for voice services, the reject paging request, the paging restriction and the paging timing collision control).

If MUSIM UE supports one or more MUSIM features, the UE indicates support of one or more MUSIM features (except for the paging timing collision control) during the registration procedure. If the UE has indicated support of the N1 NAS signalling connection release or the reject paging request or both and the UE supports the paging restriction, the UE indicates support of the paging restriction.

If the UE indicates support of one or more MUSIM features and the network decides to accept one or more MUSIM features, the network indicates the support of one or more MUSIM features during the registration procedure. The network only indicates the support of the paging restriction together with the support of either N1 NAS signalling connection release or the reject paging request.

The network does not indicate support for any MUSIM feature to the UE during the registration for emergency services.

If a UE stops fulfilling the condition to be considered a MUSIM UE as defined in subclause 3.1, and the UE has negotiated support of one or more MUSIM features, then the UE shall initiate a registration procedure for mobility and periodic registration update to indicate that all the MUSIM features are not supported (except for the paging timing collision control) as specified in subclause 5.5.1.3.

[TS 24.501, clause 5.5.1.2.2]

…

If the MUSIM UE supports the N1 NAS signalling connection release, then the UE shall set the N1 NAS signalling connection release bit to "N1 NAS signalling connection release supported" in the 5GMM capability IE of the REGISTRATION REQUEST message otherwise the UE shall not set the N1 NAS signalling connection release bit to "N1 NAS signalling connection release supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

If the MUSIM UE supports the paging indication for voice services, then the UE shall set the paging indication for voice services bit to "paging indication for voice services supported" in the 5GMM capability IE of the REGISTRATION REQUEST message otherwise the UE shall not set the paging indication for voice services bit to "paging indication for voice services supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

If the MUSIM UE supports the reject paging request, then the UE shall set the reject paging request bit to "reject paging request supported" in the 5GMM capability IE of the REGISTRATION REQUEST message otherwise the UE shall not set the reject paging request bit to "reject paging request supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

If the MUSIM UE sets:

- the reject paging request bit to "reject paging request supported";

- the N1 NAS signalling connection release bit to "N1 NAS signalling connection release supported"; or

- both of them;

and supports the paging restriction, then the UE shall set the paging restriction bit to "paging restriction supported" in the 5GMM capability IE of the REGISTRATION REQUEST message otherwise the UE shall not set the paging restriction bit to "paging restriction supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

9.1.5.1.16.3 Test description

9.1.5.1.16.3.1 Pre-test conditions

System Simulator:

- Initial conditions for system simulator as described in TS 38.508-1 [4], clause 4.9.36.2.1.

UE:

- Initial conditions for UE as described in TS 38.508-1 [4], clause 4.9.36.2.1.

Preamble:

- The UE is in state Switched OFF [State 0-A as per TS 38.508-1 [4] Table 4.4A.2-0].

9.1.5.1.16.3.2 Test procedure sequence

Table 9.1.5.1.16.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Check: Does the UE perform test procedure for registration of a MUSIM UE as described in TS 38.508-1 [4], Table 4.9.36.2.2-1? | - | - | 1 | - |

9.1.5.1.16.3.3 Specific message contents

None.

##### 9.1.5.1.17 Initial registration / Success / UAS

9.1.5.1.17.1 Test Purpose (TP)

(1)

**with** { UE is powered on and has sent a REGISTRATION REQUEST message }

**ensure that** {

**when** { UE receives Service-level-AA container IE with service-level-AA pending indication in REGISTRATION ACCEPT }

**then** { UE shall send a REGISTRATION COMPLETE message to acknowledge reception of the service-level-AA pending indication, and the UE shall not attempt to perform another registration procedure or to establish a PDU session for USS communication }

9.1.5.1.17.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501, clauses 4.22.1, 5.5.1.2.2, 5 5.1.2.4. Unless otherwise stated these are Rel-17 requirements.

[TS 24.501, clause 5.5.1.2.2]

5.5.1.2.2 Initial registration initiation

…

If the UE supports UAS services, the UE shall set the UAS bit to "UAS services supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

When the UE supporting UAS services initiates an initial registration for UAS services, the UE shall include the service-level device ID in the Service-level-AA container IE of the REGISTRATION REQUEST message and set the value to the CAA-level UAV ID. The UE shall include the service-level-AA server address in the Service-level-AA container IE of the REGISTRATION REQUEST message and set the value to the USS address, if it is provided by the upper layers.

…

[TS 24.501, clause 5.5.1.2.2]

5.5.1.2.4 Initial registration accepted by the network

If the UE has included the service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE of the REGISTRATION REQUEST message, and if:

- the UE has a valid aerial UE subscription information;

- the UUAA procedure is to be performed during the registration procedure according to operator policy;

- there is no valid successful UUAA result for the UE in the UE 5GMM context; and

- the REGISTRATION REQUEST message was not received over non-3GPP access,

then the AMF shall initiate the UUAA-MM procedure with the UAS-NF as specified in TS 23.256 [6AB] and shall include a service-level-AA pending indication in the Service-level-AA container IE of the REGISTRATION ACCEPT message. The AMF shall store in the UE 5GMM context that a UUAA procedure is pending. The AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3. If the REGISTRATION REQUEST message was received over non-3GPP access, the AMF shall not initiate UUAA-MM procedure.

…

If the UE has included the service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE of the REGISTRATION REQUEST message and the REGISTRATION ACCEPT message contains the service-levelAA pending indication in the Service-level-AA container IE, the UE shall return a REGISTRATION COMPLETE message to the AMF to acknowledge reception of the service-level-AA pending indication, and the UE shall not attempt to perform another registration procedure for UAS services until the UUAA-MM procedure is completed, or to establish a PDU session for USS communication or a PDU session for C2 communication until the UUAA-MM procedure is completed successfully. If the UE has included the service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE of the REGISTRATION REQUEST message and the REGISTRATION ACCEPT message does not contain the service-level-AA pending indication in the Service-level-AA container IE, the UE shall consider the UUAA-MM procedure is not triggered.

[TS 24.501, clause 5.4.4.2]

9.1.5.17.3 Test description

9.1.5.1.17.3.1 Pre-test conditions

System Simulator:

- NGC Cell A

UE:

- The UE is capable of UAS operation and provisioned with CAA-level UAV ID.

Preamble:

- The UE is in state Switched OFF (state 0-A) according to TS 38.508-1 [4].

9.1.5.1.17.3.2 Test procedure sequence

Table 9.1.5.1.17.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
|  | Void | - | - | - | - |
| 3-14 | Steps 2 to 13 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 15 | The SS transmits a REGISTRATION ACCEPT message including | <-- | REGISTRATION ACCEPT | - | - |
| 16 | Check: Does the UE transmit a REGISTRATION COMPLETE message? | --> | REGISTRATION COMPLETE | 1 | P |
| 17 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST message within 60 seconds? | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 1 | F |
| 18 | The SS releases the RRC connection. | - | - | - | - |

9.1.5.1.17.3.3 Specific message contents

Table 9.1.5.1.17.3.3-0: SECURITY MODE COMPLETE (step 9, Table 9.1.5.1.17.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-26 | | | |
| Information Element | Value/Remark | Comment | Condition |
| NAS message container | Contents of Table 9.1.5.1.17.3.3-1 |  |  |

Table 9.1.5.1.17.3.3-1: REGISTRATION REQUEST (Step 9, Table 9.1.5.1.17.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| Service-level-AA container | Present, Contents not checked |  |  |
| Service-level-AA payload type | Present, Contents not checked |  |  |

Table 9.1.5.1.17.3.3-2:REGISTRATION ACCEPT (Step12, Table 9.1.5.1.17.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| Service-level-AA container |  |  |  |
| Service-level-AA pending indication | ‘1010 0001’B |  |  |

#### 9.1.5.2 Mobility and periodic registration update

##### 9.1.5.2.1 Mobility registration update / TAI list handling

9.1.5.2.1.1 Test Purpose (TP)

(1)

**with** { UE in state 5GMM-REGISTERED, and 5GMM-IDLE mode over 3GPP access }

**ensure that** {

**when** { UE detects entering a tracking area which is not in the list of forbidden TAs and is not in the list of tracking areas that the UE previously registered in the AMF }

**then** { UE initiates **and** successfully completes the registration procedure for mobility registration update }

}

(2)

**with** { UE in state 5GMM-REGISTERED, and 5GMM-IDLE mode over 3GPP access }

**ensure that** {

**when** { UE detects entering a tracking area which is not in the list of forbidden TAs and is in the list of tracking areas that the UE previously registered in the AMF }

**then** { UE does not initiate the registration procedure for mobility registration update }

}

(3)

**with** { UE in state 5GMM-REGISTERED, and 5GMM-IDLE mode over 3GPP access }

**ensure that** {

**when** { UE receives a new TAI list during a mobility registration update procedure }

**then** { UE shall delete its old TAI list and store the received TAI list }

}

9.1.5.2.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clauses 5.5.1.3.2, 5.5.1.3.4. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.5.1.3.2]

The UE in state 5GMM-REGISTERED shall initiate the registration procedure for mobility and periodic registration update by sending a REGISTRATION REQUEST message to the AMF,

a) when the UE detects entering a tracking area that is not in the list of tracking areas that the UE previously registered in the AMF;

...

If case b) is the only reason for initiating the registration procedure for mobility and periodic registration update, the UE shall indicate "periodic registration updating" in the 5GS registration type IE; otherwise the UE shall indicate "mobility registration updating".

...

After sending the REGISTRATION REQUEST message to the AMF the UE shall start timer T3510. If timer T3502 is currently running, the UE shall stop timer T3502. If timer T3511 is currently running, the UE shall stop timer T3511.

If the last visited registered TAI is available, the UE shall include the last visited registered TAI in the REGISTRATION REQUEST message.

The UE shall handle the 5GS mobility identity IE in the REGISTRATION REQUEST message as follows:

...

b) for all other cases, if the UE holds a valid 5G-GUTI, the UE shall indicate the 5G-GUTI in the 5GS mobile identity IE.

...

When the registration procedure for mobility and periodic registration update is initiated in 5GMM-IDLE mode, the UE may include a PDU session status IE in the REGISTRATION REQUEST message, indicating which PDU sessions associated with the access type the REGISTRATION REQUEST message is sent over are active in the UE.

...



Figure 5.5.1.3.2.1: Registration procedure for mobility and periodic registration update

[TS 24.501, clause 5.5.1.3.4]

The AMF shall assign and include a TAI list as a registration area the UE is registered to in the REGISTRATION ACCEPT message. The UE, upon receiving a REGISTRATION ACCEPT message, shall delete its old TAI list and store the received TAI list. If the REGISTRATION REQUEST message was received over non-3GPP access, the AMF shall include only the N3GPP TAI in the TAI list.

...

Upon receipt of the REGISTRATION ACCEPT message, the UE shall reset the registration attempt counter, enter state 5GMM-REGISTERED and set the 5GS update status to 5U1 UPDATED.

...

If the REGISTRATION ACCEPT message contains a 5G-GUTI, the UE shall return a REGISTRATION COMPLETE message to the AMF to acknowledge the received 5G-GUTI, stop timer T3519 if running, and delete any stored SUCI.

9.1.5.2.1.3 Test description

9.1.5.2.1.3.1 Pre-test conditions

System Simulator:

- 3 cells, NGC Cell A, and NGC Cell B and NGC Cell D belonging to the same PLMN and different TA in accordance with TS 38.508-1 [4] Table 6.3.2.2-1

- System information combination NR-2 as defined in TS 38.508-1 [4], sub-clause 4.4.3.1.2 is used in all cells when active.

UE:

None.

Preamble:

- The UE is in test state 1N-A as defined in TS 38.508-1 [4], subclause 4.4A on NGC Cell A.

- During the initial registration:

- In the list of tracking areas provided by the AMF (IE 'TAI list') contains only the TAI of NGC Cell A.

9.1.5.2.1.3.2 Test procedure sequence

Table 9.1.5.2.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS configures:  - NGC Cell B as "Serving cell"  - NGC Cell A as "Non-suitable "Off" cell". | - | - | - | - |
| 2 | Check: Does the UE perform on NGC Cell B the Registration procedure for mobility registration update by executing the Test procedure to check that UE is camped on a new cell belonging to a new TA as specified in TS 38.508-1 [4] subclause 4.9.5?  NOTE: During the procedure the SS assigns a TAI list containing the TAI of NGC Cell B and NGC Cell D. | - | - | 1 | - |
| 3 | The SS configures:  - NGC Cell D as "Serving cell"  - NGC Cell B as "Non-suitable "Off" cell". | - | - | - | - |
| 4 | Check: Does the UE send in the next 30 sec a request for RRC connection establishment. | --> | NR RRC: RRCSetupRequest | 2 | F |
| 5 | Check: Does the result of generic test procedure in TS 38.508-1 [4] subclause 4.9.4 indicate that the UE is in 5GC RRC\_IDLE state on the NGC Cell D? | - | - | 2 | - |
| 6 | The SS configures:  - NGC Cell A as "Serving cell"  - NGC Cell D as "Non-suitable "Off" cell". | - | - | - | - |
| 7 | Check: Does the UE perform on NGC Cell A the Registration procedure for mobility registration update as specified in TS 38.508-1 [4] subclause 4.9.5, '*connected without release*'? | - | - | 3 | - |

9.1.5.2.1.3.3 Specific message contents

Table 9.1.5.2.1.3.3-1: REGISTRATION REQUEST (step 2, Table 9.1.5.2.1.3.2-1; step 3, TS 38.508-1 [4] Table 4.9.5.2.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6. | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type | '010'B | mobility registration updating |  |
| 5GS mobile identity | Active 5G-GUTI assigned in the preamble |  |  |
| 5GMM capability | Any value |  |  |
| Last visited registered TAI | The TAI of the NGC Cell A, see TS 38.508-1 [4] Table 6.3.2.2-1 |  |  |
| S1 UE network capability | If included then Any value | Shall be included if S1 mode indicated as supported in the IE '5GMM capability' |  |

Table 9.1.5.2.1.3.3-2: REGISTRATION ACCEPT (step 2, Table 9.1.5.2.1.3.2-1; step 4, TS 38.508-1 [4] Table 4.9.5.2.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7. | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result |  |  |  |
| 5GS registration result value | '001'B | 3GPP access |  |
| SMS allowed | '0'B | SMS over NAS not allowed |  |
| 5G-GUTI | A 5G-GUTI different to the one provided by the UE in the REGISTRATION REQUEST |  |  |
| TAI list |  |  |  |
| Type of list | "00"B | list of TACs belonging to one PLMN, with non-consecutive TAC values |  |
| MCC | The MCC of the PLMN to which the NGC Cell A, NGC Cell B and NGC Cell D belong to, see TS 38.508-1 [4] Table 6.3.2.2-1 |  |  |
| MNC | The MNC of the PLMN to which the NGC Cell A, NGC Cell B and NGC Cell D belong to, see TS 38.508-1 [4] Table 6.3.2.2-1 |  |  |
| TAC 1 | The TAI of the NGC Cell B, see TS 38.508-1 [4] Table 6.3.2.2-1 |  |  |
| TAC 2 | The TAI of the NGC Cell D, see TS 38.508-1 [4] Table 6.3.2.2-1 |  |  |
| PDU session status | If PDU session status was included in the REGISTRATION REQUEST, the indicated as active PDN sessions shall be confirmed as active |  |  |

Table 9.1.5.2.1.3.3-3: REGISTRATION REQUEST (step 7, Table 9.1.5.2.1.3.2-1; step 3, TS 38.508-1 [4] Table 4.9.5.2.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6. | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type | '010'B | mobility registration updating |  |
| 5GS mobile identity | Active 5G-GUTI assigned in Table 9.1.5.2.1.3.3-2: REGISTRATION ACCEPT |  |  |
| 5GMM capability | Any value |  |  |
| Last visited registered TAI | The TAI of the NGC Cell D, see TS 38.508-1 [4] Table 6.3.2.2-1 |  |  |
| S1 UE network capability | If included then Any value | Shall be included if S1 mode indicated as supported in the IE '5GMM capability' |  |

Table 9.1.5.2.1.3.3-4: REGISTRATION ACCEPT (step 7, Table 9.1.5.2.1.3.2-1; step 4, TS 38.508-1 [4] Table 4.9.5.2.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7. | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result |  |  |  |
| 5GS registration result value | '001'B | 3GPP access |  |
| SMS allowed | '0'B | SMS over NAS not allowed |  |
| 5G-GUTI | Active 5G-GUTI assigned in the preamble |  |  |
| TAI list |  |  |  |
| Type of list | "00"B | list of TACs belonging to one PLMN, with non-consecutive TAC values |  |
| MCC | The MCC of the PLMN to which the NGC Cell A, NGC Cell B and NGC Cell D belong to, see TS 38.508-1 [4] Table 6.3.2.2-1 |  |  |
| MNC | The MNC of the PLMN to which the NGC Cell A, NGC Cell B and NGC Cell D belong to, see TS 38.508-1 [4] Table 6.3.2.2-1 |  |  |
| TAC 1 | The TAI of the NGC Cell A, see TS 38.508-1 [4] Table 6.3.2.2-1 |  |  |
| PDU session status | If PDU session status was included in the REGISTRATION REQUEST, the indicated as active PDU sessions shall be confirmed as active |  |  |

##### 9.1.5.2.2 Periodic registration update / Accepted

9.1.5.2.2.1 Test Purpose (TP)

(1)

**with** { the UE in 5GMM-REGISTERED state and 5GMM-IDLE mode over 3GPP access }

**ensure that** {

**when** { the periodic registration updating timer T3512 expires }

**then** { the UE initiates the registration procedure for mobility and periodic registration update and indicates "periodic registration updating" in the 5GS registration type IE }

}

(2)

**with** { the UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { the UE receives an REGISTRATION ACCEPT message included a new T3512 value IE }

**then** { the UE uses the new value in T3512 value IE as periodic registration update timer (T3512) }

}

9.1.5.2.2.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clauses 5.5.1.3.1, 5.5.1.3.2 and 5.5.1.3.4. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.5.1.3.1]

This procedure is used by a UE for both mobility and periodic registration update of 5GS services. This procedure, when used for periodic registration update of 5GS services, is performed only in 3GPP access.

This procedure used for periodic registration update of 5GS services is controlled in the UE by timer T3512. When timer T3512 expires, the registration procedure for mobility and periodic registration area updating is started. Start and reset of timer T3512 is described in subclause 10.2.

[TS 24.501, clause 5.5.1.3.2]

The UE in state 5GMM-REGISTERED shall initiate the registration procedure for mobility and periodic registration update by sending a REGISTRATION REQUEST message to the AMF,

a) when the UE detects entering a tracking area that is not in the list of tracking areas that the UE previously registered in the AMF;

b) when the periodic registration updating timer T3512 expires;

…

If item b) is the only reason for initiating the registration procedure for mobility and periodic registration update, the UE shall indicate "periodic registration updating" in the 5GS registration type IE; otherwise the UE shall indicate "mobility registration updating".

…

[TS 24.501, clause 5.5.1.3.4]

…

If the REGISTRATION ACCEPT message included a T3512 value IE, the UE shall use the value in T3512 value IE as periodic registration update timer (T3512). If the T3512 value IE is not included, the UE shall use the value currently stored, e.g. from a prior REGISTRATION ACCEPT message.

…

9.1.5.2.2.3 Test description

9.1.5.2.2.3.1 Pre-test conditions

System Simulator:

- NGC Cell A.

UE:

- None.

Preamble:

- The UE is in state 0N-B on NGC Cell A according to TS 38.508-1 [4].

9.1.5.2.2.3.2 Test procedure sequence

Table 9.1.5.2.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2-14 | Steps 1-13 of the generic procedure for UE registration specified in TS 38.508-1 [4] table 4.5.2.2-2 are performed. | - | - | - | - |
| 15 | The SS transmits a REGISTRATION ACCEPT message. | <-- | REGISTRATION ACCEPT | - | - |
| 16-21 | Steps 15-20a1 of the generic procedure for UE registration specified in TS 38.508-1 [4] table 4.5.2.2-2 are performed. | - | - | - | - |
| 22 | The SS waits 3 minutes. (Expire of T3512) | - | - | - | - |
| 23 | Check: Does the UE transmit a REGISTRATION REQUEST message with the 5GS registration type IE indicating "periodic registration updating"? | --> | REGISTRATION REQUEST | 1 | P |
| 24 | The SS transmits a REGISTRATION ACCEPT message including T3512 value IE. | <-- | REGISTRATION ACCEPT | - | - |
| 24A | The UE transmits a REGISTRATION COMPLETE message. | --> | REGISTRATION COMPLETE | - | - |
| 25 | The SS releases the RRC connection. | - | - | - | - |
| 26 | The SS waits 1 minute. (Expire of T3512) | - | - | - | - |
| 27 | Check: Does the UE transmit a REGISTRATION REQUEST message? | --> | REGISTRATION REQUEST | 2 | P |
| 28 | The SS transmits a REGISTRATION ACCEPT message. | <-- | REGISTRATION ACCEPT | - | - |
| 29 | The UE transmits a REGISTRATION COMPLETE message. (NOTE 1) | --> | REGISTRATION COMPLETE | - | - |
| NOTE 1: the UE finishes in State 3N-A with T3540 started. | | | | | |

9.1.5.2.2.3.3 Specific message contents

Table 9.1.5.2.2.3.3-1: REGISTRATION ACCEPT (Step 15, Table 9.1.5.2.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-7 | | | |
| Information Element | Value/Remark | Comment | Condition |
| T3512 value |  |  |  |
| Unit | '101'B | value is incremented in multiples of 1 minute |  |
| Timer value | '0 0011'B | 3 minutes |  |

Table 9.1.5.2.2.3.3-2: REGISTRATION REQUEST (Steps 23 & 27, Table 9.1.5.2.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type |  |  |  |
| 5GS registration type value | '011'B | periodic registration updating |  |

Table 9.1.5.2.2.3.3-3: REGISTRATION ACCEPT (Step 24, Table 9.1.5.2.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-7 | | | |
| Information Element | Value/Remark | Comment | Condition |
| T3512 value |  |  |  |
| Unit | '101'B | value is incremented in multiples of 1 minute |  |
| Timer value | '0 0001'B | 1 minute |  |

##### 9.1.5.2.3

##### 9.1.5.2.4 Mobility registration update / The lower layer requests NAS signalling connection recovery

9.1.5.2.4.1 Test Purpose (TP)

(1)

**with** { UE in state 5GMM-REGISTERED, and 5GMM-CONNECTED mode over 3GPP access and does not have signalling or user uplink data pending }

**ensure that** {

**when** { UE receives an indication of "RRC Connection failure" from the lower layers }

**then** { UE initiates **and** successfully completes the registration procedure for mobility registration update }

}

9.1.5.2.4.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clauses 5.5.1.3.2, 5.5.1.3.4. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.5.1.3.2]

The UE in state 5GMM-REGISTERED shall initiate the registration procedure for mobility and periodic registration update by sending a REGISTRATION REQUEST message to the AMF,

...

f) when the UE receives an indication of "RRC Connection failure" from the lower layers and does not have signalling or user uplink data pending (i.e. when the lower layer requests NAS signalling connection recovery);

...

If case b) is the only reason for initiating the registration procedure for mobility and periodic registration update, the UE shall indicate "periodic registration updating" in the 5GS registration type IE; otherwise the UE shall indicate "mobility registration updating".

...

After sending the REGISTRATION REQUEST message to the AMF the UE shall start timer T3510. If timer T3502 is currently running, the UE shall stop timer T3502. If timer T3511 is currently running, the UE shall stop timer T3511.

If the last visited registered TAI is available, the UE shall include the last visited registered TAI in the REGISTRATION REQUEST message.

The UE shall handle the 5GS mobility identity IE in the REGISTRATION REQUEST message as follows:

...

b) for all other cases, if the UE holds a valid 5G-GUTI, the UE shall indicate the 5G-GUTI in the 5GS mobile identity IE.

...

When the registration procedure for mobility and periodic registration update is initiated in 5GMM-IDLE mode, the UE may include a PDU session status IE in the REGISTRATION REQUEST message, indicating which PDU sessions associated with the access type the REGISTRATION REQUEST message is sent over are active in the UE.

...



Figure 5.5.1.3.2.1: Registration procedure for mobility and periodic registration update

[TS 24.501, clause 5.5.1.3.4]

Upon receipt of the REGISTRATION ACCEPT message, the UE shall reset the registration attempt counter, enter state 5GMM-REGISTERED and set the 5GS update status to 5U1 UPDATED.

...

If the REGISTRATION ACCEPT message contains a 5G-GUTI, the UE shall return a REGISTRATION COMPLETE message to the AMF to acknowledge the received 5G-GUTI, stop timer T3519 if running, and delete any stored SUCI.

9.1.5.2.4.3 Test description

9.1.5.2.4.3.1 Pre-test conditions

System Simulator:

- NGC Cell A, default system information in accordance with TS 38.508-1 [4] sub-clause 4.4.3.1.2.

UE:

- None.

Preamble:

- Cell configuration in accordance with TS 38.508-1 [4] Table 6.3.2.2-1:

- NGC Cell A "Serving cell"

- The UE is in test state 3N-A as defined in TS 38.508-1 [4], subclause 4.4A.2 on NGC Cell A.

9.1.5.2.4.3.2 Test procedure sequence

Table 9.1.5.2.4.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS configures:  - NGC Cell A as "Non-suitable "off" cell" in order to simulate radio link failure.  (NOTE 1) | - | - | - | - |
| 2 | Wait for T=T310+T311+1.2 sec.  (NOTE 1) | - | - | - | - |
| 3 | The SS configures:  - NGC Cell A as "Serving cell". | - | - | - | - |
| 4 | Check: Does the UE perform on NGC Cell A the Registration procedure for mobility registration update by executing the Test procedure to check that UE is camped on a new cell belonging to a new TA as specified in TS 38.508-1 [4] subclause 4.9.5.2.2-1, '*connected without release*'? (NOTE 2) | - | - | 1 | - |
| NOTE 1: Steps 1-2 simulate the RRC connection failure needed in order for the UE "NAS layer" to receive an indication of "RRC Connection failure" from the lower layers. This is based on requirements specified in TS 38.331 [12], subclauses 5.3.10.1, 5.3.10.3, 5.3.11. A 1s delay is added to allow for N310 consecutive "out-of-sync" indications and 0.2s is added for timer tolerance. Note that N310, T310, N311, T311 values are set in TS 38.508-1 [4], Table 4.6.3-150, *RLF-TimersAndConstants*.  NOTE 2: the UE finishes in State 3N-A with T3540 started. | | | | | |

9.1.5.2.4.3.3 Specific message contents

Table 9.1.5.2.4.3.3-1: REGISTRATION REQUEST (step 4, Table 9.1.5.2.4.3.2-1; step 3, TS 38.508-1 [4] Table 4.9.5.2.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-6. | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type | '010'B | mobility registration updating |  |
| 5GS mobile identity | Active 5G-GUTI assigned in the preamble |  |  |
| 5GMM capability | Any value |  |  |
| Last visited registered TAI | The TAI of the NGC Cell A, see TS 38.508-1 [4] Table 6.3.2.2-1 |  |  |
| S1 UE network capability | If included then Any value | Shall be included if S1 mode indicated as supported in the IE '5GMM capability' |  |

Table 9.1.5.2.4.3.3-2: REGISTRATION ACCEPT (step 4, Table 9.1.5.2.4.3.2-1; step 4, TS 38.508-1 [4] Table 4.9.5.2.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-7. | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result |  |  |  |
| 5GS registration result value | '001'B | 3GPP access |  |
| SMS allowed | '0'B | SMS over NAS not allowed |  |
| 5G-GUTI | Active 5G-GUTI assigned in the preamble |  |  |
| TAI list |  |  |  |
| Type of list | "00"B | list of TACs belonging to one PLMN, with non-consecutive TAC values |  |
| MCC | The MCC of the PLMN to which the NGC Cell A, NGC Cell B and NGC Cell D belong to, see TS 38.508-1 [4] Table 6.3.2.2-1 |  |  |
| MNC | The MNC of the PLMN to which the NGC Cell A, NGC Cell B and NGC Cell D belong to, see TS 38.508-1 [4] Table 6.3.2.2-1 |  |  |
| TAC 1 | The TAI of the NGC Cell A, see TS 38.508-1 [4] Table 6.3.2.2-1 |  |  |
| PDU session status | If PDU session status was included in the REGISTRATION REQUEST, the indicated as active PDN sessions shall be confirmed as active |  |  |

##### 9.1.5.2.5 Void

##### 9.1.5.2.6 Void

##### 9.1.5.2.7 Mobility and periodic registration update / Rejected / UE identity cannot be derived by the network

9.1.5.2.7.1 Test Purpose (TP)

(1)

**with** { UE in state 5GMM-REGISTERED on an NGC cell }

**ensure that** {

**when** { UE initiates a Mobility and periodic registration procedure on an NGC cell and receives a REGISTRATION REJECT message including 5GMM cause value #9 (UE identity cannot be derived by the network) }

**then** { UE deletes any 5G-GUTI, last visited registered TAI and ngKSI, enters the state 5GMM-DEREGISTERED 5U2 NOT UPDATED, **and**, subsequently automatically initiates the initial registration procedure }

}

9.1.5.2.7.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clause 5.5.1.3.5. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.5.1.3.5]

If the mobility and periodic registration update request cannot be accepted by the network, the AMF shall send a REGISTRATION REJECT message to the UE including an appropriate 5GMM cause value.

The UE shall take the following actions depending on the 5GMM cause value received in the REGISTRATION REJECT message.

...

#9 (UE identity cannot be derived by the network).

The UE shall set the 5GS update status to 5U2 NOT UPDATED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. The UE shall enter the state 5GMM-DEREGISTERED.

If the rejected request was not for initiating an emergency PDU session, the UE shall subsequently, automatically initiate the initial registration procedure.

9.1.5.2.7.3 Test description

9.1.5.2.7.3.1 Pre test conditions

System Simulator:

- 1 cell

- NGC Cell A as defined in TS 38.508-1 [4] Table 6.3.2.2-1. Default system information combination as defined in TS 38.508-1 [4], sub-clause 4.4.3.1.2.

UE:

None.

Preamble:

- The UE is brought to state 1N-A, RRC\_IDLE Connectivity (NR), in accordance with the procedure described in TS 38.508-1 [4], Table 4.5.2.2-2. 5G-GUTI and ngKSI are assigned and security context established.

9.1.5.2.7.2 Test procedure sequence

Table 9.1.5.2.7.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | SS waits for 30s (T3512 expiry). | - | - | - | - |
| 2 | The UE transmits a REGISTRATION REQUEST message with the 5GS registration type IE indicating "periodic registration updating". | --> | REGISTRATION REQUEST | - | - |
| 3 | The SS transmits a REGISTRATION REJECT message including 5GMM cause value #9 (UE identity cannot be derived by the network). | <-- | REGISTRATION REJECT | - | - |
| 4 | SS releases the RRC connection. | - | - | - | - |
| 5 | Check: Does the UE perform initial registration on NGC Cell A as specified in TS 38.508-1 [4], Table 4.5.2.2-2? The UE does not provide 5G-GUTI, last visited registered TAI or ngKSI. | - | - | 1 | P |

9.1.5.2.7.3.3 Specific message contents

Table 9.1.5.2.7.3.3-1: REGISTRATION ACCEPT (Preamble; TS 38.508-1 [4] Table 4.5.2.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7. | | | |
| Information Element | Value/remark | Comment | Condition |
| T3512 value |  |  |  |
| Unit | '100'B | value is incremented in multiples of 30 seconds |  |
| Timer value | '0 0001'B | 30 seconds |  |

Table 9.1.5.2.7.3.3-2: REGISTRATION REQUEST (step 2, Table 9.1.5.2.7.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-6. | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type | '011' | periodic registration updating |  |
| ngKSI | Active ngKSI assigned in the Preamble |  |  |
| 5GS mobile identity | Active 5G-GUTI assigned in the Preamble |  |  |
| Last visited registered TAI | The TAI of the NGC Cell A, see TS 38.508-1 [4] Table 6.3.2.2-1 |  |  |

Table 9.1.5.2.7.3.3-3: REGISTRATION REJECT (step 3, Table 9.1.5.2.7.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-9. | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | '0000 1001'B | #9 - UE identity cannot be derived by the network |  |

Table 9.1.5.2.7.3.3-4: REGISTRATION REQUEST (step 5, Table 9.1.5.2.7.3.2-1; step 4, TS 38.508-1 [4] Table 4.5.2.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-6, condition NON\_CLEARTEXT\_IE | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type | '001' | Initial registration |  |
| ngKSI | '111' | no key is available |  |
| 5GS mobile identity | SUCI |  |  |
| Non-current native NAS key set identifier | Not present |  |  |
| Last visited registered TAI | Not present |  |  |
| Additional GUTI | Not present |  |  |
| NAS message container | Not included |  |  |

Table 9.1.5.2.7.3.3-5: SECURITY MODE COMPLETE (step 5, Table 9.1.5.2.7.3.2-1; step 9, TS 38.508-1 [4] Table 4.5.2.2-2)

|  |
| --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-26, condition RINMR\_INDICATED. |

##### 9.1.5.2.8 Mobility and periodic registration update / Rejected / Implicitly de-registered

9.1.5.2.8.1 Test Purpose (TP)

(1)

**with** { UE in state 5GMM-REGISTERED on an NGC cell }

**ensure that** {

**when** { UE initiates a Mobility and periodic registration procedure on an NGC cell and receives a REGISTRATION REJECT message including 5GMM cause value #10 (implicitly de-registered) }

**then** { UE deletes any partial native 5G security context, enters the state 5GMM-DEREGISTERED.NORMAL-SERVICE, **and**, initiates a new registration procedure for initial registration }

}

9.1.5.2.8.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clause 5.5.1.3.5. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.5.1.3.5]

If the mobility and periodic registration update request cannot be accepted by the network, the AMF shall send a REGISTRATION REJECT message to the UE including an appropriate 5GMM cause value.

The UE shall take the following actions depending on the 5GMM cause value received in the REGISTRATION REJECT message.

...

#10 (implicitly de-registered).

The UE shall enter the state 5GMM-DEREGISTERED.NORMAL-SERVICE. The UE shall delete any mapped 5G security context or partial native 5G security context.

If the registration rejected request was not for initiating an emergency PDU session, the UE shall perform a new registration procedure for initial registration.

9.1.5.2.8.3 Test description

9.1.5.2.8.3.1 Pre test conditions

System Simulator:

- 2 cells, NGC Cell A, and NGC Cell B belonging to the same PLMN and different TA in accordance with TS 38.508-1 [4] Table 6.3.2.2-1. Default system information combination as defined in TS 38.508-1 [4], sub-clause 4.4.3.1.2 is used in all cells when active.

UE:

None.

Preamble:

- Cell configuration in accordance with TS 38.508-1 [4] Table 6.2.2.1-3:

- NGC Cell A "Serving cell"

- NGC Cell B "Non-suitable "Off" cell"

- The UE is in test state 1N-A as defined in TS 38.508-1 [4], subclause 4.4A.2 on NGC Cell A.

- During the initial registration:

- In the list of tracking areas provided by the AMF (IE 'TAI list') contains only the TAI of NGC Cell A.

9.1.5.2.8.2 Test procedure sequence

Table 9.1.5.2.8.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS configures:  - NGC Cell B as "Serving cell"  - NGC Cell A as "Non-Suitable "Off" cell". | - | - | - | - |
| - | EXCEPTION: Unless otherwise stated the following messages are exchange on NGC Cell B. | - | - | - | - |
| 2 | The UE transmits an REGISTRATION REQUEST message indicating "mobility registration updating". | --> | 5GMM: REGISTRATION REQUEST | - | - |
| 3 | The SS transmits an AUTHENTICATION REQUEST message to establish a new security context. | <-- | 5GMM: AUTHENTICATION REQUEST | - | - |
| 4 | The UE transmits an AUTHENTICATION RESPONSE message. | --> | 5GMM: AUTHENTICATION RESPONSE | - | - |
| 5 | The SS transmits a REGISTRATION REJECT message including 5GMM cause value #10 (implicitly de-registered) prior to initating a SMC to take into account the created during the steps 3-4 partial native 5G security context. (NOTE 1) | <-- | REGISTRATION REJECT | - | - |
| 6 | SS releases the RRC connection. | - | - | - | - |
| 7-9 | Steps 1-3 from the generic procedure for UE initial Registration as specified in TS 38.508-1 [4], subclause 4.5.2, Table 4.5.2.2-2 (connectivity *NR)* take place. | - | - | - | - |
| 10 | Check: Does the UE send a REGISTRATION REQUEST message, 5GS registration type IE set to Initial registration? | --> | 5GMM: REGISTRATION REQUEST | 1 | P |
| 11 | The SS transmits a SECURITY MODE COMMAND message indicating the ngKSI of the partial native 5G security context assigned in the AUTHENTICATION REQUEST message sent in step 3. | <-- | 5GMM: SECURITY MODE COMMAND | - | - |
| 12 | The UE transmits a SECURITY MODE REJECT message. | --> | 5GMM: SECURITY MODE REJECT | 1 | P |
| 13-27a1 | Steps 5-19a1 from the generic procedure for UE initial Registration as specified in TS 38.508-1 [4], subclause 4.5.2, Table 4.5.2.2-2 (connectivity *NR)* take place. | - | - | - | - |
| NOTE 1: This 5GMM cause is sent to the UE either if the network has implicitly de-registered the UE, e.g. after the implicit de-registration timer has expired, or if the 5GMM context data related to the subscription does not exist in the AMF e.g. because of a AMF restart, or because of a registration request for mobility or registration update is routed to a new AMF (see TS 24.301 [22], subclause A.1). The latter is an example when the serving AMF will not initiate a security mode control procedure after the primary authentication and key agreement procedure. | | | | | |

9.1.5.2.8.3.3 Specific message contents

Table 9.1.5.2.8.3.3-1: REGISTRATION REQUEST (step 2, Table 9.1.5.2.8.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-6. | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type | '010'B | mobility registration updating |  |
| ngKSI | Active ngKSI assigned in the Preamble |  |  |
| 5GS mobile identity | Active 5G-GUTI assigned in the Preamble |  |  |
| Last visited registered TAI | The TAI of the NGC Cell A, see TS 38.508-1 [4] Table 6.3.2.2-1 |  |  |

Table 9.1.5.2.8.3.3-2: REGISTRATION REJECT (step 5, Table 9.1.5.2.8.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-9. | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | '0000 1010'B | #10 - implicitly de-registered |  |

Table 9.1.5.2.8.3.3-3: REGISTRATION REQUEST (step 10, Table 9.1.5.2.8.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6. | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type | '001'B | Initial registration |  |
| ngKSI | ngKSI assigned in the preamble | Native current security context is still present |  |
| 5GS mobile identity | Active 5G-GUTI assigned in the preamble |  |  |
| Non-current native NAS key set identifier | Not present | partial native 5G security context has been deleted |  |
| Last visited registered TAI | The TAI of the NGC Cell A, see TS 38.508-1 [4] Table 6.3.2.2-1 |  |  |

Table 9.1.5.2.8.3.3-4: SECURITY MODE COMMAND (step 11, Table 9.1.5.2.8.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-25. | | | |
| Information Element | Value/remark | Comment | Condition |
| ngKSI | The ngKSI of the partial native 5G security context assigned in the AUTHENTICATION REQUEST message sent in step 3 |  |  |

Table 9.1.5.2.8.3.3-5: SECURITY MODE REJECT (step 12, Table 9.1.5.2.8.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-25. | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | '0001 1000'B | #24 - Security mode rejected, unspecified |  |

##### 9.1.5.2.9 Void

##### 9.1.5.2.10 Mobility registration update / MUSIM / NAS signalling connection release

9.1.5.2.10 Test Purpose (TP)

(1)

**with** { UE configured to release the NAS signalling connection and transmit REGISTRATION REQUEST message with request type IE set as “NAS Signalling connection release” and Follow-on request indicator set to “No follow-on request pending” }

**ensure that** {

**when** { UE receives REGISTRATION ACCEPT message with “N1 NAS signalling connection release supported” in 5GS network feature support IE}

**then** { UE enters 5GMM-REGISTERED or 5GMM-IDLE state}

}

9.1.5.2.10.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clauses 5.5.1.3.2, 5.5.1.3.4. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.5.1.3.2]

The UE in state 5GMM-REGISTERED shall initiate the registration procedure for mobility and periodic registration update by sending a REGISTRATION REQUEST message to the AMF,

a) when the UE detects entering a tracking area that is not in the list of tracking areas that the UE previously registered in the AMF;

...

If case b) is the only reason for initiating the registration procedure for mobility and periodic registration update, the UE shall indicate "periodic registration updating" in the 5GS registration type IE; otherwise, if the UE initiates the registration procedure for mobility and periodic registration update due to case Zg), the UE shall indicate "disaster roaming mobility registration updating" in the 5GS registration type IE; otherwise the UE shall indicate "mobility registration updating".

...

If the last visited registered TAI is available, the UE shall include the last visited registered TAI in the REGISTRATION REQUEST message.

The UE shall handle the 5GS mobility identity IE in the REGISTRATION REQUEST message as follows:

...

b) for all other cases, if the UE holds a valid 5G-GUTI, the UE shall indicate the 5G-GUTI in the 5GS mobile identity IE.

...

If the network supports the N1 NAS signalling connection release, and the MUSIM UE requests the network to release the NAS signalling connection, the UE shall set Request type to "NAS signalling connection release" in the UE request type IE, set the Follow-on request indicator to "No follow-on request pending" and, if the network supports the paging restriction, may set the paging restriction preference in the Paging restriction IE in the REGISTRATION REQUEST message. In addition, the UE shall not include the Uplink data status IE or the Allowed PDU session status IE in the REGISTRATION REQUEST message even if the UE has one or more active always-on PDU sessions associated with the 3GPP access.

NOTE 15: If the network has already indicated support for N1 NAS signalling connection release in the current stored registration area and the UE doesn't have an emergency PDU session established, the MUSIM UE is allowed to request the network to release the NAS signalling connection during registration procedure for mobility and periodic registration update that is due to mobility outside the registration area even before detecting whether the network supports the N1 NAS signalling connection release in the current TAI.

NOTE 16: If the network has already indicated support for paging restriction in the current stored registration area and the UE doesn't have an emergency PDU session established, the MUSIM UE is allowed to include paging restriction together with the request to the network to release the NAS signalling connection during registration procedure for mobility and periodic registration update that is due to mobility outside the registration area even before detecting whether the network supports the paging restriction in the current TAI.

...

[TS 24.501, clause 5.5.1.3.4]

If the UE indicates support of the N1 NAS signalling connection release in the REGISTRATION REQUEST message and the network decides to accept the N1 NAS signalling connection release, then the AMF shall set the N1 NAS signalling connection release bit to "N1 NAS signalling connection release supported" in the 5GS network feature support IE of the REGISTRATION ACCEPT message.

...

If the MUSIM UE requests the release of the NAS signalling connection, by setting Request type to "NAS signalling connection release" in the UE request type IE included in the REGISTRATION REQUEST message, and the AMF supports the N1 NAS signalling connection release, the AMF shall initiate the release of the NAS signalling connection after the completion of the registration procedure for mobility and periodic registration update.

9.1.5.2.10.3 Test description

9.1.5.2.10.3.1 Pre-test conditions

System Simulator:

- 3 cells, NGC Cell A belonging to the home PLMN1 and Cell G and Cell H (home PLMN2 and different TA) are configured in accordance with TS 38.508-1 [4] table 6.3.2.2-1 and table 6.3.2.2-3 respectively.

- System information combination NR-2 as defined in TS 38.508-1 [4], sub-clause 4.4.3.1.2 is used in Cells G and H when active.

- The SS configures the NGC Cell H as the "Non-suitable "Off" cell".

UE:

- Initial conditions for UE as described in TS 38.508-1 [4], Table 4.9.36.2.2-1.

Preamble:

- The UE performs a successful registration for MUSIM according to Table 4.9.36.2.2-1 of TS 38.508-1 [4].

9.1.5.2.10.3.2 Test procedure sequence

Table 9.1.5.2.10.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| - | The following messages are to be observed on NGC Cell A unless explicitly stated otherwise. | - | - | - | - |
| 1 | The SS transmits a *Paging* message. | <-- | NR RRC: *Paging* |  | - |
| 2-8 | Steps 2-8 of the generic procedure for NR RRC\_Connected specified in TS 38.508-1 [4] Table 4.5.4.2-3 are performed. | - | - | - | - |
| 9 | The SS configures:  -- NGC Cell G as "Non-suitable "Off" cell. | - | - | - | - |
| 10 | UE with USIM TS 38.508-1 [4] Table 6.4.1-28 is configured to release the NAS Signalling Connection using AT or MMI command. (Note 1) | - | - | - | - |
| 11 | The SS configures:  -- NGC Cell H as "Serving cell". | - | - | - | - |
| - | The following messages are to be observed on NGC Cell H unless explicitly stated otherwise. | - | - | - | - |
| 12 | UE transmits a REGISTRATION REQUEST with request type IE set as “NAS Signalling connection release” and Follow-on request indicator set to “No follow-on request pending”. | --> | REGISTRATION REQUEST | - | - |
| 13 | The SS transmits a REGISTRATION ACCEPT message. | <-- | REGISTRATION ACCEPT | - | - |
| 14 | The UE sends a REGISTRATION COMPLETE message. | --> | REGISTRATION COMPLETE | - | - |
| 14A | The SS transmits *RRCRelease* message. | - | - | - | - |
| 15 | SS transmits an *RRCRelease* message on NGC Cell A to release RRC connection and move the UE to RRC\_IDLE. | - | - | - | - |
| 16 | Void |  |  |  |  |
| - | The following messages are to be observed on NGC Cell H unless explicitly stated otherwise. | - | - | - | - |
| 17 | The SS transmits a *Paging* message. | <-- | NR RRC: *Paging* | - | - |
| 18 | Check: Does the UE transmit a *RRCSetupRequest* message? | --> | NR RRC: *RRCSetupRequest* | 1 | P |
| 19-24 | Steps 3-8 of generic procedure as defined in TS 38.508-1 [4] Table 4.5.4.2-3 are executed on NGC Cell H to complete the service request procedure. | - | - | - | - |
| 25 | The SS transmits *RRCRelease* message. | - | - | - | - |
| Note 1: The configuration to release N1 NAS signalling connection may be performed by MMI or AT Command.  Note 2: Void | | | | | |

9.1.5.2.10.3.3 Specific message contents

Table 9.1.5.2.10.3.3-1: REGISTRATION REQUEST (step 12, Table 9.1.5.2.10.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6. | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type |  |  |  |
| 5GS registration type value | '010' | mobility registration updating |  |
| FOR | ‘0’B | No Follow-on request pending |  |
| Uplink data status | Not Present |  |  |
| 5GMM capability |  |  |  |
| N1 NAS signalling connection release (NCR) (octet 6, bit 5) | ‘1’B | N1 NAS signalling connection release supported |  |
| UE Request type |  |  |  |
| Request type (bits 4 to 1 of octet 3) | ‘0001’B | NAS signalling connection release |  |

Table 9.1.5.2.10.3.3-2: REGISTRATION ACCEPT (step 13, Table 9.1.5.2.10.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7. | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM capability |  |  |  |
| N1 NAS signalling connection release (NCR) (octet 5, bit 4) | ‘1’B | N1 NAS signalling connection release supported |  |

##### 9.1.5.2.11 UAS / Mobility and periodic registration update / UUAA / Rejected

9.1.5.2.11.1 Test Purpose (TP)

(1)

**with** { UE in 5GMM-REGISTERED state and successfully authenticated for UAS services through UUAA-MM procedure }

**ensure that** {

**when** { UE initiates a Mobility and periodic registration procedure on an NGC cell and receives a REGISTRATION REJECT message including 5GMM cause value #79 (UAS services not allowed) }

**then** { UE enters the state GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE 5U2 NOT UPDATED and shall not attempt registration procedure for UAS services }

}

9.1.5.2.11.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501, clauses 4.22.2, 5.5.1.2.2, 5.5.1.3.2 and 5.5.1.3.5. Unless otherwise stated these are Rel-17 requirements.

[TS 24.501, clause 5.5.1.2.2]

5.5.1.2.2 Initial registration initiation

…

If the UE supports UAS services, the UE shall set the UAS bit to "UAS services supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

When the UE supporting UAS services initiates an initial registration for UAS services, the UE shall include the service-level device ID in the Service-level-AA container IE of the REGISTRATION REQUEST message and set the value to the CAA-level UAV ID. The UE shall include the service-level-AA server address in the Service-level-AA container IE of the REGISTRATION REQUEST message and set the value to the USS address, if it is provided by the upper layers.

…

[TS 24.501, clause 5.5.1.3.2]

5.5.1.3.2 Mobility and periodic registration update initiation

…

If the UE supports UAS services, the UE shall set the UAS bit to "UAS services supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

…

[TS 24.501, clause 5.5.1.3.5]

5.5.1.3.5 Mobility and periodic registration update not accepted by the network

…

If the AMF receives the mobility and periodic registration update request including the service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE and the AMF determines that the UE is not allowed to use UAS services via 5GS based on the user's subscription data and the operator policy, the AMF shall return a REGISTRATION REJECT message with 5GMM cause #79 (UAS services not allowed).

…

#79 (UAS services not allowed).

The UE shall abort the registration procedure for mobility and periodic registration update procedure, set the 5GS update status to 5U2 NOT UPDATED and enter state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE. Additionally, the UE shall reset the registration attempt counter. The UE may re-attempt the registration procedure to the current PLMN for services other than UAS services and shall not include the service-level device ID set to the CAA-level UAV ID in the Service-level-AA container IE of REGISTRATION REQUEST message unless the UE receives a CONFIGURATION UPDATE COMMAND message including the service-level-AA service status indication in the Service-level-AA container IE with the UAS field set to "UAS services enabled".

If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall in addition set the EPS update status to EU2 NOT UPDATED, reset the tracking area updating attempt counter and enter the state EMM-REGISTERED.

…

9.1.5.17.3 Test description

9.1.5.2.11.3.1 Pre-test conditions

System Simulator:

- 2 cells, NGC Cell A, and NGC Cell G belonging to different PLMNs in accordance with TS 38.508-1 [4] Table 6.3.2.2-1. System information combination NR-2 as defined in TS 38.508-1 [4], sub-clause 4.4.3.1.2 is used in all cells when active.

UE:

- The UE is capable of UAS operation and provisioned with CAA-level UAV ID.

Preamble:

- Cell configuration in accordance with TS 38.508-1 [4] Table 6.2.2.1-3:

- NGC Cell A "Serving cell"

- NGC Cell G "Non-suitable "Off" cell"

- The UE is in state 1N-A on NGC Cell A according to TS 38.508-1 [4] and successfully authenticated for aerial services through UUAA-MM.

9.1.5.2.11.3.2 Test procedure sequence

Table 9.1.5.2.11.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS configures:  - NGC Cell G as "Serving cell"  - NGC Cell A as "Non-Suitable "Off" cell". | - | - | - | - |
| - | EXCEPTION: Unless otherwise stated the following messages are exchange on NGC Cell G. | - | - | - | - |
| 2-4 | Steps 1-3 of Table 4.9.5.2.2-1 of the generic procedure in TS 38.508-1 [4] are performed. (Note 2) | - | - | - | - |
| 5-13 | Void | - | - | - | - |
| 14 | The SS transmits a REGISTRATION REJECT message including 5GMM cause value #79 (UAS services not allowed). | <-- | REGISTRATION REJECT | - | - |
| 15 | SS releases the RRC connection. | - | - | - | - |
| 16 | Check: Does the UE transmit a REGISTRATION REQUEST message with the service-level device ID in the Service-level-AA container IE within 60 seconds? | --> | REGISTRATION REQUEST | 1 | F |

9.1.5.2.11.3.3 Specific message contents

Table 9.1.5.2.11.3.3-0:REGISTRATION REQUEST (Preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| Service-level-AA container | Present, Contents not checked |  |  |
| Service-level-AA payload | Present, Contents not checked |  |  |

Table 9.1.5.2.11.3.3-1:REGISTRATION REJECT (Step 14, Table 9.1.5.2.11.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | '0100 1111'B | #79 - UAS services not allowed |  |

### 9.1.6 De-registration

#### 9.1.6.1 UE-initiated de-registration

##### 9.1.6.1.1 UE-initiated de-registration / Switch off / Abnormal / De-registration and 5GMM common procedure collision

9.1.6.1.1.1 Test Purpose (TP)

(1)

**with** { the UE in 5GMM-REGISTERED state }

**ensure that** {

**when** { the UE is switched off }

**then** { the UE shall send DEREGISTRATION REQUEST message with De-registration type IE indicated to "Switch off" }

}

(2)

**with** { the UE in 5GMM-DEREGISTERED-INITIATED state }

**ensure that** {

**when** { the UE receives a DEREGISTRATION REQUEST message before the UE-initiated de-registration procedure has been completed }

**then** { the UE ignores the message and shall continue de-registration procedure }

}

(3)

**with** { the UE in 5GMM-DEREGISTERED-INITIATED state }

**ensure that** {

**when** { the UE receives a 5GMM common procedure before the UE-initiated de-registration procedure has been completed }

**then** { the UE ignores the message and shall continue de-registration procedure }

}

(4)

**with** { the UE supports remove USIM without power down and in 5GMM-REGISTERED state }

**ensure that** {

**when** { the USIM is removed from the UE }

**then** { the UE shall send DEREGISTRATION REQUEST message with De-registration type IE indicated to "Switch off" }

}

9.1.6.1.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clauses 5.5.2.1, 5.5.2.2.1 and 5.5.2.2.6. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.5.2.1]

The de-registration procedure is used:

a) by the UE to de-register for 5GS services over 3GPP access when the UE is registered over 3GPP access;;

b) by the UE to de-register for 5GS services over 3GPP access, non-3GPP access, or both when the UE is registered in the same PLMN over both accesses;

c) by the network to inform the UE that it is deregistered for 5GS services over 3GPP access when the UE is registered over 3GPP access;

d) by the network to inform the UE that it is deregistered for 5GS services over 3GPP access, non-3GPP access, or both when the UE is registered in the same PLMN over both accesses; and

e) by the network to inform the UE to re-register to the network.

The de-registration procedure with appropriate de-registration type shall be invoked by the UE:

a) if the UE is switched off; and

b) as part of the eCall inactivity procedure defined in subclause 5.5.3.

The de-registration procedure with appropriate de-registration type shall be invoked by the network:

a) if the network informs whether the UE should re-register to the network.

The de-registration procedure with appropriate access type shall be invoked by the UE:

a) if the UE wants to de-register for 5GS services over 3GPP access when the UE is registered over 3GPP access; or

b) the UE wants to de-register for 5GS services over 3GPP access, non-3GPP access, or both when the UE is registered in the same PLMN over both accesses.

If the de-registration procedure is triggered due to USIM removal, the UE shall indicate "switch off" in the de-registration type IE.

If the de-registration procedure is requested by the UDM for a UE that has an emergency PDU session, the AMF shall not send a DEREGISTRATION REQUEST message to the UE.

If the de-registration procedure for 5GS services is performed, the PDU sessions, if any, for this particular UE are released locally without peer-to-peer signalling between the UE and the network.

The UE is allowed to initiate the de-registration procedure even if the timer T3346 is running.

NOTE: When the UE has no PDU sessions over non-3GPP access, or the UE moves all the PDU sessions over a non-3GPP access to a 3GPP access, the UE and the AMF need not initiate de-registration over the non-3GPP access.

The AMF shall provide the UE with a non-3GPP de-registration timer.

[TS 24.501, clause 5.5.2.2.1]

The de-registration procedure is initiated by the UE by sending a DEREGISTRATION REQUEST message (see example in figure 5.5.2.2.1). The De-registration type IE included in the message indicates whether the de-registration procedure is due to a "switch off" or not. The access type included in the message indicates whether the de-registration procedure is:

a) for 5GS services over 3GPP access when the UE is registered over 3GPP access only;

b) for 5GS services over non-3GPP access when the UE is registered over non-3GPP access only; or

c) for 5GS services over 3GPP access, non-3GPP access or both 3GPP access and non-3GPP access when the UE is registered in the same PLMN over both accesses.

If the UE has a valid 5G-GUTI, the UE shall populate the 5GS mobile identity IE with the valid 5G-GUTI. If the UE does not have a valid 5G-GUTI, the UE shall populate the 5GS mobile identity IE with its SUCI.

If the UE does not have a valid 5G-GUTI and it does not have a valid SUCI, then the UE shall populate the5GSmobile identity IE with its PEI.

If the de-registration request is not due to switch off and the UE is in the state 5GMM-REGISTERED or 5GMM-REGISTERED-INITIATED, timer T3521 shall be started in the UE after the DEREGISTRATION REQUEST message has been sent. The UE shall enter the state 5GMM-DEREGISTERED-INITIATED.

If the UE is to be switched off, the UE shall try for a period of 5 seconds to send the DEREGISTRATION REQUEST message. During this period, the UE may be switched off as soon as the DEREGISTRATION REQUEST message has been sent.

[TS 24.501, clause 5.5.2.2.6]

…

d) De-registration procedure collision.

De-registration containing de-registration type "switch off":

- If the UE receives a DEREGISTRATION REQUEST message before the UE-initiated de-registration procedure has been completed, this message shall be ignored and the UE-initiated de-registration procedure shall continue.

Otherwise:

- If the UE receives a DEREGISTRATION REQUEST message before the UE-initiated de-registration procedure has been completed, it shall treat the message as specified in subclause 5.5.2.3.2 with the following modification:

- If the DEREGISTRATION REQUEST message received by the UE contains de-registration type "re-registration required", and the UE-initiated de-registration procedure is with de-registration type "normal de-registration", the UE need not initiate the registration procedure for initial registration.

e) De-registration and 5GMM common procedure collision.

De-registration containing de-registration type "switch off":

- If the UE receives a message used in a 5GMM common procedure before the de-registration procedure has been completed, this message shall be ignored and the de-registration procedure shall continue.

Otherwise:

- If the UE receives a message used in a 5GMM common procedure before the de-registration procedure has been completed, both the 5GMM common procedure and the de-registration procedure shall continue.

9.1.6.1.1.3 Test description

9.1.6.1.1.3.1 Pre-test conditions

System Simulator:

- NGC Cell A.

UE:

- None.

Preamble:

- The UE is in state 3N-A on NGC Cell A according to TS 38.508-1 [4].

9.1.6.1.1.3.2 Test procedure sequence

Table 9.1.6.1.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 0 | SS stops sending RLC acknowledgments. | - | - | - | - |
| 1 | Cause switch off | - | - | - | - |
| 2 | Check: Does the UE transmit a DEREGISTRATION REQUEST with the De-registration type IE indicating "switch off"? | --> | DEREGISTRATION REQUEST | 1 | P |
| 3 | The SS transmits a DEREGISTRATION REQUEST message. | <-- | DEREGISTRATION REQUEST | - | - |
| 3A | SS resumes sending RLC acknowledgments | - | - | - | - |
| 4 | Check: Does the UE transmit a DEREGISTRATION ACCEPT message within 6 seconds (T3522)? | --> | DEREGISTRATION ACCEPT | 2 | F |
| 5 | The SS releases the RRC connection. | - | - | - | - |
| 6 | Switch on the UE | - | - | - | - |
| 7 | The UE performs Registration procedure as specified in TS 38.508-1 [4] subclause 4.5.2 with *'connected without release'*. | - | - | - | - |
| 7A | SS stops sending RLC acknowledgments. | - | - | - | - |
| 8 | Cause switch off. | - | - | - | - |
| 9 | The UE transmits a DEREGISTRATION REQUEST with the De-registration type IE indicating "switch off". | --> | DEREGISTRATION REQUEST | - | - |
| 10 | The SS transmits an IDENTITY REQUEST message. | <-- | IDENTITY REQUEST | - | - |
| 10A | SS resumes sending RLC acknowledgments |  |  |  |  |
| 11 | Check: Does the UE transmit an IDENTITY RESPONSE message within 6 seconds (T3570)? | --> | IDENTITY RESPONSE | 3 | F |
| 12 | The SS releases the RRC connection. | - | - | - | - |
| - | EXCEPTION: Steps 13a1 to 13a4 describe behaviour that depends on the UE capability; the "lower case letter" identifies a step sequence that take place if the UE supports remove USIM without power down: pc\_USIM\_Removal = TRUE [29] | - | - | - | - |
| 13a1 | Switch on the UE | - | - | - | - |
| 13a2 | The UE performs Registration procedure as specified in TS 38.508-1 [4] subclause 4.5.2 with *'connected without release'*. | - | - | - | - |
| 13a3 | Cause removal of USIM from the UE without powering down. | - | - | - | - |
| 13a4 | Check: Does the UE transmit a DEREGISTRATION REQUEST with the De-registration type IE indicating "switch off"? | --> | DEREGISTRATION REQUEST | 4 | P |

9.1.6.1.1.3.3 Specific message contents

Table 9.1.6.1.1.3.3-1: DEREGISTRATION REQUEST (Steps 2, 9 and 13a4, Table 9.1.6.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-12 | | | |
| Information Element | Value/Remark | Comment | Condition |
| De-registration type |  |  |  |
| Switch off | ‘1’B |  |  |

##### 9.1.6.1.2 UE-initiated de-registration / Normal de-registration / Abnormal / Transmission failure without TAI change from lower layers, de-registration and 5GMM common procedure collision, T3521 timeout

9.1.6.1.2.1 Test Purpose (TP)

(1)

**with** { the UE in 5GMM-REGISTERED state }

**ensure that** {

**when** { the UE initiates "normal de-registration" type deregistration from 5GS services over 3GPP access }

**then** { the UE sends DEREGISTRATION REQUEST message with De-registration type IE indicated to "Normal de-registration" and starts timer T3521 }

}

(2)

**with** { the UE in 5GMM-DEREGISTERED-INTIATED state }

**ensure that** {

**when** { Transmission failure of DEREGISTRATION REQUEST message indication without TAI change from lower layers }

**then** { the UE restarts the de-registration procedure }

}

(3)

**with** { the UE in 5GMM-DEREGISTERED-INTIATED state }

**ensure that** {

**when** { the UE receives a message used in a 5GMM common procedure before the de-registration procedure has been completed }

**then** { both the 5GMM common procedure and the de-registration procedure shall continue }

}

(4)

**with** { the UE in 5GMM-DEREGISTERED-INTIATED state }

**ensure that** {

**when** { the first four expiries of the timer T3521 }

**then** { the UE shall retransmit the DEREGISTRATION REQUEST message and shall reset and restart timer T3521 }

}

(5)

**with** { the UE in 5GMM-DEREGISTERED-INTIATED state }

**ensure that** {

**when** { On the fifth expiry of timer T3521 }

**then** { the detach procedure shall be aborted and the UE performs local detach }

}

9.1.6.1.2.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501 clause 5.5.2.2.6 and TS 38.331 clause 5.7.2.4. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.5.2.2.6]

c) T3521 timeout.

On the first four expiries of the timer, the UE shall retransmit the DEREGISTRATION REQUEST message and shall reset and restart timer T3521. On the fifth expiry of timer T3521, the de-registration procedure shall be aborted and the UE proceeds as follows:

1) if the de-registration procedure was performed due to disabling of 5GS services, the UE shall enter the 5GMM-NULL state; or

2) if the de-registration type "normal de-registration" was requested for reasons other than disabling of 5GS services, the UE shall enter the 5GMM-DEREGISTERED state.

…

e) De-registration and 5GMM common procedure collision.

De-registration containing de-registration type "switch off":

- If the UE receives a message used in a 5GMM common procedure before the de-registration procedure has been completed, this message shall be ignored and the de-registration procedure shall continue.

Otherwise:

- If the UE receives a message used in a 5GMM common procedure before the de-registration procedure has been completed, both the 5GMM common procedure and the de-registration procedure shall continue.

h) Transmission failure of DEREGISTRATION REQUEST message indication without TAI change from lower layers.

The UE shall restart the de-registration procedure.

[TS 38.331, clause 5.7.2.4]

The UE shall:

1> if AS security is not started and radio link failure occurs before the successful delivery of ULInformationTransfer messages has been confirmed by lower layers; or

1> if mobility (i.e. handover, RRC connection re-establishment) occurs before the successful delivery of ULInformationTransfer messages has been confirmed by lower layers:

2> inform upper layers about the possible failure to deliver the information contained in the concerned ULInformationTransfer messages.

9.1.6.1.2.3 Test description

9.1.6.1.2.3.1 Pre-test conditions

System Simulator:

- NGC Cell A and NGC Cell B

- Both cells are configured as per table 6.3.2.2-1 TS 38.508-1 [4] with the below exceptions

Table 9.1.6.1.2.3.1–1: Cell configuration

|  |  |  |
| --- | --- | --- |
| NGC Cell | TAC | TAI |
| B | 1 | TAI-1 |

UE:

- None.

Preamble:

- the UE is in state 3N-A on NGC Cell A according to TS 38.508-1 [4].

9.1.6.1.2.3.2 Test procedure sequence

Table 9.1.6.1.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 0 | The SS configures:  - NGC Cell B as "Suitable neighbour cell". |  |  |  |  |
| 0A | SS transmits NR RRCReconfigurationmessage to configure specific maxRetxThreshold for NGC Cell A. | <-- | NR RRC: RRCReconfiguration | - | - |
| 0B | The UE transmits NR RRCReconfigurationComplete message. | --> | NR RRC: RRCReconfigurationComplete | - | - |
| 1 | The SS is configured not send RLC ACK for the message sent in step 2. | - | - | - | - |
| 1A | AT or MMI command to cause UE to initiate de-registration. | - | - | - | - |
| - | The following messages are to be observed on Cell A unless explicitly stated otherwise. | - | - | - | - |
| 2 | Does the UE transmit a DEREGISTRATION REQUEST message with De-registration type IE indicating "Normal de-registration"? The UE starts timer T3521. | --> | 5GMM: DEREGISTRATION REQUEST | 1 | P |
| 3 | Void | - | - | - | - |
| 3A | The SS transmits an *RRCReconfiguration* message including reconfigurationWithSync with rach-ConfigDedicated to order the UE to perform intra-frequency handover to NGC Cell B. | <-- | NR RRC: RRCReconfiguration | - | - |
| - | The following messages are to be observed on Cell B unless explicitly stated otherwise. | - | - | - | - |
| 3B | The UE transmits an *RRCReconfigurationComplete* message. | --> | NR RRC: RRCReconfigurationComplete | - | - |
| 4 | Check: Does the UE restart the de-registration procedure by sending DEREGISTRATION REQUEST message? Timer T3521 is started. | --> | 5GMM: DEREGISTRATION REQUEST | 2 | P |
| 4A | The SS configures:  - NGC Cell A as "Non-suitable "Off" cell". | - | - | - | - |
| 5 | With T3521 still running the SS shall send AUTHENTICATION REQUEST. | <-- | 5GMM: AUTHENTICATION REQUEST | - | - |
| 6 | Check: Does the UE transmit an AUTHENTICATION RESPONSE message? | --> | 5GMM: AUTHENTICATION RESPONSE | 3 | P |
| 7 | SS responds with DEREGISTRATION ACCEPT message. | <-- | 5GMM: DEREGISTRATION ACCEPT | - | - |
| 8 | The SS releases the RRC connection. | - | - | - | - |
| 9 | AT or MMI command to cause UE to initiate registration. | - | - | - | - |
| 10-24a4 | Steps 2-19a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed to complete the registration. | - | - | - | - |
| 25 | Cause UE to initiate de-registration. | - | - | - | - |
| 26 | Check: Does the UE transmit a DEREGISTRATION REQUEST message with De-registration type IE indicating "Normal de-registration"? The UE starts timer T3521. | --> | 5GMM: DEREGISTRATION REQUEST | 1 | P |
| 27 | SS does not respond to the DEREGISTRATION REQUEST message. | - | - | - | - |
| 28 | Check: When the timer T3521 expires does the UE re-transmit DEREGISTRATION REQUEST message? Timer T3521 is re-started (1st expiry). | --> | 5GMM: DEREGISTRATION REQUEST | 4 | P |
| 29 | The SS does not respond to the DEREGISTRATION REQUEST message. | - | - | - | - |
| 30 | Check: When the timer T3521 expires does the UE re-transmit DEREGISTRATION REQUEST message? Timer T3521 is re-started (2nd expiry). | --> | 5GMM: DEREGISTRATION REQUEST | 4 | P |
| 31 | The SS does not respond to the DEREGISTRATION REQUEST message. | - | - | - | - |
| 32 | Check: When the timer T3521 expires does the UE re-transmit DEREGISTRATION REQUEST message? Timer T3521 is re-started (3rd expiry). | --> | 5GMM: DEREGISTRATION REQUEST | 4 | P |
| 33 | The SS does not respond to the DEREGISTRATION REQUEST message. | - | - | - | - |
| 34 | Check: When the timer T3521 expires does the UE re-transmit DEREGISTRATION REQUEST message? Timer T3521 is re-started (4th expiry). | --> | 5GMM: DEREGISTRATION REQUEST | 4 | P |
| 35 | The SS does not respond to the DEREGISTRATION REQUEST message. | - | - | - | - |
| 36 | Check: When the timer T3521 expires does the UE re-transmit DEREGISTRATION REQUEST message in 10s?  The UE shall abort the de-registration procedure and enter the 5GMM-DEREGISTERED (5th expiry). | --> | 5GMM: DEREGISTRATION REQUEST | 5 | F |
| Note: T3521 value is specified as 15s in TS 24.501 [22]. | | | | | |

9.1.6.1.2.3.3 Specific message contents

Table 9.1.6.1.2.3.3-0A: *RRCReconfiguration* (step 0A Table 9.1.6.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-13 | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCReconfiguration ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcReconfiguration SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| masterCellGroup | CellGroupConfig with condition SRB2\_DRB1 configured in the preamble | OCTET STRING (CONTAINING CellGroupConfig) |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.1.6.1.2.3.3-0B: *CellGroupConfig* (Table 9.1.6.1.2.3.3-0A)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-19 | | | |
| Information Element | Value/remark | Comment | Condition |
| CellGroupConfig ::= SEQUENCE { |  |  |  |
| rlc-BearerToAddModList SEQUENCE (SIZE(1..maxLCH)) OF RLC-BearerConfig { | 1 entry |  | SRB2\_DRB1 |
| RLC-Bearer-Config[1] | RLC-BearerConfig with condition SRB2 |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.1.6.1.2.3.3-0C: *RLC-BearerConfig* (Table 9.1.6.1.2.3.3-0B)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.3-148 | | | |
| Information Element | Value/remark | Comment | Condition |
| RLC-BearerConfig ::= SEQUENCE { |  |  |  |
| rlc-Config | RLC-Config using condition AM |  | AM |
| } |  |  |  |

Table 9.1.6.1.2.3.3-0D: *RLC-Config* (Table 9.1.6.1.2.3.3-0C)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.3-149 | | | |
| Information Element | Value/remark | Comment | Condition |
| RLC-Config ::= CHOICE { |  |  |  |
| am SEQUENCE { |  |  | AM |
| ul-AM-RLC SEQUENCE { |  |  |  |
| maxRetxThreshold | t32 |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.1.6.1.2.3.3-1: DEREGISTRATION REQUEST (steps 2, 4, 26, 28, 30, 32 and 34, Table 9.1.6.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-12 | | | |
| Information Element | Value/remark | Comment | Condition |
| De-registration type |  |  |  |
| Switch off | ‘0’B | Normal de-registration |  |
| Access type | ‘01’B | 3GPP access |  |

Table 9.1.6.1.2.3.3-2: *RRCReconfiguration-HO* (step 3A Table 9.1.6.1.2.3.2-1)

|  |
| --- |
| Derivation path: TS 38.508-1 [4] Table 4.8.1-1A with condition RBConfig\_KeyChange |

##### 9.1.6.1.3 UE-initiated de-registration / Abnormal / Change of cell into a new tracking area

9.1.6.1.3.1 Test Purpose (TP)

(1)

**with** { UE in 5GMM-DEREGISTERED-INITIATED state and de-registration request is not due to switch off }

**ensure that** {

**when** { UE changes into a new tracking area that is not in the stored TAI list }

**then** { UE aborts the de-registration procedure and initiates a mobility registration procedure }

}

(2)

**with** { UE in 5GMM-REGISTERED-INITIATED state for a mobility registration procedure due to change of cell into a new tracking area list during UE-initiated de-registration procedure }

**ensure that** {

**when** { UE receives REGISTRATION ACCEPT message }

**then** { UE re-initiates the de-registration procedure after completing the mobility registration procedure }

}

(3)

**Void**

9.1.6.1.3.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clause 5.5.2.2.6. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501 clause 5.5.2.2.6]

The following abnormal cases can be identified:

…

f) Change of cell into a new tracking area.

If a cell change into a new tracking area that is not in the stored TAI list occurs before the UE-initiated de-registration procedure is completed, the de-registration procedure shall be aborted and re-initiated after successfully performing a registration procedure for mobility or periodic update used for mobility (i.e. the 5GS registration type IE set to "mobility registration updating" in the REGISTRATION REQUEST message). If the de-registration procedure was initiated due to removal of the USIM or the UE is to be switched off, the UE shall abort the de-registration procedure and enter the state 5GMM-DEREGISTERED.

9.1.6.1.3.3 Test description

9.1.6.1.3.3.1 Pre-test conditions

System Simulator:

- NGC Cell A belongs to Home PLMN and TAI-1 and set as serving cell;

- NGC Cell B belongs to Home PLMN and TAI-2 and set as Non-suitable “Off” cell.

UE:

- None;

Preamble:

- The UE is in state 3N-A on NGC cell A according to TS 38.508-1 [4].

9.1.6.1.3.3.2 Test procedure sequence

Table 9.1.6.1.3.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| - | The following messages are to be observed on NGC Cell A unless explicitly stated otherwise. | - | - | - | - |
| 1 | Cause UE to de-register for non Switch off reason using MMI or AT commands. | - | - | - | - |
| 2 | The UE transmits DEREGISTRATION REQUEST message. (The UE starts timer T3521) | --> | DEREGISTRATION REQUEST |  |  |
| 3 | The SS does not respond to DEREGISTRATION REQUEST message. | - | - | - | - |
| 4 | The SS configures NGC Cell A as the " Suitable neighbour intra-frequency cell " and NGC Cell B as the "Serving cell".  Note: T3521 value is specified as 15s in TS 24.501 [22] and it is assumed that SS can  configure cells within this time. | - | - | - | - |
| 5 | The SS transmits an  RRCReconfiguration message on  NGC Cell A to order the UE to perform intra-frequency handover to NGC Cell B. | - | - | - | - |
| 6 | The UE transmits a  RRCReconfigurationComplete  message on NGC Cell B to confirm the successful completion of the intra frequency handover. | - | - | - | - |
| - | The following messages are to be observed on NGC Cell B unless explicitly stated otherwise. | - | - | - | - |
| 7 | Check: Does the UE transmit a REGISTRATION REQUEST message with registration type value set to “mobility registration updating” | --> | REGISTRATION REQUEST | 1 | P |
| 8 -9 | Steps 4 to 5 of the generic procedure in TS 38.508-1 [4] subclause 4.9.5.2.2 | - | - | - | - |
| 10-22 | Void |  |  |  |  |
| 23 | Check: Does the UE transmit DEREGISTRATION REQUEST message? | --> | DEREGISTRATION REQUEST | 2 | P |
| 24 | The SS transmits DEREGISTRATION ACCEPT message. | <-- | DEREGISTRATION ACCEPT | - | - |
| 25 | The SS transmits an *RRCRelease* message. | - | - | - | - |
| 26 | Check: Does the test result of the generic procedure in TS 38.508-1 [4] subclause 4.9.13 indicates that the UE doesn’t responds to paging when paged with NG-5G-S-TMSI? | - | - | 2 | P |
| 27-35 | Void | - | - | - | - |

9.1.6.1.3.3.3 Specific message contents

Table 9.1.6.1.3.3.3-1: DEREGISTRATION REQUEST (steps 2 and 23, Table 9.1.6.1.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-12 | | | |
| Information Element | Value/remark | Comment | Condition |
| De-registration type |  |  |  |
| Switch off | ‘0’B | Normal de-registration |  |
| Re-registration required | ‘0’B | Spare bit |  |
| Access type | ‘01’B | 3GPP access |  |
| 5GS mobile identity | 5G-GUTI | Same value as assigned in REGISTRATION ACCEPT |  |

Table 9.1.6.1.3.3.3-2: *RRCReconfiguration-HO* (step 5, Table 9.1.6.1.3.3.2-1)

|  |
| --- |
| Derivation Path: TS 38.508-1 [4],Table 4.8.1-1A with condition RBConfig\_KeyChange |

Table 9.1.6.1.3.3.3-3: Void

Table 9.1.6.1.3.3.3-4: Void

Table 9.1.6.1.3.3.3-5: Void

Table 9.1.6.1.3.3.3-6: Void)

Table 9.1.6.1.3.3.3-7: REGISTRATION REQUEST (step 7, Table 9.1.6.1.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘010’B |  | Mobility |

Table 9.1.6.1.3.3.3-8: Void

##### 9.1.6.1.4 Void

#### 9.1.6.2 Network-initiated de-registration

##### 9.1.6.2.1 Network-initiated de-registration / De-registration for 3GPP access / Re-registration required

9.1.6.2.1.1 Test Purpose (TP)

(1)

**with** { the UE in 5GMM-REGISTERED state }

**ensure that** {

**when** { the SS sends a DEREGISTRATION REQUEST message indicates "re-registration required" and the de-registration request is for 3GPP access }

**then** { the UE sends a DEREGISTRATION ACCEPT message to the network and releases the existing NAS signalling connection, then initiates an initial registration and also re-establishes any previously established PDU sessions. }

}

9.1.6.2.1.2 Conformance requirements

References: The conformance requirement covered in the present TC is specified in: 3GPP TS 24.501 clauses 5.5.2.3.2. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501 clause5.5.2.3.2]

NOTE 1: When the de-registration type indicates "re-registration required", user interaction is necessary in some cases when the UE cannot re-establish the PDU session (s), if any, automatically.

…

Upon sending a DEREGISTRATION ACCEPT message, the UE shall delete the rejected NSSAI as specified in subclause 4.6.2.2.

If the de-registration type indicates "re-registration required", then the UE shall ignore the 5GMM cause IE if received.

If the de-registration type indicates "re-registration not required", the UE shall take the actions depending on the received 5GMM cause value:

#3 (Illegal UE);

…

As an implementation option, the UE may enter the state 5GMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection according to 3GPP TS 23.122 [5].

9.1.6.2.1.3 Test description

9.1.6.2.1.3.1 Pre-test conditions

System Simulator:

- NGC Cell A.

UE:

- None.

Preamble:

- the UE is in state 3N-A on NGC Cell A according to TS 38.508-1 [4].

9.1.6.2.1.3.2 Test procedure sequence

Table 9.1.6.2.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message/PDU/SDU |  |  |
| 1 | The SS transmits a DEREGISTRATION REQUEST with indicates "re-registration required". | <-- | DEREGISTRATION REQUEST | - | - |
| 2 | Check: Does the UE transmit a DEREGISTRATION ACCEPT message? | --> | DEREGISTRATION ACCEPT | 1 | P |
| 3 | The SS releases RRC connection. | - | - | - | - |
| 4 | The UE transmits an *RRCSetupRequest* message. | --> | NR RRC: RRCSetupRequest | - | - |
| 5 | The SS transmits an *RRCSetup* message. | <-- | NR RRC: RRCSetup | - | - |
| 6 | Check: Does the UE transmit an *RRCSetupComplete* message and REGISTRATION REQUEST message with registration type set to "initial registration". | --> | NR RRC: RRCSetupComplete  5GMM: REGISTRATION REQUEST | 1 | P |
| 7-23a1 | Steps 5-20a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |

9.1.6.2.1.3.3 Specific message contents

Table 9.1.6.2.1.3.3-1: DEREGISTRATION REQUEST (step 1, Table 9.1.6.2.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-14 | | | |
| Information Element | Value/Remark | Comment | Condition |
| DEREGISTRATION type |  |  |  |
| Switch off | '0’B | Normal de-registration |  |
| Re-registration required | ‘1’B | re-registration required |  |
| Access type | ‘01’B | 3GPP access |  |

##### 9.1.6.2.2 Network-initiated de-registration / De-registration for 3GPP access / Re-registration not required

9.1.6.2.2.1 Test Purpose (TP)

(1)

**with** { the UE in 5GMM-REGISTERED state }

**ensure that** {

**when** { the SS sends a DEREGISTRATION REQUEST message indicates no 5GMM cause IE, ""re-registration not required"" and the de-registration request is for 3GPP access) }

**then** { the UE deletes 5G-GUTI, TAI list, last visited registered TAI, list of equivalent PLMNs, ngKSI, sends a DEREGISTRATION ACCEPT message enter the state 5GMM-DEREGISTERED for 3GPP access }

}

9.1.6.2.2.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501 clauses 5.5.2.3.2 and 5.5.2.3.4. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.5.2.3.2]

Upon receiving the DEREGISTRATION REQUEST message, if the DEREGISTRATION REQUEST message indicates "re-registration not required" and the de-registration request is for 3GPP access, the UE shall perform a local release of the PDU sessions over 3GPP access, if any. The UE shall send a DEREGISTRATION ACCEPT message to the network and enter the state 5GMM-DEREGISTERED for 3GPP access.

[TS 24.501, clause 5.5.2.3.4]

b) DEREGISTRATION REQUEST, other 5GMM cause values than those treated in subclause 5.5.2.3.2, cases of 5GMM cause value#11, #22 and #72 that are considered as abnormal cases according to subclause 5.5.2.3.2 or no 5GMM cause IE is included, and the De-registration type IE indicates "re-registration not required".

The UE shall delete 5G-GUTI, TAI list, last visited registered TAI, list of equivalent PLMNs, ngKSI, shall set the 5GS update status to 5U2 NOT UPDATED and shall start timer T3502.

A UE not supporting S1 mode may enter the state 5GMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection according to 3GPP TS 23.122 [5]; otherwise the UE shall enter the state 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION.

9.1.6.2.2.3 Test description

9.1.6.2.2.3.1 Pre-test conditions

System Simulator:

- NGC Cell A.

UE:

- the UE is previously registered on 5GC, and when on 5GC, the UE is last authenticated and registered on NGC cell A using default message contents according to TS 38.508-1 [4];

Preamble:

- The UE is in state 3N-A on NGC Cell A according to TS 38.508-1 [4].

- The T3502 in UE set to 2 minutes.

9.1.6.2.2.3.2 Test procedure sequence

Table 9.1.6.2.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U – S | Message |  |  |
| 1 | SS sends a DEREGISTRATION REQUEST message indicates no 5GMM cause IE, "re-registration not required" and the de-registration request is for 3GPP access | <-- | 5GMM: DEREGISTRATION REQUEST | - | - |
| 2 | Check: Does the UE transmit a DEREGISTRATION ACCEPT message?  Note: Now UE should start timer T3502. | --> | 5GMM: DEREGISTRATION ACCEPT | 1 | P |
| 3 | The SS releases the RRC connection. | - | - | - | - |
| 4 | The SS waits 2 mins for T3502 to expire. | - | - | - | - |
| 5-22a1 | Does the UE performs Steps 2-19a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4]? | - | - | 1 | P |

9.1.6.2.2.3.3 Specific message contents

Table 9.1.6.2.2.3.3-1: Message REGISTRATION ACCEPT (preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| T3502 Value | 2mins |  |  |
| Timer value | '0 0010'B | The timer value is 2mins. |  |
| Unit | '001'B |  |  |

Table 9.1.6.2.2.3.3-2: Message DEREGISTRATION REQUEST (step 1, Table 9.1.6.2.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-12 | | | |
| Information Element | Value/remark | Comment | Condition |
| De-registration type |  |  |  |
| Switch off | ‘0’B | Normal de-registration |  |
| Re-registration required | ‘0’B | re-registration not required |  |
| Access type | ‘01’B | 3GPP access |  |
| 5GMM cause | Not Present |  |  |

Table 9.1.6.2.2.3.3-3: Message REGISTRATION REQUEST (step7, Table 9.1.6.2.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| ngKSI |  |  |  |
| NAS key set identifier | '111'B | no key is available (UE to network) |  |
| TSC | Any allowed value | TSC does not apply for NAS key set identifier value "111" |  |
| 5GS mobile identity | The valid SUCI |  |  |
| Last visited registered TAI | Not present |  |  |

##### 9.1.6.2.3 UAS / De-registration / UE-initiated / Network-initiated

9.1.6.2.3.1 Test Purpose (TP)

(1)

**with** { the UE in 5GMM-REGISTERED state and successfully authenticated for UAS services through UUAA-MM procedure }

**ensure that** {

**when** { the UE reauthentication through UUAA-MM procedure fails the UE reauthentication through UUAA-MM procedure fails and the network initiates the de-registration procedure by sending a DEREGISTRATION REQUEST message to the UE with cause value “UAS services not allowed” }

**then** { UE either locally deregisters with UE sending a DEREGISTRATION REQUEST or responds to network originating DEREGISTRATION REQUEST with cause value #79 "UAS services not allowed" with DEREGISTRATION ACCEPT message UE responds to DEREGISTRATION REQUEST with DEREGISTRATION ACCEPT message }

}

(2)

**Void**

9.1.6.2.3.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clauses 4.22.2, 5.5.2.1 and 5.5.2.3.1. Unless otherwise stated these are Rel-17 requirements.

[TS 24.501, clause 4.22.2]

The 5GS supports the USS UAV Authorization and Authentication (UUAA) procedure for a UE supporting UAS services. Depending on operator policy or regulatory requirements, the UUAA-MM procedure can be performed by the UE and the AMF at a registration procedure as specified in subclause 5.5.1.2 or the UUAA-SM procedure can be performed by the UE and the SMF at a PDU session establishment procedure as specified in subclause 6.4.1.2. The UE shall support UUAA-MM and UUAA-SM, and the network shall support UUAA-SM and may optionally support UUAA-MM. The UUAA procedure needs to be performed by 5GS with USS successfully before the connectivity for UAS services is established.

During the registration procedure as described in subclause 5.5.1.2, the UE supporting UAS services provides CAA-level UAV ID to the AMF, and the AMF may trigger the UUAA-MM procedure. If the UE supporting UAS services does not provide CAA-level UAV ID to the AMF and the network is configured to perform UUAA-MM at registration procedure, the AMF may accept the registration request and shall mark in the UE's 5GMM context that the UE is not allowed to request UAS services. If the UE wants to use the UAS services by providing the CAA-Level UAV ID later on, the UE shall perform the registration procedure for mobility and periodic registration update.

When a UE supporting UAS services requests to establish a PDU session as described in subclause 6.4.1.2 for USS communication, the UE provides CAA-level UAV ID to the network, and the SMF may trigger the UUAA-SM procedure based on the DNN and S-NSSAI combination for aerial services according to the user's subscription data and the CAA-level UAV ID provided by the UE.

…

After successful UUAA procedure, either the AMF or the SMF may initiate re-authentication of the UAV when required by the USS. If UUAA-MM fails during a re-authentication and there are PDU sessions established using UAS services, the AMF shall request the SMF to perform the release of these PDU sessions and may trigger a network-initiated de-registration procedure based on operator policy. If UUAA-SM fails during a re-authentication, the SMF shall release the PDU session related to re-authentication.

…

[TS 24.501, clause 5.5.2.1]

The de-registration procedure is used:

…

h) by the network to inform the UE supporting UAS service that it is deregistered for UAS services in 5GS.

[TS 24.501, clause 5.5.2.3.1]

The network initiates the de-registration procedure by sending a DEREGISTRATION REQUEST message to the UE (see example in figure 5.5.2.3.1.1).

NOTE 1: If the AMF performs a local de-registration, it will inform the UE with a 5GMM messages (e.g. SERVICE REJECT message or REGISTRATION REJECT message) with 5GMM cause #10 "implicitly de-registered" only when the UE initiates a 5GMM procedure.

The network may include a 5GMM cause IE to specify the reason for the DEREGISTRATION REQUEST message. The network shall start timer T3522. The network shall indicate whether re-registration is needed or not in the De-registration type IE. The network shall also indicate via the access type whether the de-registration procedure is:

a) for 3GPP access only;

b) for non-3GPP access only; or

c) for 3GPP access, non-3GPP access or both when the UE is registered in the same PLMN for both accesses.

…

If the network de-registration is triggered due to:

a) an unsuccessful outcome of an ongoing UUAA-MM procedure;

…

c) the UE not allowed to use UAS services via 5GS due to a change of the aerial UE subscription information,

then the network shall set the 5GMM cause value in the DEREGISTRATION REQUEST message to #79 "UAS services not allowed".

NOTE 3: If the UE supporting UAS service has requested other services than UAS services, or if there are other ongoing network slice-specific authentication and authorization on pending NSSAIs, it is then an operator policy or configuration decision whether to keep the UE supporting UAS service registered to the network, but that UE supporting UAS services is not allowed to access UAS services via 5GS as specified in 3GPP TS 23.256 [6AB].

…

The AMF shall trigger the SMF to release locally the PDU session(s) over the indicated access(es), if any, for the UE and enter state 5GMM-DEREGISTERED-INITIATED. If a PDU session is associated with one or more multicast MBS sessions, the SMF shall consider the UE as removed from the associated multicast MBS sessions.



Figure 5.5.2.3.1.1: Network-initiated de-registration procedure

9.1.6.2.3.3 Test description

9.1.6.2.3.3.1 Pre-test conditions

System Simulator:

- NGC Cell A.

UE:

- None.

Preamble:

- The UE is in state 3N-A on NGC Cell A according to TS 38.508-1 [4] and successfully authenticated for aerial services through UUAA-MM.

9.1.6.2.3.3.2 Test procedure sequence

Table 9.1.6.2.3.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | SS sends authentication message based on authentication method used through DL NAS TRANSPORT message to request authentication. | <-- | 5GMM: DL NAS TRANSPORT | - | - |
| 2 | UE sends authentication message through UL NAS TRANSPORT message in response to authentication request. | --> | 5GMM: UL NAS TRANSPORT |  |  |
| 3 | SS sends authentication message through DL NAS TRANSPORT message to inform UE about failed authentication. | <-- | 5GMM: DL NAS TRANSPORT |  |  |
| 4 | Start Timer T1 = 5s. (Note 1) | - | - | - | - |
| - | EXCEPTION: Depending about the UE implementation either steps 5a1 to 5a3 or steps 5b1 to 5b3 are conducted. (Note 1) | - | - | - | - |
| 5a1 | Check: Does UE transmit DEREGISTRATION REQUEST message? | --> | 5GMM: DEREGISTRATION REQUEST | 1 | P |
| 5a2 | Stop timer T1 | - | - | - | - |
| 5a3 | The SS transmits DEREGISTRATION ACCEPT message | <-- | 5GMM: DEREGISTRATION ACCEPT |  |  |
| 5b1 | Timer T1 expires | - | - | - | - |
| 5b2 | The SS transmits a DEREGISTRATION REQUEST message with cause value in the DEREGISTRATION REQUEST message set to #79 “UAS services not allowed” | <-- | 5GMM: DEREGISTRATION REQUEST | - | - |
| 5b3 | Check: Does the UE transmit a DEREGISTRATION ACCEPT? | --> | 5GMM: DEREGISTRATION ACCEPT | 1 | P |
| 6 | The SS releases the RRC connection. | - | - | - | - |
| Note 1: Some UEs might start UE initiated de-registration due to failed authentication. Therefore, a arbitrary selected waiting period is needed to see whether UE initiates de-registration itself. If UE starts self de-registration, then steps 5a1 to 5a3 are conducted, otherwise steps 5b1 to 5b3 are conducted. | | | | | |

9.1.6.2.3.3.3 Specific message contents

Table 9.1.6.2.3.3.3-1: DL NAS TRANSPORT (step 1, Table 9.1.6.2.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-11 | | | |
| Information Element | | Value/remark | Comment | Condition |
| Payload container type | | ‘1001’B | Service-level-AA container |  |
| Payload container | | Present |  |  |
| Length of payload container contents | |  | 2 octets, Service-level-AA container length set according to used authentication message. |  |
| Payload container contents | |  | Authentication message based on authentication method used forwarded transparently from USS to UE using service-level-AA payload with type UUAA. |  |

Table 9.1.6.2.3.3.3-2: UL NAS TRANSPORT (step 2, Table 9.1.6.2.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-11 | | | |
| Information Element | | Value/remark | Comment | Condition |
| Payload container type | | ‘1001’B | Service-level-AA container |  |
| Payload container | | Present |  |  |
| Length of payload container contents | |  | 2 octets, Service-level-AA container length set according to used authentication message. |  |
| Payload container contents | |  | Authentication message based on authentication method used forwarded transparently from USS to UE using service-level-AA payload with type UUAA. |  |

Table 9.1.6.2.3.3.3-3: DL NAS TRANSPORT (step 3, Table 9.1.6.2.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-11 | | | |
| Information Element | | Value/remark | Comment | Condition |
| Payload container type | | ‘1001’B | Service-level-AA container |  |
| Payload container | | Present |  |  |
| Length of payload container contents | |  | 2 octets, Service-level-AA container length set according to used authentication message. |  |
| Payload container contents | |  | Authentication response indicating authentication failure from USS to UE. |  |

Table 9.1.6.2.3.3.3-4: DEREGISTRATION REQUEST (step 5a1, Table 9.1.6.2.3.3.2-1)

|  |
| --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-12 |

Table 9.1.6.2.3.3.3-5: DEREGISTRATION ACCEPT UE (step 5a3, Table 9.1.6.2.3.3.2-1)

|  |
| --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-13 |

Table 9.1.6.2.3.3.3-6: DEREGISTRATION REQUEST (step 5b2, Table 9.1.6.2.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-14 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GMM cause | ‘01001111’B | UAS services not allowed |  |

Table 9.1.6.2.3.3.3-7: DEREGISTRATION ACCEPT (step 5b3, Table 9.1.6.2.3.3.2-1)

|  |
| --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-15 |

### 9.1.7 Service request

#### 9.1.7.1 Service request / Idle mode uplink user data transport / Rejected / Restricted service area, abnormal / T3517, T3525

9.1.7.1.1 Test Purpose (TP)

(1)

**with** { the UE is in 5GMM-REGISTERED state and 5GMM-IDLE mode over 3GPP access }

**ensure that** {

**when** { UE has uplink user data pending }

**then** { the UE sends a SERVICE REQUEST message }

}

(2)

**with** { the **UE** sent a SERVICE REQUEST message }

**ensure that** {

**when** { UE receives a SERVICE REJECT message including an appropriate 5GMM cause value #28(Restricted **service** area) }

**then** { the UE performs the mobility registration update procedure }

}

(3)

**with** { the UE is in 5GMM-REGISTERED state and the UE has triggered the SERVICE REQUEST in 5GMM-IDLE mode }

**ensure that** {

**when** { T3517 expired}

**then** { the UE increases the service request attempt counter, aborts the procedure and release locally any resources allocated for the service request procedure }

}

(4)

**with** { the UE is in 5GMM-REGISTERED state and 5GMM-IDLE mode }

**ensure that** {

when { the service request attempt counter is equal to 5}

**then** { the UE starts timer T3525 and not attempts service request until expiry of T3525}

}

9.1.7.1.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501, clause 5.6.1.1, 5.6.1.5 and 5.6.1.7. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.6.1.1]

The purpose of the service request procedure is to change the 5GMM mode from 5GMM-IDLE to 5GMM-CONNECTED mode, and/or to request the establishment of user-plane resources for PDU sessions which are established without user-plane resources. In latter case, the 5GMM mode can be the 5GMM-IDLE mode or the 5GMM-CONNECTED mode if the UE requires to establish user-plane resources for PDU sessions.

…

The UE shall invoke the service request procedure when:

…

d) the UE, in 5GMM-IDLE mode over 3GPP access, has uplink user data pending;

...

If one of the above criteria to invoke the service request procedure is fulfilled, then the service request procedure shall only be initiated by the UE when the following conditions are fulfilled:

- its 5GS update status is 5U1 UPDATED, and the TAI of the current serving cell is included in the TAI list; and

- no 5GMM specific procedure is ongoing.

The UE shall not invoke the service request procedure when the UE is in the state 5GMM-SERVICE-REQUEST-INITIATED.



Figure 5.6.1.1.1: Service Request procedure

[TS 24.501, clause 5.6.1.5]

If the service request cannot be accepted, the network shall return a SERVICE REJECT message to the UE including an appropriate 5GMM cause value and stop timer T3517.

…

If the AMF determines that the UE is in a non-allowed area or is not in an allowed area as specified in subclause 5.3.5, then:

a) if the service type IE in the SERVICE REQUEST message is set to "signalling" or "data", the AMF shall send a SERVICE REJECT message with the 5GMM cause value set to #28 "Restricted service area";

…

The UE shall take the following actions depending on the 5GMM cause value received in the SERVICE REJECT message.

#28 (Restricted service area).

The UE shall enter the state 5GMM-REGISTERED.NON-ALLOWED-SERVICE, and perform the registration procedure for mobility and periodic registration update unless the service type IE in the SERVICE REQUEST message was set to "elevated signalling" (see subclause 5.3.5 and 5.5.1.3).

If the service type IE in the SERVICE REQUEST message was set to "elevated signalling", the UE shall not re-initiate service request procedure until the UE enters an allowed area or leaves a non-allowed area, except for emergency services, high priority access or responding to paging or notification.

[TS 24.501, clause 5.6.1.7]

The following abnormal cases can be identified:

a) T3517 expired.

The UE shall enter the state 5GMM-REGISTERED.

If the UE triggered the service request procedure in 5GMM-IDLE mode and the service type of the SERVICE REQUEST message was not set to "emergency services fallback", then the 5GMM sublayer shall increment the service request attempt counter, abort the procedure and release locally any resources allocated for the service request procedure. The service request attempt counter shall not be incremented, if:

1) the service request procedure is initiated to establish an emergency PDU session;

2) the UE has an emergency PDU session established;

3) the UE is a UE configured for high priority access in selected PLMN; or

4) the service request is initiated in response to paging or notification from the network.

If the service request attempt counter is greater than or equal to 5, the UE shall start timer T3525. Additionally, if the service request was initiated for an MO MMTEL voice call, a notification that the service request was not accepted due to the UE having started timer T3525 shall be provided to the upper layers.

NOTE 1: This can result in the upper layers requesting implementation specific mechanisms, e.g. the MMTEL voice call being attempted to another IP-CAN, or establishment of a CS voice call (if supported and not already attempted in the CS domain).

The UE shall not attempt service request until expiry of timer T3525 unless:

1) the service request is initiated in response to paging or notification from the network;

2 the UE is a UE configured for high priority access in selected PLMN;

3) the service request is initiated to establish an emergency PDU session;

4) the UE has an emergency PDU session established; or

5) the UE is registered in a new PLMN.

NOTE 2: The NAS signalling connection can also be released if the UE deems that the network has failed the authentication check as specified in subclause 5.4.1.3.7.

9.1.7.1.3 Test description

9.1.7.1.3.1 Pre-test conditions

System Simulator:

- NGC Cell A.

UE:

- None.

Preamble:

- The UE is in state 3N-A with UE test loop mode B active (T\_delay\_modeB = 5) according to TS 38.508-1 [4].

9.1.7.1.3.2 Test procedure sequence

Table 9.1.7.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS configures:  - NGC Cell A as the "Serving cell". | - | - | - | - |
| 2 | The SS transmits one IP Packet to the UE. | <-- | IP packet | - | - |
| 3 | The SS waits 1 second after the IP packet has been transmitted in step 2 and then transmits an RRCRelease message. (Note 1) | - | - | - | - |
| 4 | Check: Does UE transmit a SERVICE REQUEST message with Service type IE set to ‘data’? (Note 2) | --> | SERVICE REQUEST | 1 | P |
| 5 | The SS transmits a SERVICE REJECT message with 5GMM cause = "Restricted service area". | <-- | SERVICE REJECT | - | - |
| 6-7 | Void | - | - | - | - |
| 7AA | The SS starts timer 5 sec.  Note: An arbitraty chosen timer to avoid message crossing. | - | - | - | - |
|  | EXCEPTION: Steps 7ABa1 to 7ABb3 describe behaviour that depends on the UE implementation; the "lower case letter" identifies a step sequence that take place if the UE is implemented in a certain way. | - | - | - | - |
| 7ABa1 | UE transmit REGISTRATION REQUEST message.  NOTE: Allowed for Rel-15 UEs. | --> | REGISTRATION REQUEST | 2 | P |
| 7ABa2 | Stop timer 5 sec. | - | - | - | - |
| 7ABb1 | Timer 5 sec expires. | - | - | - | - |
| 7ABb2 | The SS releases the RRC connection. | - | - | - | - |
| 7ABb3 | Check: Does the UE transmit REGISTRATION REQUEST over a new signalling connection? | --> | REGISTRATION REQUEST | 2 | P |
| 7AC-7B | Void |  |  |  |  |
| 8A | SS stops transmitting UL grant. | - | - | - | - |
| 8B | The SS sends a REGISTRATION ACCEPT message | <-- | REGISTRATION ACCEPT | - | - |
| 8C | SS transmits one UL grant, for the UE to transmit the REGISTRATION COMPLETE message at step 8D. | - | - | - | - |
| 8D | The UE sends a REGISTRATION COMPLETE. | --> | REGISTRATION COMPLETE | - | - |
| 8E | The SS releases the RRC connection. | - | - | - | - |
| 8F | The SS resumes UL grant transmission. | - | - | - | - |
| 8G | The UE transmits a SERVICE REQUEST message over a new signalling connection. | --> | SERVICE REQUEST | - | - |
| 8H | The SS does not respond to SERVICE REQUEST message.  Note: The UE locally releases the signalling connection after T3517 expiry. | - | - | - | - |
| - | EXCEPTION: Steps 9 to 10 are repeated for 4 times. | - | - | - | - |
| 9 | Check: Does the UE transmit a SERVICE REQUEST message after T3517 expiry but before 60s over a new signalling connection? | --> | SERVICE REQUEST | 3 | P |
| 10 | The SS does not respond to SERVICE REQUEST message.  Note: The UE locally releases the signalling connection after T3517 expiry. | - | - | - | - |
| 11 | Check: Does the UE transmit a SERVICE REQUEST message within 60 seconds (minimum value of T3525) over a new signalling connection? | --> | SERVICE REQUEST | 3,4 | F |
| 12A | The SS starts timer 10 sec after Step 11 to see if UE performs the optional Steps listed below. | - | - | - | - |
|  | EXCEPTION: Steps 12Aa1 to 12Aa6 describe behaviour that depends on the UE implementation; the "lower case letter" identifies a step sequence that take place if the UE is implemented in a certain way. | - | - | - | - |
| 12Aa1 | The UE transmits a SERVICE REQUEST message after T3525 expiry over a new signalling connection. | --> | SERVICE REQUEST | - | - |
| 12Aa2-12Aa4 | Steps 5 to 7 of the NR RRC\_CONNECTED procedure in TS 38.508-1 [4] Table 4.5.4.2-3 are executed. | - | - | - | - |
| - | EXCEPTION: Steps 12Aa5 and 12Aa6 can occur in any order. | - | - | - | - |
| 12Aa5 | The UE transmits an RRCReconfigurationComplete message. | --> | NR RRC: RRCReconfigurationComplete | - | - |
| 12Aa6 | The UE loop backs the IP packet received in step 2 on the DRB associated with the default PDU session. | - | - | - | - |
| Note 1: The 1 second delay is used to secure that the UE have received and forwarded the IP Packet transmitted by the SS in step 2 to the UE test loop function before the RRCRelease message is sent by the SS in step 3.  Note 2: Triggered when timer T\_delay\_modeB (IP PDU delay time) expires and pending uplink data exist in buffered PDCP SDUs according to TS 38.509 [6] clause 5.3.4.2.3 and TS 36.509 [8] clause 5.4.4.3. | | | | | |

9.1.7.1.3.3 Specific message contents

Table 9.1.7.1.3.3-1: ACTIVATE TEST MODE (preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol discriminator | 1 1 1 1 |  |  |
| Skip indicator | 0 0 0 0 |  |  |
| Message type | 1 0 0 0 0 1 0 0 |  |  |
| UE test loop mode | 0 0 0 0 0 0 0 1 | UE test loop mode B | UE TEST LOOP MODE B |

Table 9.1.7.1.3.3-2: CLOSE UE TEST LOOP (preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol discriminator | 1 1 1 1 |  |  |
| Skip indicator | 0 0 0 0 |  |  |
| Message type | 1 0 0 0 0 0 0 0 |  |  |
| UE test loop mode | 0 0 0 0 0 0 0 1 | UE test loop mode B | UE TEST LOOP MODE B |
| UE test loop mode B LB setup |  |  |
| IP PDU delay | 0 0 0 0 0 1 0 1 | 5 seconds |

Table 9.1.7.1.3.3-3: SERVICE REQUEST (steps 4, 8G and 9, Table 9.1.7.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.1-16 | | | |
| Information Element | Value/remark | Comment | Condition |
| Service type |  |  |  |
| Service type value | ‘0001’B | data |  |
| Uplink data status |  | Indicates data present for the PDU session with the DL IP packet looped back.  The other bits are not checked. | Not allowed to be sent in cleartext and shall only be included in the complete SERVICE REQUEST message in the NAS message container IE. |

Table 9.1.7.1.3.3-4: SERVICE REJECT (step 5, Table 9.1.7.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.1-18 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | '0001 1100'B | Restricted service area |  |

Table 9.1.7.1.3.3-5: REGISTRATION REQUEST (steps 7ABa1 and 7ABb3, Table 9.1.7.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type | '010'B | mobility registration updating |  |

#### 9.1.7.2 Service request / Connected mode user data transport / Abnormal / T3517

9.1.7.2.1 Test Purpose (TP)

(1)

**with** { the UE is in 5GMM-REGISTERED state and 5GMM-CONNECTED mode over 3GPP access }

**ensure that** {

**when** { the UE has user data pending due to no user-plane resources established for PDU session(s) used for user data transport }

**then** { the UE sends a SERVICE REQUEST message }

}

(2)

**with** { the UE sends a SERVICE REQUEST message in 5GMM-CONNECTED mode }

**ensure that** {

**when** { T3517 expired }

**then** { the UE stays in 5GMM-CONNECTED mode }

}

9.1.7.2.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501 clauses 5.6.1.1, 5.6.1.2 and 5.6.1.7. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.6.1.1]

The purpose of the service request procedure is to change the 5GMM mode from 5GMM-IDLE to 5GMM-CONNECTED mode, and/or to request the establishment of user-plane resources for PDU sessions which are established without user-plane resources. In latter case, the 5GMM mode can be the 5GMM-IDLE mode or the 5GMM-CONNECTED mode if the UE requires to establish user-plane resources for PDU sessions.

NOTE 1: The lower layer indicates when the user-plane resources for PDU sessions are successfully established or released.

This procedure is used when:

…

- the UE has user data pending over 3GPP access and the UE is in 5GMM-IDLE or 5GMM-CONNECTED mode over 3GPP access;

The UE shall invoke the service request procedure when:

…

e) the UE, in 5GMM-CONNECTED mode or in 5GMM-CONNECTED mode with RRC inactive indication, has user data pending due to no user-plane resources established for PDU session(s) used for user data transport;



Figure 5.6.1.1.1: Service Request procedure

[TS 24.501, clause 5.6.1.2]

The UE initiates the service request procedure by sending a SERVICE REQUEST message to the AMF and starts timer T3517.

…

For cases d) and e) in subclause 5.6.1.1, the Uplink data status IE shall be included in the SERVICE REQUEST message to indicate the PDU session(s) the UE has pending user data to be sent. If the UE is not a UE configured for high priority access in selected PLMN:

a) if there exists an emergency PDU session which is indicated in the Uplink data status IE the service type IE in the SERVICE REQUEST message shall be set to "emergency services"; or

b) otherwise, the service type IE in the SERVICE REQUEST message shall be set to "data".

…

The Uplink data status IE may be included in the SERVICE REQUEST message to indicate which PDU session(s) associated with the access type the SERVICE REQUEST message is sent over have pending user data to be sent.

…

[TS 24.501, clause 5.6.1.7]

The following abnormal cases can be identified:

a) T3517 expired.

The UE shall enter the state 5GMM-REGISTERED.

If the UE triggered the service request procedure in 5GMM-IDLE mode and the service type of the SERVICE REQUEST message was not set to "emergency services fallback", then the 5GMM sublayer shall increment the service request attempt counter, abort the procedure and release locally any resources allocated for the service request procedure. The service request attempt counter shall not be incremented, if:

1) the service request procedure is initiated to establish an emergency PDU session;

2) the UE has an emergency PDU session established;

3) the UE is a UE configured for high priority access in selected PLMN; or

4) the service request is initiated in response to paging or notification from the network.

If the service request attempt counter is greater than or equal to 5, the UE shall start timer T3525. Additionally, if the service request was initiated for an MO MMTEL voice call, a notification that the service request was not accepted due to the UE having started timer T3525 shall be provided to the upper layers.

NOTE 1: This can result in the upper layers requesting implementation specific mechanisms, e.g. the MMTEL voice call being attempted to another IP-CAN, or establishment of a CS voice call (if supported and not already attempted in the CS domain).

The UE shall not attempt service request until expiry of timer T3525 unless:

1) the service request is initiated in response to paging or notification from the network;

2) the UE is a UE configured for high priority access in selected PLMN;

3) the service request is initiated to establish an emergency PDU session;

4) the UE has an emergency PDU session established; or

5) the UE is registered in a new PLMN.

NOTE 2: The NAS signalling connection can also be released if the UE deems that the network has failed the authentication check as specified in subclause 5.4.1.3.7.

...

9.1.7.2.3 Test description

9.1.7.2.3.1 Pre-test conditions

System Simulator:

- NGC Cell A

UE:

- None.

Preamble:

- the UE is in 5GS state 3N-A with at least one PDU session (with PDU session ID X where 1 <= X <= 15) active according to TS 38.508-1 [4], clause 4.4A.3 Table 4.4A.3-1. and using the message condition UE TEST LOOP MODE B prepared according to TS 38.508-1 [4]. DRB n is defined as default DRB for the PDU session X.

9.1.7.2.3.2 Test procedure sequence

Table 9.1.7.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U – S | Message |  |  |
| 1 | Void. |  |  |  |  |
| 1A | Cause the UE to request establishment of PDU session Y to the DN. (Note 1) | - | - | - | - |
| 1B | The UE transmits a PDU SESSION ESTABLISHMENT REQUEST message. (Note 2) | --> | NR 5GSM: PDU SESSION ESTABLISHMENT REQUEST | - | - |
| 1C | SS transmits a PDU SESSION ESTABLISHMENT ACCEPT message. (Note 2) | <-- | NR 5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |
| 1D | The SS transmits a CLOSE UE TEST LOOP message with IP PDU delay set to 1 second. | <-- | CLOSE UE TEST LOOP | - | - |
| 1E | The UE transmits a CLOSE UE TEST LOOP COMPLETE message. | --> | CLOSE UE TEST LOOP COMPLETE | - | - |
| 1F | The SS transmits one IP PDU on PDU session X. | <-- | - | - | - |
| 2 | The SS transmits an *RRCReconfiguration* message to release User-plane resources for the PDU session X. | <-- | NR RRC: RRCReconfiguration | - | - |
| 3 | The UE transmits an *RRCReconfigurationComplete* message. | --> | NR RRC: RRCReconfigurationComplete | - | - |
| 4 | Check: Does the UE transmit a *SERVICE REQUEST* message? | --> | NR 5GMM: SERVICE REQUEST | 1 | P |
| 5 | The SS does not respond to the *SERVICE REQUEST* message. | - | - | - | - |
| 6 | Wait for T3517 seconds (Note 3). | - | - | - | - |
| 7 | The UE transmit a *SERVICE REQUEST* message. | --> | NR 5GMM: SERVICE REQUEST | - | - |
| 8 | The SS sends an IDENTITY REQUEST message. | <-- | NR 5GMM: IDENTITY REQUEST | - | - |
| 9 | Check: Does the UE transmit an IDENTITY RESPONSE message?. | --> | NR 5GMM: IDENTITY RESPONSE | 2 | P |
| 10 | The SS transmits an *RRCReconfiguration* message Piggybacked with SERVICE ACCEPT message to setup User-plane resources for the PDU session X. | <-- | NR RRC: RRCReconfiguration  NR 5GMM: SERVICE ACCEPT |  |  |
|  | EXCEPTION: Steps 11 and 13 can occur in any order | - | - | - | - |
| 11 | The UE transmits an *RRCReconfigurationComplete* message | --> | NR RRC: RRCReconfigurationComplete | - | - |
| 12 | Void | - | - | - | - |
| 13 | The UE loop back the IP PDU on PDU session X. | - | - | - | - |
| Note 1: The request to establish a PDU session may be performed by MMI or AT command.  Note 2: The reason to establish PDU session Y is to avoid that, after release user-plane resource for PDU session X in step 2-3, the UE can still be in 5GMM-CONNECTED mode as TP1 said. Otherwise, if the UE has only PDU session X, then according to TS 38.331 clause 5.3.1.1, UE has to release both SRB2 and DRB of PDU session X, then go to 5GMM-IDLE mode which violate TP1.  Note 3: T3517 expires after 15 seconds. | | | | | |

9.1.7.2.3.3 Specific message contents

Table 9.1.7.2.3.3-0: PDU SESSION ESTABLISHMENT ACCEPT (step 1C, Table 9.1.7.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-2 | | | |
| Information Element | Value/remark | Comment | Condition |
| Authorized QoS rules | 5GC QoS rule of the Config#1 in Table 4.8.4-1 |  |  |
| Mapped EPS bearer contexts |  |  |  |
| Mapped EPS bearer context |  |  |  |
| Mapped EPS QoS parameters | EPC default bearer context of the Config#1 in Table 4.8.4-1 |  |  |
| DNN | The same DNN value as sent in the UL NAS TRANSPORT message at step 1B |  |  |

Table 9.1.7.2.3.3-1: RRCReconfiguration (step 2, Table 9.1.7.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-13 | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCReconfiguration ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcReconfiguration SEQUENCE { |  |  |  |
| radioBearerConfig | RadioBearerConfig |  |  |
| masterCellGroup | MasterCellGroup |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.1.7.2.3.3-2a: RadioBearerConfig (Table 9.1.7.2.3.3-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.3-132 | | | |
| Information Element | Value/remark | Comment | Condition |
| RadioBearerConfig ::= SEQUENCE { |  |  |  |
| drb-ToReleaseList SEQUENCE (SIZE (1..maxDRB)) OF DRB-Identity { | 1 entry |  |  |
| DRB-Identity[1] | DRB configured in the preamble | entry 1 |  |
| } |  |  |  |
| } |  |  |  |

Table 9.1.7.2.3.3-2b: MasterCellGroup (Table 9.1.7.2.3.3-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.6.3-19 | | | |
| Information Element | Value/remark | Comment | Condition |
| CellGroupConfig ::= SEQUENCE { |  |  |  |
| rlc-BearerToAddModList | Not present |  |  |
| rlc-BearerToReleaseList SEQUENCE (SIZE(1..maxLC-ID)) OF LogicalChannelIdentity { | 1 entry |  |  |
| logicalChannelIdentity[1] | Logical channel identity corresponding to DRB configured in the preamble | entry 1 |  |
| } |  |  |  |
| mac-CellGroupConfig | Not present |  |  |
| physicalCellGroupConfig | Not present |  |  |
| spCellConfig | Not present |  |  |
| } |  |  |  |

Table 9.1.7.2.3.3-3: SERVICE REQUEST (step 4, 7, Table 9.1.7.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-16 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Service type | '0001'B | data |  |
| Uplink data status |  |  |  |
| PSI(X) | '1'B | PSI(X) is set to 1 indicates that uplink data are pending for the PDU session X activated in preamble. |  |

Table 9.1.7.2.3.3-4: IDENTITY REQUEST (step 8, Table 9.1.7.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] table 4.7.1-21 | | | |
| Information Element | Value/remark | Comment | Condition |
| Identity type | ‘0010’B | 5G-GUTI |  |

Table 9.1.7.2.3.3-5: IDENTITY RESPONSE (step 9, Table 9.1.7.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] table 4.7.1-22 | | | |
| Information Element | Value/remark | Comment | Condition |
| Mobile identity | 5G-GUTI |  |  |

Table 9.1.7.2.3.3-6: RRCReconfiguration (step 10, Table 9.1.7.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-13 | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCReconfiguration ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcReconfiguration SEQUENCE { |  |  |  |
| radioBearerConfig | RadioBearerConfig with conditions DRB configured in the preamble |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| masterCellGroup | CellGroupConfig with condition DRB configured in the preamble | OCTET STRING (CONTAINING CellGroupConfig) |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.1.7.2.3.3-7: SERVICE ACCEPT (step 10, Table 9.1.7.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-17 | | | |
| Information Element | Value/Remark | Comment | Condition |
| PDU session reactivation result |  |  |  |
| PSI(X) | '0'B | PSI(X) is set to 0 indicates that establishment of user-plane resource of the PDU session X activated in preamble is successful. |  |

#### 9.1.7.3 Service request / MUSIM / NAS signalling connection release

9.1.7.3.1 Test Purpose (TP)

(1)

**with** { MUSIM UE in state 5GMM-CONNECTED having transmitted a SERVICE REQUEST message and set the Request type to "NAS signalling connection release" in the UE request type IE }

**ensure that** {

**when** { UE receives SERVICE ACCEPT message }

**then** { the UE enters the state 5GMM-REGISTERED after the completion of the Service Request procedure }

}

9.1.7.3.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501, clauses 5.6.1.1, 5.6.1.2.1, and 5.6.1.4.1 and in TS 36.331, clause 5.3.3.4.

[TS 24.501, clause 5.6.1.1]

The purpose of the service request procedure is to change the 5GMM mode from 5GMM-IDLE to 5GMM-CONNECTED mode.

…

The UE shall invoke the service request procedure when:

…

o) the network supports the N1 NAS signalling connection release, the MUSIM UE,

- is in 5GMM-CONNECTED mode, requests the network to release the NAS signalling connection and, if the network supports the paging restriction, optionally includes paging restriction;

- is in 5GMM-CONNECTED mode with RRC inactive indication, requests the network to release the NAS signalling connection and, if the network supports the paging restriction, optionally includes paging restriction; or

- is in 5GMM-CONNECTED mode with RRC inactive indication, rejects the RAN paging, requests the network to release the NAS signalling connection and, if the network supports the paging restriction, optionally includes paging restriction; or

[TS 24.501, clause 5.6.1.2.1]

…

For cases o and p in subclause 5.6.1.1, the UE shall not include the Uplink data status IE and the Allowed PDU session status IE in the SERVICE REQUEST message. Further,

- for case o in subclause 5.6.1.1, the UE shall set Request type to "NAS signalling connection release" in the UE request type IE and Service type to "signalling";

[TS 24.501, clause 5.6.1.4.1]

For cases other than h) in subclause 5.6.1.1, the UE shall treat the reception of the SERVICE ACCEPT message as successful completion of the procedure. The UE shall reset the service request attempt counter, stop timer T3517 and enter the state 5GMM-REGISTERED.

…

the AMF shall initiate the release of the N1 NAS signalling connection as follows:

- for case o in subclause 5.6.1.1, after the completion of the service request procedure;

9.1.7.3.3 Test description

9.1.7.3.3.1 Pre-test conditions

System Simulator:

- Initial conditions for system simulator as described in TS 38.508-1 [4], clause 4.9.36.2.1.

UE:

- Initial conditions for UE as described in TS 38.508-1 [4], clause 4.9.36.2.1.

Preamble:

- The UE performs test procedure for initial registration of a MUSIM UE as described in TS 38.508-1 [4], Table 4.9.36.2.2-1.

9.1.7.3.3.2 Test procedure sequence

Table 9.1.7.3.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| - | The following messages are to be observed on NGC Cell A unless explicitly stated otherwise. | - | - | - | - |
| 1 | The NR RRC\_CONNECTED procedure in TS 38.508-1 [4] Table 4.5.4.2-3 is executed to successfully complete the service request procedure. | - | - | - | - |
| 2-7 | Void | - | - | - | - |
| 7A | The SS transmits a *Paging* message on NGC Cell G. | <-- | NR RRC: *Paging* | - | - |
| 8 | Configure the UE to release N1 NAS signalling connection on NGC Cell A. (Note 1) | - | - | - | - |
| - | The following messages are to be observed on NGC Cell A unless explicitly stated otherwise. | - | - | - | - |
| 9-10 | Void | - | - | - | - |
| 11 | The UE transmits a SERVICE REQUEST message. This message is included in an ULInformationTransfer message. | --> | 5GMM: SERVICE REQUEST | - | - |
| 12-13 | Void | - | - | - | - |
| 14 | The SS transmits a SERVICE ACCEPT message. This message is included in a DLInformationTransfer message. | <-- | 5GMM: SERVICE ACCEPT | - | - |
| 15 | The SS releases the RRC connection. | - | - | - | - |
| 16 | Void | - | - | - | - |
| - | The following messages are to be observed on NGC Cell G unless explicitly stated otherwise | - | - | - | - |
| 16A-16G | Steps 2 to 8 of the NR RRC\_CONNECTED procedure in TS 38.508-1 [4] Table 4.5.4.2-3 are executed to successfully complete the service request procedure. (Note 3) | - | - | - | - |
| 16F | The SS releases the RRC connection. | - | - | - | - |
| - | The following messages are to be observed on NGC Cell A unless explicitly stated otherwise. | - | - | - | - |
| 17 | The SS transmits a *Paging* message. | <-- | NR RRC: *Paging* | - | - |
| 18 | Check: Does the UE transmit a *RRCSetupRequest* message? | --> | NR RRC: RRCSetupRequest | 1 | P |
| 19-24 | Steps 3 to 8 of the NR RRC\_CONNECTED procedure in TS 38.508-1 [4] Table 4.5.4.2-3 are executed to successfully complete the service request procedure. | - | - | - | - |
| 25 | The SS releases the RRC connection. | - | - | - | - |
| Note 1: The configuration to release N1 NAS signalling connection may be performed by MMI or AT Command.  Note 2: Void  Note 3: UE responds to the Paging message transmitted on NGC Cell G at step 7A. | | | | | |

9.1.7.3.3.3 Specific message contents

Table 9.1.7.3.3.3-1: SERVICE REQUEST (step 11, Table 9.1.7.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-16 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Service type |  |  |  |
| Service type value | ‘0000’B | signalling |  |
| UE request type |  |  |  |
| Request type (bits 4 to 1 of octet 3) | ‘0001’B | NAS signalling connection release |  |

#### 9.1.7.4 Service request / MUSIM / Rejection of paging

9.1.7.4.1 Test Purpose (TP)

(1)

**with** { the UE in 5GMM-idle state }

**ensure that** {

**when** { UE is configured to reject the paging message }

**then** { UE transmits SERVICE REQUEST message with Request type set to “Rejection of paging” in the UE request type IE and service type set to “mobile terminated services” }

}

9.1.7.4.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501 clauses 5.6.1.1, 5.6.2.2.1 and 5.6.1.4.1. Unless otherwise stated these are Rel-17 requirements.

[TS 24.501, clause 5.6.1.1]

…

p) the network supports the reject paging request, the MUSIM UE in 5GMM-IDLE mode when responding to paging rejects the paging request from the network, requests the network to release the NAS signalling connection and, if the network supports the paging restriction, optionally includes paging restriction

[TS 24.501, clause 5.6.2.2.1]

…

The MUSIM UE based on implementation may use the paging cause indicated by lower layers (see 3GPP TS 38.331 [30]), if any, to accept the paging, reject the paging or ignore the paging indication.

Upon reception of a paging indication, if the network supports the rejection of paging request and if a MUSIM UE decides not to accept the paging, the UE may initiate a service request procedure to reject the paging as specified in clause 5.6.1.1

[TS 24.501, clause 5.6.1.4.1]

For cases other than h) in subclause 5.6.1.1, the UE shall treat the reception of the SERVICE ACCEPT message as successful completion of the procedure. The UE shall reset the service request attempt counter, stop timer T3517 and enter the state 5GMM-REGISTERED.

9.1.7.4.3 Test description

9.1.7.4.3.1 Pre-test conditions

System Simulator:

- NGC Cell A (home PLMN1) and cell G (home PLMN2) are configured according to TS 38.508-1 [4] tables 6.3.2.2-1 and 6.3.2.2-3 and with default system information combination as defined in TS 38.508-1 sub-clause 4.4.3.1.2.

UE:

- The UE is a MUSIM UE.

- The UE is equipped with two USIMs with configuration as defined in TS 38.508-1 [4] tables 6.4.1-27 and 6.4.1-28.

Preamble:

- The UE performs a successful registration for MUSIM according to Table 4.9.36.2.2-1 of TS 38.508-1 [4].

9.1.7.4.3.2 Test procedure sequence

Table 9.1.7.4.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U – S | Message |  |  |
| 1 | UE is configured to reject Paging. (Note 1) | - | - | - | - |
| - | The following messages are to be observed on NR Cell G unless explicitly stated otherwise. | - | - | - | - |
| 2 | The SS transmits a *Paging* message. | <-- | NR RRC: *Paging* | - | - |
| 3-4 | Steps 2-3 of the generic procedure for NR RRC\_Connected specified in TS 38.508-1 [4] Table 4.5.4.2-3 are performed. | - | - | - | - |
| 5 | Check: Does the UE transmit an *RRCSetupComplete* message and a SERVICE REQUEST message? | --> | 5GMM: SERVICE REQUEST | 1 | P |
| 6-7 | Steps 5 and 6 of the generic procedure for NR RRC\_Connected specified in TS 38.508-1 [4] Table 4.5.4.2-3 are performed. | - | - | - | - |
| 8 | The SS transmits a SERVICE ACCEPT message. | <-- | 5GMM: SERVICE ACCEPT | - | - |
| 9 | The SS releases the RRC connection. | - | - | - | - |
| Note 1: The configuration of Page rejection may be performed by MMI or AT Command. | | | | | |

9.1.7.4.3.3 Specific message contents

Table 9.1.7.4.3.3-1: SERVICE REQUEST (step 5, Table 9.1.7.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-16 | | | |
| Information Element | Value/Remark | Comment | Condition |
| UE request type | ‘0010’ | Rejection of paging |  |

### 9.1.8 SMS over NAS

#### 9.1.8.1 SMS over NAS / MO and MT SMS over NAS / Idle mode

9.1.8.1.1 Test Purpose (TP)

(1)

**with** { the UE in switched off state with valid USIM inserted }

**ensure that** {

**when** { the UE requests initial registration for SMS over NAS }

**then** { the UE shall send REGISTRATION REQUEST message with SMS requested bit of the 5GS update type IE "SMS over NAS supported" }

}

(2)

**with** { the UE in 5GMM-REGISTERED state }

**ensure that** {

**when** { the UE initiates a periodic registration update and the requirements to use SMS over NAS transport have not changed in the UE}

**then** { the UE sets the SMS requested bit of the 5GS update type IE in the REGISTRATION REQUEST message to the same value as indicated by the UE in the last REGISTRATION REQUEST message }

}

(3)

**with** { the UE in 5GMM\_Connected state with NR RRC\_IDLE mode and the UE has sent a SERVICE REQUEST message triggered by initiating MO SMS}

**ensure that** {  
 **when** { UE receives a SERVICE ACCEPT message from SS }

**then** { UE sends CP-DATA containing RP-DATA RPDU (SMS SUBMIT TPDU) encapsulated in an Uplink NAS transport message }

}

(4)

**with** { UE has sent CP-DATA containing an RP-DATA RPDU (SMS SUBMIT TPDU) encapsulated in an Uplink NAS transport message }

**ensure that** {  
 **when** { UE receives a CP-DATA containing an RP-ACK RPDU encapsulated in a Downlink NAS transport message }

**then** { UE sends a CP-ACK encapsulated in an Uplink NAS Transport message }

}

(5)

**with** { the UE in 5GMM-REGISTERED state with NR RRC\_IDLE mode, UE has received a paging request and UE has completed a SERVICE REQUEST procedure}

**ensure that** {  
  **when** { UE receives a CP-DATA containing an RP-DATA RPDU (SMS DELIVER TPDU) encapsulated in a Downlink NAS transport message }

**then** { UE sends a CP-ACK encapsulated in an Uplink NAS transport message followed by a CP-DATA containing an RP-ACK RPDU encapsulated in an Uplink NAS transport message}

}

9.1.8.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clause 5.5.1.2.2, 5.5.1.2.4, 5.5.1.3.2, 5.5.1.3.4, 9.11.3.6 and 9.11.3.9A. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501 clause 5.5.1.2.2]

The UE in state 5GMM-DEREGISTERED shall initiate the registration procedure for initial registration by sending a REGISTRATION REQUEST message to the AMF,

a) when the UE performs initial registration for 5GS services;

b) when the UE performs initial registration for emergency services;

c) when the UE performs initial registration for SMS over NAS; and

d) when the UE moves from GERAN to NG-RAN coverage or the UE moves from a UTRAN to NG-RAN coverage.

…

The UE initiates the registration procedure for initial registration by sending a REGISTRATION REQUEST message to the AMF, starting timer T3510. If timer T3502 is currently running, the UE shall stop timer T3502. If timer T3511 is currently running, the UE shall stop timer T3511.

…

If the UE requests the use of SMS over NAS, the UE shall include the 5GS update type IE in the REGISTRATION REQUEST message with the SMS requested bit set to “SMS over NAS supported”. When the 5GS update type IE is included in the REGISTRATION REQUEST for reasons other than requesting the use of SMS over NAS, and the UE does not need to register for SMS over NAS, the UE shall set the SMS requested bit of the 5GS update type IE to “SMS over NAS not supported” in the REGISTRATION REQUEST message.

[TS 24.501 clause 5.5.1.2.4]

If the initial registration request is accepted by the network, the AMF shall send a REGISTRATION ACCEPT message to the UE.

…

If the 5GS update type IE was included in the REGISTRATION REQUEST message with the SMS requested bit set to “SMS over NAS supported”, and SMSF selection is successful, then the AMF shall send the REGISTRATION ACCEPT message after the SMSF has confirmed that the activation of the SMS service was successful. When sending the REGISTRATION ACCEPT message, the AMF shall:

a) set the SMS allowed bit of the 5GS registration result IE to “SMS over NAS allowed” in the REGISTRATION ACCEPT message, if the UE has set the SMS requested bit of the 5GS registration type IE to “SMS over NAS supported” in the REGISTRATION REQUEST message and the network allows the use of SMS over NAS for the UE; and

b) store the SMSF address and the value of the SMS allowed bit of the 5GS registration result IE in the UE 5GMM context and consider the UE available for SMS over NAS.

[TS 24.501 clause 5.5.1.3.2]

The UE in state 5GMM-REGISTERED shall initiate the registration procedure for mobility and periodic registration update by sending a REGISTRATION REQUEST message to the AMF,

l) when the UE needs to register for SMS over NAS, indicate a change in the requirements to use SMS over NAS, or de-register from SMS over NAS;

…

The UE in state 5GMM-REGISTERED shall initiate the registration procedure for mobility and periodic update by sending a REGISTRATION REQUEST message to the AMF when the UE needs to request the use of SMS over NAS transport or the current requirements to use SMS over NAS transport change in the UE. The UE shall set the SMS requested bit of the 5GS update type IE in the REGISTRATION REQUEST message as specified in subclause 5.5.1.2.2.

When initiating a registration procedure for mobility and periodic registration update and the UE needs to send the 5GS update type IE for a reason different than indicating a change in requirement to use SMS over NAS, the UE shall set the SMS requested bit of the 5GS update type IE in the REGISTRATION REQUEST message to the same value as indicated by the UE in the last REGISTRATION REQUEST message.

If the UE no longer requires the use of SMS over NAS, then the UE shall include the 5GS update type IE in the REGISTRATION REQUEST message with the SMS requested bit set to “SMS over NAS not supported”.

[TS 24.501 clause 5.5.1.3.4]

If the registration update request has been accepted by the network, the AMF shall send a REGISTRATION ACCEPT message to the UE.

…

If the 5GS update type IE was included in the REGISTRATION REQUEST message with the SMS requested bit set to “SMS over NAS not supported” and:

a) the SMSF address is stored in the UE 5GMM context and:

1) the UE is considered available for SMS over NAS; or

2) the UE is considered not available for SMS over NAS and the SMSF has confirmed that the activation of the SMS service is successful; or

b) the SMSF address is not stored in the UE 5GMM context, the SMSF selection is successful and the SMSF has confirmed that the activation of the SMS service is successful;

then the AMF shall set the SMS allowed bit of the 5GS registration result IE in the REGISTRATION ACCEPT message as specified in subclause 5.5.1.2.4. If the UE 5GMM context does not contain an SMSF address or the UE is not considered available for SMS over NAS, then the AMF shall:

a) store the SMSF address in the UE 5GMM context if not stored already; and

b) store the value of the SMS allowed bit of the 5GS registration result IE in the UE 5GMM context and consider the UE available for SMS over NAS.

If SMSF selection in the AMF or SMS activation via the SMSF is not successful, or the AMF does not allow the use of SMS over NAS, then the AMF shall set the SMS allowed bit of the 5GS registration result IE to “SMS over NAS not allowed" in the REGISTRATION ACCEPT message.

If the 5GS update type IE was included in the REGISTRATION REQUEST message with the SMS requested bit set to "SMS over NAS not supported", then the AMF shall:

a) mark the 5GMM context to indicate that the UE is not available for SMS over NAS; and

NOTE 2: The AMF can notify the SMSF that the UE is deregistered from SMS over NAS based on local configuration.

b) set the SMS allowed bit of the 5GS registration result IE to "SMS over NAS not supported" in the REGISTRATION ACCEPT message.

When the UE receives the REGISTRATION ACCEPT message, if the UE is also registered over another access to the same PLMN, the UE considers the value indicated by the SMS allowed bit of the 5GS registration result IE as applicable for both accesses over which the UE is registered.

[TS 24.501 clause 9.11.3.6]

The purpose of the 5GS registration result information element is to specify the result of a registration procedure.

The 5GS registration result information element is coded as shown in figure 9.11.3.6.1 and table 9.11.3.6.1.

The 5GS registration result is a type 4 information element with a length of 3 octets.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | | 7 | | 6 | | 5 | | 4 | | 3 | 2 | 1 | |  | |
| 5GS registration result IEI | | | | | | | | | | | | | | octet 1 | |
| Length of 5GS registration result contents | | | | | | | | | | | | | | octet 2 | |
| 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | SMS allowed | | 5GS registration result value | | | | octet 3 | |

Figure 9.11.3.6.1: 5GS registration result information element

Table 9.11.3.6.1: 5GS registration result information element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 5GS registration result value (octet 3, bits 1 to 3) | | | | |
| Bits | | | | |
| 3 | 2 | 1 |  |  |
| 0 | 0 | 1 |  | 3GPP access |
| 0 | 1 | 0 |  | Non-3GPP access |
| 0 | 1 | 1 |  | 3GPP access and non-3GPP access |
| 1 | 1 | 1 |  | reserved |
|  | | | | |
| All other values are unused and shall be treated as "3GPP access", if received by the UE. | | | | |
|  | | | | |
| SMS over NAS transport allowed (SMS allowed) (octet 3, bit 4) | | | | |
| Bit | | | | |
| 4 |  |  |  |  |
| 0 |  |  |  | SMS over NAS not allowed |
| 1 |  |  |  | SMS over NAS allowed |
|  | | | | |
| Bits 5 to 8 of octet 3 are spare and shall be coded as zero. | | | | |

[TS 24.501 clause 9.11.3.9A]

The purpose of the 5GS update type IE is to allow the UE to provide additional information to the network when performing a registration procedure.

The 5GS update type information element is coded as shown in figure 9.11.3.9A.1 and table 9.11.3.9A.1.

The 5GS update type is a type 4 information element.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | | 7 | | 6 | | 5 | | 4 | | 3 | | 2 | | 1 | |  | |
| 5GS update type IEI | | | | | | | | | | | | | | | | octet 1 | |
| Length of 5GS update type | | | | | | | | | | | | | | | | octet 2 | |
| 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | 0  Spare | | NG-RAN-RCU | | SMS requested | | octet 3 | |

Figure 9.11.3.9A.1: 5GS update type information element

Table 9.11.3.9A.1: 5GS update type information element

|  |  |  |
| --- | --- | --- |
| SMS over NAS transport requested (SMS requested) (octet 3, bit 1) | | |
| Bit | | |
| 1 |  |  |
| 0 |  | SMS over NAS not supported |
| 1 |  | SMS over NAS supported |
|  | | |
| NG-RAN Radio Capability Update (NG-RAN-RCU) (octet 3, bit 2) | | |
| Bits | | |
| 2 |  |  |
| 0 |  | NG-RAN radio capability update not needed |
| 1 |  | NG-RAN radio capability update needed |
|  | | |
| Bits 3 to 8 of octet 3 are spare and shall be coded as zero. | | |

9.1.8.1.3 Test description

9.1.8.1.3.1 Pre-test conditions

System Simulator:

NGC Cell A belongs to Home PLMN and TAI1;

UE:

The UE does not have any stored SMS message.

Preamble:

The UE is in state Switched OFF (state 0N-B) according to TS 38.508-1 [4].

9.1.8.1.3.2 Test procedure sequence

Table 9.1.8.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched ON. | - | - | - | - |
| 2 - 4 | UE establishes RRC connection by executing steps 2-4 of Table 4.5.2.2-2 in TS 38.508-1 [4]. | - | - | - | - |
| 5 | Check: Does UE transmit a REGISTRATION REQUEST message including 5GS update type IE with SMS requested bit set to "SMS over NAS supported"? | --> | REGISTRATION REQUEST | 1 | P |
| 6 - 14 | Steps 5 to 13 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4]are performed. | - | - | - | - |
| 15 | SS transmits REGISTRATION ACCEPT message including 5GS registration result with SMS allowed bit set to “SMS over NAS allowed” and T3512 value set to 3 minutes. | <-- | REGISTRATION ACCEPT | - | - |
| 16 -21a1 | Steps 15 to 20a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4]. | - | - | - | - |
| 21A | Wait for the expiry of T3512. | - | - | - | - |
| 22 - 24 | UE establishes RRC connection by executing steps 2-4 of Table 4.5.2.2-2 in TS38.508-1 [4]. | - | - | - | - |
| 25 | Check: Does UE perform periodic Registration, including 5GS update type IE with SMS requested bit set to "SMS over NAS supported"? | --> | REGISTRATION REQUEST | 2 | P |
| 26 - 34 | Void. | - | - | - | - |
| 35 | SS transmits REGISTRATION ACCEPT message including 5GS registration result with SMS allowed bit set to “SMS over NAS allowed” and T3512 value set to 3 minutes. | <-- | REGISTRATION ACCEPT | - | - |
| 35A | The UE transmits a REGISTRATION COMPLETE message. | --> | REGISTRATION COMPLETE | - | - |
| 36 | The SS transmits an *RRCRelease* message. | - | - | - | - |
| 37 | Sending of a 160 character MO SMS is initiated at the UE via MMI or AT command. | - | - | - | - |
| 38 | The UE establishes RRC connection and transmits a SERVICE REQUEST message by executing steps 2-4 of Table 4.5.4.2-2 in TS 38.508-1 [4]. | --> | SERVICE REQUEST |  |  |
| 39 -42 | Steps 5 to 8 of Table 4.5.4.2-3 of the generic procedure in TS 38.508-1 [4]are performed. | - | - | - | - |
| 43 | The UE transmits a CP-DATA containing an RP-DATA RPDU (SMS SUBMIT TPDU) encapsulated in an Uplink NAS transport message. | --> | UPLINK NAS TRANSPORT | 3 | P |
| 44 | The SS transmits a CP-ACK encapsulated in a Downlink NAS Transport message. | <-- | DOWNLINK NAS TRANSPORT | - | - |
| 45 | The SS transmits a CP-DATA containing an RP-ACK RPDU encapsulated in a Downlink NAS transport message | <-- | DOWNLINK NAS TRANSPORT | - | - |
| 46 | Check: Does the UE transmit a CP-ACK encapsulated in an Uplink NAS Transport message? | --> | UPLINK NAS TRANSPORT | 4 | P |
| 47 | The SS transmits an *RRCRelease* message | - | - | - | - |
| 48 | The SS pages the UE using NG-5G-S-TMSI. | - | - | - | - |
| 49 | The UE establishes RRC connection and transmits a SERVICE REQUEST message by executing steps 2-4 of Table 4.5.4.2-3 in TS 38.508-1 [4]. | --> | SERVICE REQUEST | - | - |
| 50-53 | Steps 5 to 8 of Table 4.5.4.2-3 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 54 | The SS transmits a CP-DATA containing a RP-DATA RPDU (SMS DELIVER TPDU) encapsulated in a Downlink NAS transport message to the UE. | <-- | DOWNLINK NAS TRANSPORT | - | - |
| 55 | Check: Does the UE transmit a CP-ACK encapsulated in an Uplink NAS transport message? | --> | UPLINK NAS TRANSPORT | 5 | P |
| 56 | Check: Does the UE transmit a CP-DATA containing a RP-ACK RPDU encapsulated in an Uplink NAS transport message? | --> | UPLINK NAS TRANSPORT | 5 | P |
| 57 | The SS transmits a CP-ACK encapsulated in a Downlink NAS transport message to the UE. | <-- | DOWNLINK NAS TRANSPORT | - | - |

9.1.8.1.3.3 Specific message contents

Table 9.1.8.1.3.3-1: REGISTRATION REQUEST (step 5, Table 9.1.8.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type |  |  |  |
| 5GS registration type value | ‘001’B |  | INITIAL |
| 5GS update type |  |  |  |
| SMS requested | SMS over NAS supported |  |  |

Table 9.1.8.1.3.3-2: REGISTRATION ACCEPT (steps 15 and 35, Table 9.1.8.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result |  |  |  |
| SMS allowed | SMS over NAS allowed |  |  |
| T3512 value |  |  |  |
| Timer value | ‘00011’B |  |  |
| Unit | ‘101’B |  |  |

Table 9.1.8.1.3.3-3: REGISTRATION REQUEST (step 25, Table 9.1.8.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type |  |  |  |
| 5GS registration type value | ‘011’B |  | PERIODIC |
| 5GS update type |  |  |  |
| SMS requested | SMS over NAS supported |  |  |

Table 9.1.8.1.3.3-3A: SERVICE REQUEST (step 38, Table 9.1.8.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-16 | | | |
| Information Element | Value/remark | Comment | Condition |
| Service type |  |  |  |
| Service type value | ‘0000’B | signalling |  |

Table 9.1.8.1.3.3-4: UL NAS TRANSPORT (step 43, Table 9.1.8.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-10 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0010’B | SMS |  |
| Payload container | CP-DATA | RP-DATA RPDU |  |

Table 9.1.8.1.3.3-5: DL NAS TRANSPORT (step 44, Table 9.1.8.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-11 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0010’B | SMS |  |
| Payload container | CP-ACK |  |  |

Table 9.1.8.1.3.3-6: DL NAS TRANSPORT (step 45, Table 9.1.8.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-11 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0010’B | SMS |  |
| Payload container | CP-DATA | RP-ACK RPDU |  |

Table 9.1.8.1.3.3-7: UL NAS TRANSPORT (step 46, Table 9.1.8.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-10 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0010’B | SMS |  |
| Payload container | CP-ACK |  |  |

Table 9.1.8.1.3.3-8: DL NAS TRANSPORT (step 54, Table 9.1.8.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-11 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0010’B | SMS |  |
| Payload container | CP-DATA | RP-DATA |  |

Table 9.1.8.1.3.3-9: UL NAS TRANSPORT (step 55, Table 9.1.8.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-10 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0010’B | SMS |  |
| Payload container | CP-ACK |  |  |

Table 9.1.8.1.3.3-10: UL NAS TRANSPORT (step 56, Table 9.1.8.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-10 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0010’B | SMS |  |
| Payload container | CP-DATA | RP-ACK |  |

Table 9.1.8.1.3.3-11: DL NAS TRANSPORT (step 57, Table 9.1.8.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-11 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0010’B | SMS |  |
| Payload container | CP-ACK |  |  |

#### 9.1.8.2 SMS over NAS / Multiple MO and MT SMS over NAS / Connected mode

9.1.8.2.1 Test Purpose (TP)

(1)

**with** { the UE is in 5GMM-REGISTERED state and 5GMM-CONNECTED mode over 3GPP access }

**ensure that** {  
 **when** { a Multiple MO SMS is initiated at the UE }

**then** { UE sends CP-DATA containing RP-DATA RPDU (SMS SUBMIT TPDU) encapsulated in an Uplink NAS transport message }

}

(2)

**with** { UE has sent CP-DATA containing an RP-DATA RPDU (SMS SUBMIT TPDU) encapsulated in an Uplink NAS transport message and has another MO SMS to send }

**ensure that** {  
 **when** { UE receives a CP-DATA containing an RP-ACK RPDU encapsulated in a Downlink NAS transport message }

**then** { UE does not send a final CP-ACK before it sends a CP-DATA containing the successive RP-DATA RPDU (SMS SUBMIT TPDU) encapsulated in an Uplink NAS transport message }

}

(3)

**with** { UE has sent CP-DATA containing an RP-DATA RPDU (SMS SUBMIT TPDU) encapsulated in an Uplink NAS transport message and has no further MO SMS to send }

ensure that {  
  **when** { UE receives a CP-DATA containing an RP-ACK RPDU encapsulated in a Downlink NAS transport message }

**then** { UE sends a CP-ACK encapsulated in an Uplink NAS transport message }

}

(4)

**with** { the UE is in 5GMM-REGISTERED state and 5GMM-CONNECTED mode over 3GPP access }

**ensure that** {  
 **when** { UE receives a CP-DATA containing an RP-DATA RPDU (SMS DELIVER TPDU) encapsulated in a Downlink NAS transport message, and subsequently a second CP-DATA containing an RP-DATA RPDU (SMS DELIVER TPDU) encapsulated in a Downlink NAS transport message with different transaction identifier }

**then** { UE sends twice a CP-ACK encapsulated in an Uplink NAS transport message followed by a CP-DATA containing an RP-ACK RPDU encapsulated in an Uplink NAS transport message}

}

9.1.8.2.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501 clause 4.5.4.2, and TS 24.011 clause 9.11.3.9A. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501 clause 4.5.4.2]

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

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

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

[TS 24.011 clause 5.4]

In the case of a SMS transfer via the PS domain, when the MS chooses to use the same PS signalling connection (in Iu mode and in S1 mode if packet-switched service is used); or in the case of a SMS transfer via the PS domain in A/Gb mode; or in the case of SMS transfer through the EPS, or in the case of SMS transfer in N1 mode, then:

- the MS shall transmit the CP-DATA for the successive RPDU and shall not transmit the final CP‑ACK for the current SMS (i.e. the one that acknowledges the CP‑DATA that carried the RP‑ACK);

- the Transaction Identifier used for the successive RPDU shall be different to that used for the current RPDU; and

- the MS shall not transmit the CP-DATA for the successive RPDU before the final CP‑DATA (i.e. the one that carried the RP‑ACK) has been received.

NOTE: When an MS sends successive memory available notifications and/or mobile originated short messages on different RR connections (in A/Gb mode) or signalling connections (in Iu mode and S1 mode), the MS is strongly recommended to use different Transaction Identifiers for the old and new MM connections.

It is possible that the final CP‑ACK of a short message transfer may not be received (e.g. due to transmission errors and/or hand overs).

For mobile terminated transfers, if the CP‑ACK is lost, the reception of a CP‑DATA with a different transaction identifier and carrying an RPDU shall be interpreted as the implicit reception of the awaited CP‑ACK followed by the reception of the new CP‑DATA message.

For mobile originated transfers, if the CP‑ACK is lost or not sent by the MS, the following events shall be interpreted as the implicit reception of the awaited CP‑ACK:

- in the case of a SMS transfer via the CS domain,, the reception of a CM SERVICE REQUEST followed by a CP‑DATA with a different transaction identifier and carrying an RPDU; or

- in the case of a SMS transfer via the PS domain, the reception of a CP-DATA with a different transaction identifier and carrying an RPDU.

9.1.8.2.3 Test description

9.1.8.2.3.1 Pre-test conditions

System Simulator:

NGC Cell A belongs to Home PLMN and TAI1.

UE:

The UE does not have any stored SMS message.

Preamble:

The UE is in state 3N-A, registered with "SMS over NAS supported".

9.1.8.2.3.2 Test procedure sequence

Table 9.1.8.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Sending of 3 MO SMS as multiple SMS is initiated at the UE via MMI or AT command | - | - | - | - |
| 2 | Check: Does the UE transmit a CP-DATA containing an RP-DATA RPDU (SMS SUBMIT TPDU) encapsulated in an Uplink NAS transport message? | --> | UPLINK NAS TRANSPORT | 1 | P |
| 3 | The SS transmits a CP-ACK encapsulated in a Downlink NAS Transport message. | <-- | DOWNLINK NAS TRANSPORT | - | - |
| 4 | The SS transmits a CP-DATA containing an RP-ACK RPDU encapsulated in a Downlink NAS transport message | <-- | DOWNLINK NAS TRANSPORT | - | - |
| 5 | Check: Does the UE transmit a CP-ACK encapsulated in an Uplink NAS Transport message before the CP-DATA in step 6 is transmitted? | --> | UPLINK NAS TRANSPORT | 2 | F |
| 6 | Check: Does the UE transmit a CP-DATA containing an RP-DATA RPDU (SMS SUBMIT TPDU) encapsulated in an Uplink NAS transport message? | --> | UPLINK NAS TRANSPORT | 2 | P |
| 7 | The SS transmits a CP-ACK encapsulated in a Downlink NAS Transport message. | <-- | DOWNLINK NAS TRANSPORT | - | - |
| 8 | The SS transmits a CP-DATA containing an RP-ACK RPDU encapsulated in a Downlink NAS transport message | <-- | DOWNLINK NAS TRANSPORT | - | - |
| 9 | Check: Does the UE transmit a CP-ACK encapsulated in an Uplink NAS Transport message before the CP-DATA in step 10 is transmitted? | --> | UPLINK NAS TRANSPORT | 2 | F |
| 10 | Check: Does the UE transmit a CP-DATA containing an RP-DATA RPDU (SMS SUBMIT TPDU) encapsulated in an Uplink NAS transport message? | --> | UPLINK NAS TRANSPORT | 2 | P |
| 11 | The SS transmits a CP-ACK encapsulated in a Downlink NAS Transport message. | <-- | DOWNLINK NAS TRANSPORT | - | - |
| 12 | The SS transmits a CP-DATA containing an RP-ACK RPDU encapsulated in a Downlink NAS transport message | <-- | DOWNLINK NAS TRANSPORT | - | - |
| 13 | Check: Does the UE transmit a CP-ACK encapsulated in an Uplink NAS Transport message? | --> | UPLINK NAS TRANSPORT | 3 | P |
| 14 | The SS transmits a CP-DATA containing an RP-DATA RPDU (SMS DELIVER TPDU) encapsulated in a Downlink NAS transport message to the UE. | <-- | DOWNLINK NAS TRANSPORT | - | - |
| 15 | Check: Does the UE transmit a CP-ACK encapsulated in an Uplink NAS transport message? | --> | UPLINK NAS TRANSPORT | 4 | P |
| 16 | Check: Does the UE transmit a CP-DATA containing an RP-ACK RPDU encapsulated in an Uplink NAS transport message? | --> | UPLINK NAS TRANSPORT | 4 | P |
| 17 | The SS transmits a CP-DATA containing an RP-DATA RPDU (SMS DELIVER TPDU) encapsulated in a Downlink NAS transport message to the UE. | <-- | DOWNLINK NAS TRANSPORT | - | - |
| 18 | Check: Does the UE transmit a CP-ACK encapsulated in an Uplink NAS transport message? | --> | UPLINK NAS TRANSPORT | 4 | P |
| 19 | Check: Does the UE transmit a CP-DATA containing an RP-ACK RPDU encapsulated in an Uplink NAS transport message? | --> | UPLINK NAS TRANSPORT | 4 | P |
| 20 | The SS transmits a CP-ACK encapsulated in a Downlink NAS transport message to the UE. | <-- | DOWNLINK NAS TRANSPORT | - | - |

9.1.8.2.3.3 Specific message contents

Table 9.1.8.2.3.3-1: UL NAS TRANSPORT (step 2, Table 9.1.8.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-10 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0010’B | SMS |  |
| Payload container | CP-DATA | RP-DATA RPDU  TI used in steps 2, 3 and 4 shall be x1. |  |

Table 9.1.8.2.3.3-2: DL NAS TRANSPORT (step 3, Table 9.1.8.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-11 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0010’B | SMS |  |
| Payload container | CP-ACK |  |  |

Table 9.1.8.2.3.3-3: DL NAS TRANSPORT (step 4, Table 9.1.8.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-11 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0010’B | SMS |  |
| Payload container | CP-DATA | RP-ACK RPDU |  |

Table 9.1.8.2.3.3-4: UL NAS TRANSPORT (step 6, Table 9.1.8.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-10 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0010’B | SMS |  |
| Payload container | CP-DATA | RP-DATA RPDU  TI used in steps 6, 7 and 8 shall be x2, with x1 <> x2 (see step 2). |  |

Table 9.1.8.2.3.3-5: DL NAS TRANSPORT (step 7, Table 9.1.8.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-11 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0010’B | SMS |  |
| Payload container | CP-ACK |  |  |

Table 9.1.8.2.3.3-6: DL NAS TRANSPORT (step 8, Table 9.1.8.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-11 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0010’B | SMS |  |
| Payload container | CP-DATA | RP-ACK RPDU |  |

Table 9.1.8.2.3.3-7: UL NAS TRANSPORT (step 10, Table 9.1.8.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-10 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0010’B | SMS |  |
| Payload container | CP-DATA | RP-DATA RPDU  TI used in steps 10, 11, 12 and 13 shall be x3, with x3 <> x2 (see step 6). |  |

Table 9.1.8.2.3.3-8: DL NAS TRANSPORT (step 11, Table 9.1.8.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-11 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0010’B | SMS |  |
| Payload container | CP-ACK |  |  |

Table 9.1.8.2.3.3-9: DL NAS TRANSPORT (step 12, Table 9.1.8.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-11 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0010’B | SMS |  |
| Payload container | CP-DATA | RP-ACK RPDU |  |

Table 9.1.8.2.3.3-10: UL NAS TRANSPORT (step 13, Table 9.1.8.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-10 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0010’B | SMS |  |
| Payload container | CP-ACK |  |  |

Table 9.1.8.2.3.3-11: DL NAS TRANSPORT (step 14, Table 9.1.8.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-11 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0010’B | SMS |  |
| Payload container | CP-DATA | RP-DATA RPDU  TI used in steps 14, 15 and 16 is y1. |  |

Table 9.1.8.2.3.3-12: UL NAS TRANSPORT (step 15, Table 9.1.8.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-10 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0010’B | SMS |  |
| Payload container | CP-ACK |  |  |

Table 9.1.8.2.3.3-13: UL NAS TRANSPORT (step 16, Table 9.1.8.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-10 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0010’B | SMS |  |
| Payload container | CP-DATA | RP-ACK RPDU |  |

Table 9.1.8.2.3.3-14: DL NAS TRANSPORT (step 17, Table 9.1.8.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-11 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0010’B | SMS |  |
| Payload container | CP-DATA | RP-DATA RPDU  TI used in steps 17, 18, 19 and 20 is y2, with y2 <> y1 (see step 14). |  |

Table 9.1.8.2.3.3-15: UL NAS TRANSPORT (step 18, Table 9.1.8.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-10 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0010’B | SMS |  |
| Payload container | CP-ACK |  |  |

Table 9.1.8.2.3.3-16: UL NAS TRANSPORT (step 19, Table 9.1.8.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-10 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0010’B | SMS |  |
| Payload container | CP-DATA | RP-ACK RPDU |  |

Table 9.1.8.2.3.3-17: DL NAS TRANSPORT (step 20, Table 9.1.8.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-11 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0010’B | SMS |  |
| Payload container | CP-ACK |  |  |

### 9.1.9 RACS

#### 9.1.9.1 RACS / Network assigned UE radio capability ID

9.1.9.1.1 Test Purpose (TP)

(1)

**with** { UE is switched on and the UE has an applicable UE radio capability ID for the current UE radio configuration for the selected network }

**ensure that** {

**when** { the UE performs an initial registration procedure }

**then** { the UE includes the UE radio capability ID in the REGISTRATION REQUEST message }

}

(2)

**with** { UE in state 5GMM-REGISTERED and 5GMM-IDLE mode and having assigned a new UE Radio Capability ID in the Registration Accept message }

**ensure that** {

**when** { UE enters a new tracking area that is not in the list of tracking areas that the UE previously registered in the AMF }

**then** { UE sends REGISTRATION REQUEST message including the new UE radio capability ID }

}

9.1.9.1.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501, clauses 4.16, 5.4.4.1, 5.4.4.2, 5.4.4.3, 5.4.4.4, 5.5.1.3.2. Unless otherwise stated these are Rel-16 requirements.

[TS 24.501, clause 4.16]

UE radio capability signalling optimisation (RACS) is a feature that is optional at both the UE and the network and which aims to optimise the transmission of UE radio capability over the radio interface (see 3GPP TS 23.501 [8]). RACS works by assigning an identifier to represent a set of UE radio capabilities. This identifier is called the UE radio capability ID. A UE radio capability ID can be either manufacturer-assigned or network-assigned. The UE radio capability ID is an alternative to the signalling of the radio capabilities container over the radio interface.

In this release of the specification, RACS is applicable to neither NB-N1 mode nor non-3GPP access.

If the UE supports RACS:

a) the UE shall indicate support for RACS by setting the RACS bit to "RACS supported" in the 5GMM capability IE of the REGISTRATION REQUEST message;

b) if the UE performs a registration procedure for initial registration and the UE has an applicable UE radio capability ID for the current UE radio configuration in the selected network, the UE shall include the UE radio capability ID in the UE radio capability ID IE as a non-cleartext IE in the REGISTRATION REQUEST message. If both a network-assigned UE radio capability ID and a manufacturer-assigned UE Radio Capability ID are applicable, the UE shall include the network-assigned UE radio capability ID in the REGISTRATION REQUEST message;

…

g) if the UE performs a registration procedure for mobility and periodic registration update due to entering a tracking area that is not in the list of tracking areas that the UE previously registered in the AMF and the UE has an applicable UE radio capability ID for the current UE radio configuration in the selected network, the UE shall include the UE radio capability ID in the UE radio capability ID IE as a non-cleartext IE in the REGISTRATION REQUEST message. If both a network-assigned UE radio capability ID and a manufacturer-assigned UE Radio Capability ID are applicable, the UE shall include the network-assigned UE radio capability ID in the REGISTRATION REQUEST message.

If the network supports RACS:

a) the network may assign a network-assigned UE radio capability ID to a UE which supports RACS by including a UE radio capability ID IE in the REGISTRATION ACCEPT message or in the CONFIGURATION UPDATE COMMAND message;

[TS 24.501, clause 5.4.4.1]

The purpose of this procedure is to:

a) allow the AMF to update the UE configuration for access and mobility management-related parameters decided and provided by the AMF by providing new parameter information within the command; or

b) request the UE to perform a registration procedure for mobility and periodic registration update towards the network to update access and mobility management-related parameters decided and provided by the AMF (see subclause 5.5.1.3).

…

9.1.9.1.3 Test description

9.1.9.1.3.1 Pre-test conditions

System Simulator:

- NGC Cell A configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in TS 38.508-1 [4] belongs to Home PLMN and set as serving cell;

- NGC Cell B configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in TS 38.508-1 [4] and set as Non-Suitable “Off” cell.

- System information combination NR-2 as defined in TS 38.508-1 [4] clause 4.4.3.1.2 is used.

UE:

- UE is previously registered on NGC Cell A using default message contents according to TS 38.508-1 [4].

Preamble:

- The UE is in state Switched OFF (State 0N-B) as per TS 38.508-1 [4] Table 4.4A.2-0.

9.1.9.1.3.2 Test procedure sequence

Table 9.1.9.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U – S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2 | Check: Does the UE transmit REGISTRATION REQUEST message including the UE radio capability ID 1? | --> | REGISTRATION REQUEST | 1 | P |
| 3-11 | Steps 5-13 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 12 | SS transmits a REGISTRATION ACCEPT message with a new UE radio capability ID 2. | <-- | REGISTRATION ACCEPT | - | - |
| 13-18 | Steps 15-20a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 19 | The SS configures NGC Cell A as the "Suitable Neighbour intra-frequency cell" and NGC Cell B as the "Serving cell". | - | - | - | - |
| 20 | Check: Does the UE perform on NGC Cell B the Registration procedure for mobility registration update by executing the Test procedure to check that UE is camped on a new cell belonging to a new TA as specified in TS 38.508-1 [4] subclause 4.9.5 including the new UE radio capability ID 2 in the REGISTRATION REQUEST message? | - | - | 2 | P |

9.1.9.1.3.3 Specific message contents

Table 9.1.9.1.3.3-1: REGISTRATION REQUEST (Preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type | '001'B | Initial registration |  |
| 5GMM capability |  |  |  |
| RACS | ‘1’B | RACS supported |  |

Table 9.1.9.1.3.3-2: REGISTRATION ACCEPT (Preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/Remark | Comment | Condition |
| UE radio capability ID | ‘01000000000010’O | Type Field (TF): 1  Version ID: 00  Radio Configuration Identifier (RCI): 000000000001 |  |

Table 9.1.9.1.3.3-3: REGISTRATION REQUEST (Step 2, Table 9.1.9.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type | '001'B | Initial registration |  |
| UE radio capability ID | ‘01000000000010’O | Type Field (TF): 1  Version ID: 00  Radio Configuration Identifier (RCI): 00000000001 |  |

Table 9.1.9.1.3.3-4: REGISTRATION ACCEPT (Step 12, Table 9.1.9.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/Remark | Comment | Condition |
| UE radio capability ID | ‘01000000000020’O | Type Field (TF): 1  Version ID: 00  Radio Configuration Identifier (RCI): 000000000002 |  |

Table 9.1.9.1.3.3-5: REGISTRATION REQUEST (Step 20, Table 9.1.9.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type | '010'B | mobility registration updating |  |
| UE radio capability ID | ‘010000000020’O | Type Field (TF): 1  Radio Configuration Identifier (RCI): 000000000002 |  |

#### 9.1.9.2 RACS / UE configuration update / UE radio capability ID

9.1.9.2.1 Test Purpose (TP)

(1)

**with** { UE in 5GMM-REGISTERED state and a UE Radio Capability ID assigned in REGISTRATION ACCEPT message }

**ensure that** {

**when** { UE receives CONFIGURATION UPDATE COMMAND with new UE Radio Capability ID and acknowledgement requested }

**then** { UE sends CONFIGURATION UPDATE COMPLETE message }

}

(2)

**with** { UE in state 5GMM-REGISTERED, and 5GMM-IDLE mode over 3GPP access and assigned a new UE Radio Capability ID in CONFIGURATION UPDATE COMMAND }

**ensure that** {

**when** { UE enters a new tracking area that is not in the list of tracking areas that the UE previously registered in the AMF }

**then** { UE sends REGISTRATION REQUEST message including the new UE radio capability ID }

}

9.1.9.2.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501, clauses 4.16, 5.4.4.1, 5.4.4.2, 5.4.4.3, 5.4.4.4, 5.5.1.3.2. Unless otherwise stated these are Rel-16 requirements.

[TS 24.501, clause 4.16]

UE radio capability signalling optimisation (RACS) is a feature that is optional at both the UE and the network and which aims to optimise the transmission of UE radio capability over the radio interface (see 3GPP TS 23.501 [8]). RACS works by assigning an identifier to represent a set of UE radio capabilities. This identifier is called the UE radio capability ID. A UE radio capability ID can be either manufacturer-assigned or network-assigned. The UE radio capability ID is an alternative to the signalling of the radio capabilities container over the radio interface.

In this release of the specification, RACS is applicable to neither NB-N1 mode nor non-3GPP access.

If the UE supports RACS:

a) the UE shall indicate support for RACS by setting the RACS bit to "RACS supported" in the 5GMM capability IE of the REGISTRATION REQUEST message;

b) if the UE performs a registration procedure for initial registration and the UE has an applicable UE radio capability ID for the current UE radio configuration in the selected network, the UE shall include the UE radio capability ID in the UE radio capability ID IE as a non-cleartext IE in the REGISTRATION REQUEST message. If both a network-assigned UE radio capability ID and a manufacturer-assigned UE Radio Capability ID are applicable, the UE shall include the network-assigned UE radio capability ID in the REGISTRATION REQUEST message;

...

d) upon receiving a network-assigned UE radio capability ID in the REGISTRATION ACCEPT message or the CONFIGURATION UPDATE COMMAND message, the UE shall store the network-assigned UE radio capability ID and the PLMN ID or SNPN identity of the serving network along with a mapping to the current UE radio configuration in its non-volatile memory as specified in annex C. The UE shall be able to store at least the last 16 received network-assigned UE radio capability IDs with the associated PLMN ID or SNPN identity and the mapping to the corresponding UE radio configuration;

…

g) if the UE performs a registration procedure for mobility and periodic registration update due to entering a tracking area that is not in the list of tracking areas that the UE previously registered in the AMF and the UE has an applicable UE radio capability ID for the current UE radio configuration in the selected network, the UE shall include the UE radio capability ID in the UE radio capability ID IE as a non-cleartext IE in the REGISTRATION REQUEST message. If both a network-assigned UE radio capability ID and a manufacturer-assigned UE Radio Capability ID are applicable, the UE shall include the network-assigned UE radio capability ID in the REGISTRATION REQUEST message.

If the network supports RACS:

a) the network may assign a network-assigned UE radio capability ID to a UE which supports RACS by including a UE radio capability ID IE in the REGISTRATION ACCEPT message or in the CONFIGURATION UPDATE COMMAND message;

[TS 24.501, clause 5.4.4.1]

The purpose of this procedure is to:

a) allow the AMF to update the UE configuration for access and mobility management-related parameters decided and provided by the AMF by providing new parameter information within the command; or

b) request the UE to perform a registration procedure for mobility and periodic registration update towards the network to update access and mobility management-related parameters decided and provided by the AMF (see subclause 5.5.1.3).

…

[TS 24.501, clause 5.4.4.2]

The AMF shall initiate the generic UE configuration update procedure by sending the CONFIGURATION UPDATE COMMAND message to the UE.

The AMF shall in the CONFIGURATION UPDATE COMMAND message either:

a) include one or more of the following parameters: 5G-GUTI, TAI list, allowed NSSAI that may include the mapped S-NSSAI(s), LADN information, service area list, MICO indication, NITZ information, configured NSSAI that may include the mapped S-NSSAI(s), rejected NSSAI, network slicing subscription change indication, operator-defined access category definitions, SMS indication, service gap time value, "CAG information list", UE radio capability ID, 5GS registration result, UE radio capability ID deletion indication or truncated 5G-S-TMSI configuration;

b) include the Configuration update indication IE with the Registration requested bit set to "registration requested"; or

c) include a combination of both a) and b).

If an acknowledgement from the UE is requested, the AMF shall indicate "acknowledgement requested" in the Acknowledgement bit of the Configuration update indication IE in the CONFIGURATION UPDATE COMMAND message and shall start timer T3555. Acknowledgement shall be requested for all parameters except when only NITZ is included.

[TS 24.501, clause 5.4.4.3]

Upon receiving the CONFIGURATION UPDATE COMMAND message, the UE shall stop timer T3346 if running and use the contents to update appropriate information stored within the UE.

If "acknowledgement requested" is indicated in the Acknowledgement bit of the Configuration update indication IE in the CONFIGURATION UPDATE COMMAND message, the UE shall send a CONFIGURATION UPDATE COMPLETE message.

…

If the UE is not in NB-N1 mode, the UE has set the RACS bit to "RACS supported" in the 5GMM capability IE of the REGISTRATION REQUEST message and the CONFIGURATION UPDATE COMMAND message includes:

a) a UE radio capability ID deletion indication IE set to "Network-assigned UE radio capability IDs deletion requested", the UE shall delete any network-assigned UE radio capability IDs associated with the RPLMN or RSNPN stored at the UE; and

b) a UE radio capability ID IE, the UE shall store the UE radio capability ID as specified in annex C

9.1.9.2.3 Test description

9.1.9.2.3.1 Pre-test conditions

System Simulator:

- NGC Cell A configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in TS 38.508-1 [4] belongs to Home PLMN and set as serving cell;

- NGC Cell B configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in TS 38.508-1 [4] and set as Non-Suitable “Off” cell.

- System information combination NR-2 as defined in TS 38.508-1 [4] clause 4.4.3.1.2 is used.

UE:

None

Preamble:

- The UE is in state 3N-A on NGC cell A according to TS 38.508-1 [4].

9.1.9.2.3.2 Test procedure sequence

Table 9.1.9.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U – S | Message |  |  |
| 1 | The SS transmits CONFIGURATION UPDATE COMMAND including a new UE Radio Capability ID. | <-- | CONFIGURATION UPDATE COMMAND | - | - |
| 2 | Check: Does UE transmit CONFIGURATION UPDATE COMPLETE? | --> | CONFIGURATION UPDATE COMPLETE | 1 | P |
| 3 | The SS transmits an *RRCRelease* message. | - | - | - | - |
| 4 | The SS configures NGC Cell A as the "Non-suitable cell" and NGC Cell B as the "Serving cell". | - | - | - | - |
| 5 | Check: Does the UE perform on NGC Cell B the Registration procedure for mobility registration update by executing the Test procedure to check that UE is camped on a new cell belonging to a new TA as specified in TS 38.508-1 [4] subclause 4.9.5? | - | - | 2 | P |

9.1.9.2.3.3 Specific message contents

Table 9.1.9.2.3.3-1: REGISTRATION REQUEST (Preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type | '001'B | Initial registration |  |
| 5GMM capability |  |  |  |
| RACS | ‘1’B | RACS supported |  |

Table 9.1.9.2.3.3-2: REGISTRATION ACCEPT (Preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/Remark | Comment | Condition |
| UE radio capability ID | ‘01000000000050’O | Type Field (TF): 1  Version ID: ‘00’H  Radio Configuration Identifier (RCI): 00000000005 |  |

Table 9.1.9.2.3.3-3: CONFIGURATION UPDATE COMMAND (step 1, Table 9.1.9.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-19 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Configuration update indication | ‘11010001’B | Acknowledgement Requested |  |
| UE radio capability ID | ‘01000000000070’O | Type Field (TF): ‘1’H  Version ID: ‘00’H  Radio Configuration Identifier (RCI): ‘00000000007’H |  |

Table 9.1.9.2.3.3-4: REGISTRATION REQUEST (step 5, Table 9.1.9.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type | '010'B | mobility registration updating |  |
| UE radio capability ID | ‘01000000000070’O | Type Field (TF): ‘1’H  Version ID: ‘00’H  Radio Configuration Identifier (RCI): ‘00000000007’H |  |

#### 9.1.9.3 RACS / PLMN change within registration area / From NW assigned to Manufacturer assigned UE Radio Capability ID

9.1.9.3.1 Test Purpose (TP)

(1)

**with** { UE in state 5GMM-REGISTERED and 5GMM-IDLE mode and NW has not assigned a UE Radio Capability ID in the Registration Accept message }

ensure that {

**when** { UE enters a new tracking area that is not in the list of tracking areas that the UE previously registered in the AMF }

**then** { UE sends REGISTRATION REQUEST message including the manufacturer-assigned UE Radio Capability ID }

}

(2)

**with** { UE in state 5GMM-REGISTERED and 5GMM-IDLE mode and having assigned a new UE Radio Capability ID in the Registration Accept message }

ensure that {

**when** { UE moves to cell belong to another equivalent PLMN }

**then** { UE sends REGISTRATION REQUEST message including the manufacturer-assigned UE Radio Capability ID }

}

9.1.9.3.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501, clauses 4.16, 5.5.1.3. Unless otherwise stated these are Rel-16 requirements.

[TS 24.501, clause 4.16]

UE radio capability signalling optimisation (RACS) is a feature that is optional at both the UE and the network and which aims to optimise the transmission of UE radio capability over the radio interface (see 3GPP TS 23.501 [8]). RACS works by assigning an identifier to represent a set of UE radio capabilities. This identifier is called the UE radio capability ID. A UE radio capability ID can be either manufacturer-assigned or network-assigned. The UE radio capability ID is an alternative to the signalling of the radio capabilities container over the radio interface.

In this release of the specification, RACS is applicable to neither NB-N1 mode nor non-3GPP access.

If the UE supports RACS:

a) the UE shall indicate support for RACS by setting the RACS bit to "RACS supported" in the 5GMM capability IE of the REGISTRATION REQUEST message;

b) if the UE performs a registration procedure for initial registration and the UE has an applicable UE radio capability ID for the current UE radio configuration in the selected network, the UE shall include the UE radio capability ID in the UE radio capability ID IE as a non-cleartext IE in the REGISTRATION REQUEST message. If both a network-assigned UE radio capability ID and a manufacturer-assigned UE Radio Capability ID are applicable, the UE shall include the network-assigned UE radio capability ID in the REGISTRATION REQUEST message;

…

e) the UE shall not use a network-assigned UE radio capability ID assigned by a PLMN in PLMNs equivalent to the PLMN which assigned it;

f) upon receiving a UE radio capability ID deletion indication IE set to "Network-assigned UE radio capability IDs deletion requested" in the REGISTRATION ACCEPT message or the CONFIGURATION UPDATE COMMAND message, the UE shall delete all network-assigned UE radio capability IDs stored at the UE for the serving network, initiate a registration procedure for mobility and periodic registration update and include an applicable manufacturer-assigned UE radio capability ID for the current UE radio configuration, if available at the UE, in the UE radio capability ID IE of the REGISTRATION REQUEST message; and

g) if the UE performs a registration procedure for mobility and periodic registration update due to entering a tracking area that is not in the list of tracking areas that the UE previously registered in the AMF and the UE has an applicable UE radio capability ID for the current UE radio configuration in the selected network, the UE shall include the UE radio capability ID in the UE radio capability ID IE as a non-cleartext IE in the REGISTRATION REQUEST message. If both a network-assigned UE radio capability ID and a manufacturer-assigned UE Radio Capability ID are applicable, the UE shall include the network-assigned UE radio capability ID in the REGISTRATION REQUEST message.

If the network supports RACS:

a) the network may assign a network-assigned UE radio capability ID to a UE which supports RACS by including a UE radio capability ID IE in the REGISTRATION ACCEPT message or in the CONFIGURATION UPDATE COMMAND message;

[TS 24.501, clause 5.5.1.3]

When the UE is not in NB-N1 mode, if the UE supports RACS, the UE shall:

a) set the RACS bit to "RACS supported" in the 5GMM capability IE of the REGISTRATION REQUEST message;

b) if the UE has an applicable network-assigned UE radio capability ID for the current UE radio configuration in the selected PLMN or SNPN, include the applicable network-assigned UE radio capability ID in the UE radio capability ID IE of the REGISTRATION REQUEST message; and

c) if the UE:

1) does not have an applicable network-assigned UE radio capability ID for the current UE radio configuration in the selected PLMN or SNPN; and

2) has an applicable manufacturer-assigned UE radio capability ID for the current UE radio configuration,

include the applicable manufacturer-assigned UE radio capability ID in the UE radio capability ID IE of the REGISTRATION REQUEST message.

…

9.1.9.3.3 Test description

9.1.9.3.3.1 Pre-test conditions

System Simulator:

- NGC Cell A configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in TS 38.508-1 [4] belongs to Home PLMN and set as serving cell;

- NGC Cell B and NGC Cell E configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in TS 38.508-1 [4] and set as Non-Suitable “Off” cell.

- System information combination NR-2 as defined in TS 38.508-1 [4] clause 4.4.3.1.2 is used.

UE:

- UE is previously registered on NGC Cell A using default message contents according to TS 38.508-1 [4].

Preamble:

- The UE is in test state (State 1N-A) as per TS 38.508-1 [4] Table 4.4A.2-0.

9.1.9.3.3.2 Test procedure sequence

Table 9.1.9.3.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U – S | Message |  |  |
| 1 | The SS configures:  - NGC Cell B as the "Serving cell".  - NGC Cell A, and NGC Cell E as a "Non-suitable 'Off' cell". | - | - | - | - |
| - | The following messages are to be observed on NGC Cell B unless explicitly stated otherwise. | - | - | - | - |
| 2 | Check: Does the UE transmit REGISTRATION REQUEST message including manufactured-assigned UE Radio Capability ID? | --> | REGISTRATION REQUEST | 1 | P |
| 3 | SS transmits a REGISTRATION ACCEPT message with a Network assigned UE radio capability ID and with PLMN ID of NGC Cell E included in the Equivalent PLMNs IE. | <-- | REGISTRATION ACCEPT | - | - |
| 4 | The UE transmits a REGISTRATION COMPLETE message. | --> | REGISTRATION COMPLETE | - | - |
| 5 | The SS releases the RRC connection. | - | - | - | - |
| 6 | The SS configures:  - NGC Cell E as the "Serving cell".  - NGC Cell A, and NGC Cell B as a "Non-suitable 'Off' cell". | - | - | - | - |
| - | The following messages are to be observed on NGC Cell E unless explicitly stated otherwise. | - | - | - | - |
| 7 | Check: Does the UE transmit REGISTRATION REQUEST message including manufactured-assigned UE Radio Capability ID? | --> | REGISTRATION REQUEST | 2 | P |
| 8 | SS transmits a REGISTRATION ACCEPT message with a Network assigned UE radio capability ID. | <-- | REGISTRATION ACCEPT | - | - |
| 9 | The UE transmits a REGISTRATION COMPLETE message. | --> | REGISTRATION COMPLETE | - | - |

9.1.9.3.3.3 Specific message contents

Table 9.1.9.3.3.3-1: REGISTRATION REQUEST (Preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type | '001'B | Initial registration |  |
| 5GMM capability |  |  |  |
| RACS | ‘1’B | RACS supported |  |

Table 9.1.9.3.3.3-2: REGISTRATION ACCEPT (Preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/Remark | Comment | Condition |
| UE radio capability ID | Not Present | Network Radio capability ID is not assigned |  |

Table 9.1.9.3.3.3-3: REGISTRATION REQUEST (Step 2, Table 9.1.9.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type | '010'B | mobility registration updating |  |
| UE radio capability ID | ‘X0XXXXXXX XXXXXXXXXXX’O | Type Field (TF): 0 Vendor ID: XXXXXXXX(Note) Radio Configuration Identifier (RCI): XXXXXXXXXXX |  |
| Note: Vendor ID is assigned by Internet Assigned Numbers Authority as per TS 23.003 [34], cl.29.2.The value is not checked. | | | |

Table 9.1.9.3.3.3-4: REGISTRATION ACCEPT (Step 3, Table 9.1.9.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/Remark | Comment | Condition |
| UE radio capability ID | ‘01000000000010’O | Type Field (TF): 1Version ID: 00 Radio Configuration Identifier (RCI): 000000000001 |  |
| Equivalent PLMNs | MCC=002, MNC=101 | PLMN ID of NGC Cell E |  |

Table 9.1.9.3.3.3-5: REGISTRATION REQUEST (Step 7, Table 9.1.9.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type | '010'B | mobility registration updating |  |
| UE radio capability ID | ‘X0XXXXXXX XXXXXXXXXXX’O | Type Field (TF): 0 Vendor ID: XXXXXXXX(Note) Radio Configuration Identifier (RCI): XXXXXXXXXXX |  |
| Note: Vendor ID is assigned by Internet Assigned Numbers Authority as per TS 23.003 [34], cl.29.2.The value is not checked. | | | |

Table 9.1.9.1.3.3-6: REGISTRATION ACCEPT (Step 8, Table 9.1.9.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/Remark | Comment | Condition |
| UE radio capability ID | ‘01000000000010’O | Type Field (TF): 1 Version ID: 00 Radio Configuration Identifier (RCI): 000000000001 |  |

#### 9.1.9.4 RACS / USIM change / Handling of URCID

9.1.9.4.1 Test Purpose (TP)

(1)

**with** { UE in state 5GMM-REGISTERED and 5GMM-IDLE mode and having assigned a UE Radio Capability ID in the REGISTRATION ACCEPT message }

**ensure that** {

**when** { UE is powered on or switched on with USIM having different SUPI }

**then** { UE does not include the UE radio capability ID in the REGISTRATION REQUEST message }

}

9.1.9.4.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clause 4.16, Annex C. Unless otherwise stated these are Rel-16 requirements.

[TS 24.501, clause 4.16]

UE radio capability signalling optimisation (RACS) is a feature that is optional at both the UE and the network and which aims to optimise the transmission of UE radio capability over the radio interface (see 3GPP TS 23.501 [8]). RACS works by assigning an identifier to represent a set of UE radio capabilities. This identifier is called the UE radio capability ID. A UE radio capability ID can be either manufacturer-assigned or network-assigned. The UE radio capability ID is an alternative to the signalling of the radio capabilities container over the radio interface.

In this release of the specification, RACS is applicable to neither NB-N1 mode nor non-3GPP access.

If the UE supports RACS:

a) the UE shall indicate support for RACS by setting the RACS bit to "RACS supported" in the 5GMM capability IE of the REGISTRATION REQUEST message;

b) if the UE performs a registration procedure for initial registration and the UE has an applicable UE radio capability ID for the current UE radio configuration in the selected network, the UE shall include the UE radio capability ID in the UE radio capability ID IE as a non-cleartext IE in the REGISTRATION REQUEST message. If both a network-assigned UE radio capability ID and a manufacturer-assigned UE Radio Capability ID are applicable, the UE shall include the network-assigned UE radio capability ID in the REGISTRATION REQUEST message;

If the network supports RACS:

a) the network may assign a network-assigned UE radio capability ID to a UE which supports RACS by including a UE radio capability ID IE in the REGISTRATION ACCEPT message or in the CONFIGURATION UPDATE COMMAND message;

[TS 24.501, Annex C]

The following 5GMM parameters shall be stored in a non-volatile memory in the ME together with the SUPI from the USIM:

- configured NSSAI(s);

- NSSRG information;

- NSSAI inclusion mode(s);

- MPS indicator;

- MCS indicator;

- operator-defined access category definitions;

- network-assigned UE radio capability IDs;

…

Each network-assigned UE radio capability ID is stored together with a PLMN identity of the PLMN that provided it as well as a mapping to the corresponding UE radio configuration, and is valid in that PLMN. A network-assigned UE radio capability ID can only be used if the SUPI from the USIM matches the SUPI stored in the non-volatile memory of the ME, else the UE shall delete the network-assigned UE radio capability ID.

9.1.9.4.3 Test description

9.1.9.4.3.1 Pre-test conditions

System Simulator:

- NGC Cell A configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in TS 38.508-1 [4] belongs to Home PLMN and set as serving cell;

UE:

- The UE is equipped with a USIM containing default values (as per TS 38.508-1 [4]).

Preamble:

- The UE is in test state 1N-A as defined in TS 38.508-1 [4], subclause 4.4A.2 on NGC Cell A.

9.1.9.4.3.2 Test procedure sequence

Table 9.1.9.4.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The generic test procedure in TS 38.508-1 [4]  Table 4.9.6.1-1 of Switch off procedure in  RRC\_IDLE are performed. | - | - | - | - |
| 2 | The UE is brought back to operation with USIM configuration 25 as defined in TS 38.508-1 [4] Table 6.4.1-25. | - | - | - | - |
| 3 | Check: Does the UE transmit an REGISTRATION REQUEST message without including UE radio capability ID? | --> | REGISTRATION REQUEST | 1 | P |
| 4-19a1 | Steps 5-20a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |

9.1.9.4.3.3 Specific message contents

Table 9.1.9.4.3.3-1: REGISTRATION REQUEST (Preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type | '001'B | Initial registration |  |
| 5GMM capability |  |  |  |
| RACS | ‘1’B | RACS supported |  |

Table 9.1.9.4.3.3-2: REGISTRATION ACCEPT (Preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/Remark | Comment | Condition |
| UE radio capability ID | ‘01000000000010’O | Type Field (TF): 1  Version ID: 00  Radio Configuration Identifier (RCI): 000000000001 |  |

Table 9.1.9.4.3.3-3: REGISTRATION REQUEST (step 3, Table 9.1.9.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type | '001'B | Initial registration |  |
| UE radio capability ID | Not present |  |  |

#### 9.1.9.5 RACS / Handling of delete indication for NW assigned UE radio capability ID

9.1.9.5.1 Test Purpose (TP)

(1)

**with** { UE in 5GMM-REGISTERED state and a UE Radio Capability ID assigned in REGISTRATION ACCEPT message }

**ensure that** {

**when** { UE receives CONFIGURATION UPDATE COMMAND with UE radio capability ID deletion indication and indicating “registration requested” }

**then** { UE deletes any stored Network-assigned UE radio capability IDs and then releases the existing N1 NAS signalling connection, starts a mobility registration procedure and does not include any Network-assigned UE radio capability IDs in the REGISTRATION REQUEST message }

}

(2)

**with** { UE in state 5GMM-REGISTERED, and 5GMM-IDLE mode over 3GPP access and assigned a new UE Radio Capability ID, enters a new tracking area that is not in the list of tracking areas that the UE previously registered in the AMF }

**ensure that** {

**when** { UE receives REGISTRATRATION ACCEPT message with UE radio capability ID deletion indication }

**then** { UE deletes the stored Network-assigned UE radio capability ID and initiate a registration procedure for mobility and periodic registration update over the existing N1 NAS signalling connection }

}

9.1.9.5.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501, clauses 4.16, 5.4.4.1, 5.4.4.2, 5.4.4.3, 5.5.1.2.4. Unless otherwise stated these are Rel-16 requirements.

[TS 24.501, clause 4.16]

UE radio capability signalling optimisation (RACS) is a feature that is optional at both the UE and the network and which aims to optimise the transmission of UE radio capability over the radio interface (see 3GPP TS 23.501 [8]). RACS works by assigning an identifier to represent a set of UE radio capabilities. This identifier is called the UE radio capability ID. A UE radio capability ID can be either manufacturer-assigned or network-assigned. The UE radio capability ID is an alternative to the signalling of the radio capabilities container over the radio interface.

In this release of the specification, RACS is applicable to neither NB-N1 mode nor non-3GPP access.

If the UE supports RACS:

a) the UE shall indicate support for RACS by setting the RACS bit to "RACS supported" in the 5GMM capability IE of the REGISTRATION REQUEST message;

b) if the UE performs a registration procedure for initial registration and the UE has an applicable UE radio capability ID for the current UE radio configuration in the selected network, the UE shall include the UE radio capability ID in the UE radio capability ID IE as a non-cleartext IE in the REGISTRATION REQUEST message. If both a network-assigned UE radio capability ID and a manufacturer-assigned UE Radio Capability ID are applicable, the UE shall include the network-assigned UE radio capability ID in the REGISTRATION REQUEST message;

...

d) upon receiving a network-assigned UE radio capability ID in the REGISTRATION ACCEPT message or the CONFIGURATION UPDATE COMMAND message, the UE shall store the network-assigned UE radio capability ID and the PLMN ID or SNPN identity of the serving network along with a mapping to the current UE radio configuration in its non-volatile memory as specified in annex C. The UE shall be able to store at least the last 16 received network-assigned UE radio capability IDs with the associated PLMN ID or SNPN identity and the mapping to the corresponding UE radio configuration;

…

f) upon receiving a UE radio capability ID deletion indication IE set to "delete network-assigned UE radio capability IDs" in the REGISTRATION ACCEPT message or the CONFIGURATION UPDATE COMMAND message, the UE shall delete all network-assigned UE radio capability IDs stored at the UE for the serving network, initiate a registration procedure for mobility and periodic registration update and include an applicable manufacturer-assigned UE radio capability ID for the current UE radio configuration, if available at the UE, in the UE radio capability ID IE of the REGISTRATION REQUEST message; and

g) if the UE performs a registration procedure for mobility and periodic registration update due to entering a tracking area that is not in the list of tracking areas that the UE previously registered in the AMF and the UE has an applicable UE radio capability ID for the current UE radio configuration in the selected network, the UE shall include the UE radio capability ID in the UE radio capability ID IE as a non-cleartext IE in the REGISTRATION REQUEST message. If both a network-assigned UE radio capability ID and a manufacturer-assigned UE Radio Capability ID are applicable, the UE shall include the network-assigned UE radio capability ID in the REGISTRATION REQUEST message.

If the network supports RACS:

a) the network may assign a network-assigned UE radio capability ID to a UE which supports RACS by including a UE radio capability ID IE in the REGISTRATION ACCEPT message or in the CONFIGURATION UPDATE COMMAND message;

[TS 24.501, clause 5.4.4.1]

The purpose of this procedure is to:

a) allow the AMF to update the UE configuration for access and mobility management-related parameters decided and provided by the AMF by providing new parameter information within the command; or

b) request the UE to perform a registration procedure for mobility and periodic registration update towards the network to update access and mobility management-related parameters decided and provided by the AMF (see subclause 5.5.1.3).

…

[TS 24.501, clause 5.4.4.2]

The AMF shall initiate the generic UE configuration update procedure by sending the CONFIGURATION UPDATE COMMAND message to the UE.

The AMF shall in the CONFIGURATION UPDATE COMMAND message either:

a) include one or more of the following parameters: 5G-GUTI, TAI list, allowed NSSAI that may include the mapped S-NSSAI(s), LADN information, service area list, MICO indication, NITZ information, configured NSSAI that may include the mapped S-NSSAI(s), rejected NSSAI, network slicing subscription change indication, operator-defined access category definitions, SMS indication, service gap time value, "CAG information list", UE radio capability ID, 5GS registration result, UE radio capability ID deletion indication or truncated 5G-S-TMSI configuration;

b) include the Configuration update indication IE with the Registration requested bit set to "registration requested"; or

c) include a combination of both a) and b).

If an acknowledgement from the UE is requested, the AMF shall indicate "acknowledgement requested" in the Acknowledgement bit of the Configuration update indication IE in the CONFIGURATION UPDATE COMMAND message and shall start timer T3555. Acknowledgement shall be requested for all parameters except when only NITZ is included.

…

If the AMF includes a UE radio capability ID deletion indication IE in the CONFIGURATION UPDATE COMMAND message, the AMF shall indicate "registration requested" in the Registration requested bit of the Configuration update indication IE.

…

If the UE is not in NB-N1 mode and the UE supports RACS, the AMF may include either a UE radio capability ID IE or a UE radio capability ID deletion indication IE in the CONFIGURATION UPDATE COMMAND message.

…

[TS 24.501, clause 5.4.4.3]

Upon receiving the CONFIGURATION UPDATE COMMAND message, the UE shall stop timer T3346 if running and use the contents to update appropriate information stored within the UE.

If "acknowledgement requested" is indicated in the Acknowledgement bit of the Configuration update indication IE in the CONFIGURATION UPDATE COMMAND message, the UE shall send a CONFIGURATION UPDATE COMPLETE message.

…

If the CONFIGURATION UPDATE COMMAND message indicates "registration requested" in the Registration requested bit of the Configuration update indication IE and:

…

d) a UE radio capability ID deletion indication IE set to "Network-assigned UE radio capability IDs deletion requested" is included, and:

1) the UE is not in NB-N1 mode;

2) a new allowed NSSAI, a new configured NSSAI or a Network slicing subscription change indication is not included; and

3) the UE has set the RACS bit to "RACS supported" in the 5GMM capability IE of the REGISTRATION REQUEST message,

the UE shall, after the completion of the generic UE configuration update procedure, start a registration procedure for mobility and registration update as specified in subclause 5.5.1.3.

…

If the UE is not in NB-N1 mode, the UE has set the RACS bit to "RACS supported" in the 5GMM capability IE of the REGISTRATION REQUEST message and the CONFIGURATION UPDATE COMMAND message includes:

a) a UE radio capability ID deletion indication IE set to "Network-assigned UE radio capability IDs deletion requested", the UE shall delete any network-assigned UE radio capability IDs associated with the RPLMN or RSNPN stored at the UE; and

b) a UE radio capability ID IE, the UE shall store the UE radio capability ID as specified in annex C

[TS 24.501, clause 5.5.1.2.4]

If the UE is not in NB-N1 mode, the UE has set the RACS bit to "RACS supported" in the 5GMM Capability IE of the REGISTRATION REQUEST message and the REGISTRATION ACCEPT message includes:

a) a UE radio capability ID deletion indication IE set to "Network-assigned UE radio capability IDs deletion requested", the UE shall delete any network-assigned UE radio capability IDs associated with the RPLMN or RSNPN stored at the UE, then the UE shall, after the completion of the ongoing registration procedure, initiate a registration procedure for mobility and periodic registration update as specified in subclause 5.5.1.3.2 over the existing N1 NAS signalling connection; and

b) a UE radio capability ID IE, the UE shall store the UE radio capability ID as specified in annex C.

9.1.9.5.3 Test description

9.1.9.5.3.1 Pre-test conditions

System Simulator:

- NGC Cell A configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in TS 38.508-1 [4] belongs to Home PLMN and set as serving cell;

- NGC Cell B configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in TS 38.508-1 [4] and set as Non-Suitable “Off” cell.

- System information combination NR-2 as defined in TS 38.508-1 [4] clause 4.4.3.1.2 is used.

UE:

None

Preamble:

- The UE is in state 3N-A on NGC cell A according to TS 38.508-1 [4].

9.1.9.5.3.2 Test procedure sequence

Table 9.1.9.5.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U – S | Message |  |  |
| 1 | The SS transmits CONFIGURATION UPDATE COMMAND including UE radio capability ID deletion indication. | <-- | CONFIGURATION UPDATE COMMAND | - | - |
| 2 | Check: Does UE transmit CONFIGURATION UPDATE COMPLETE? | --> | CONFIGURATION UPDATE COMPLETE | - | - |
| 3 | SS releases the RRC connection. | - | - | - | - |
| 4 | Check: Does UE transmit a REGISTRATION REQUEST message and does not include any Network-assigned UE radio capability ID? | --> | REGISTRATION REQUEST | 1 | P |
| 5 | The SS transmits a REGISTRATION ACCEPT message including a UE radio capability ID. | <-- | REGISTRATION ACCEPT | - | - |
| 6 | The UE transmits an *ULInformationTransfer* message and a REGISTRATION COMPLETE message. | --> | REGISTRATION COMPLETE | - | - |
| 7 | The SS transmits an *RRCRelease* message. | - | - | - | - |
| 8 | The SS configures NGC Cell A as the "Non-suitable Off cell" and NGC Cell B as the "Serving cell". | - | - | - | - |
| 9 | The UE initiates a Registration procedure for mobility registration update by transmitting a REGISTRATION REQUEST message on NGC Cell B and includes the UE radio capability ID assigned at step 5. | --> | REGISTRATION REQUEST | - | - |
| 10 | The SS transmits REGISTRATION ACCEPT message including UE radio capability ID deletion indication. | <-- | REGISTRATION ACCEPT | - | - |
| 11 | The UE transmits an *ULInformationTransfer* message and a REGISTRATION COMPLETE message. | --> | REGISTRATION COMPLETE | - | - |
| 12 | Check: Does UE transmit a REGISTRATION REQUEST message and does not include any Network-assigned UE radio capability ID? | --> | REGISTRATION REQUEST | 2 | P |
| 13 | The SS transmits a REGISTRATION ACCEPT message. | <-- | REGISTRATION ACCEPT | - | - |
| 14 | The UE transmits an *ULInformationTransfer* message and a REGISTRATION COMPLETE message. | --> | REGISTRATION COMPLETE | - | - |
| 15 | The SS transmits an *RRCRelease* message. | - | - | - | - |

9.1.9.5.3.3 Specific message contents

Table 9.1.9.5.3.3-1: REGISTRATION REQUEST (Preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type | '001'B | Initial registration |  |
| 5GMM capability |  |  |  |
| RACS | ‘1’B | RACS supported |  |

Table 9.1.9.5.3.3-2: REGISTRATION ACCEPT (Preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/Remark | Comment | Condition |
| UE radio capability ID | ‘01000000000010’O | Type Field (TF): 1  Version ID: 00  Radio Configuration Identifier (RCI): 00000000001 |  |

Table 9.1.9.5.3.3-3: CONFIGURATION UPDATE COMMAND (step 1, Table 9.1.9.5.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-19 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Configuration update indication | ‘11010011’B | Registration and Acknowledgement (ACK) requested |  |
| UE radio capability ID deletion indication | ‘001'B | Network-assigned UE radio capability IDs deletion requested |  |

Table 9.1.9.5.3.3-4: REGISTRATION REQUEST (step 4 and 12, Table 9.1.9.5.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type | '010'B | mobility registration updating |  |
| UE radio capability ID | Not present or ‘x0xxxxxxxxxxxxxxxxxx’O | Manufacturer assigned UE radio capability ID, If present |  |

Table 9.1.9.5.3.3-5: REGISTRATION ACCEPT (step 5, Table 9.1.9.5.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/Remark | Comment | Condition |
| UE radio capability ID | ‘01000000000020’O | Type Field (TF): 1  Version ID: 00  Radio Configuration Identifier (RCI): 00000000002 |  |

Table 9.1.9.2.3.3-6: REGISTRATION REQUEST (step 9, Table 9.1.9.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type | '010'B | mobility registration updating |  |
| UE radio capability ID | ‘01000000000020’O | Type Field (TF): ‘1’H  Version ID: 00  Radio Configuration Identifier (RCI): ‘00000000002’H |  |

Table 9.1.9.5.3.3-7: REGISTRATION ACCEPT (step 10, Table 9.1.9.5.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/Remark | Comment | Condition |
| UE radio capability ID deletion indication | ‘001'B | Network-assigned UE radio capability IDs deletion requested |  |
| UE radio capability ID | Not Present |  |  |

Table 9.1.9.5.3.3-8: REGISTRATION ACCEPT (step 13, Table 9.1.9.5.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/Remark | Comment | Condition |
| UE radio capability ID | Not Present |  |  |

#### 9.1.9.6 RACS / Change in radio capability / NW assigned URCID

9.1.9.6.1 Test Purpose (TP)

(1)

**with** { UE in 5GMM-REGISTERED state, and 5GMM-IDLE mode over 3GPP access and a UE Radio Capability ID assigned in REGISTRATION ACCEPT message }

ensure that {

**when** { radio configuration at the UE changes }

**then** { UE initiate a registration procedure for mobility and periodic registration update over the existing N1 NAS signalling connection, and includes the 5GS update type IE in the REGISTRATION REQUEST message with the NG-RAN-RCU bit set to "UE radio capability update needed" }

}

9.1.9.6.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501, clauses 4.16, 5.5.1.3.2. Unless otherwise stated these are Rel-16 requirements.

[TS 24.501, clause 4.16]

UE radio capability signalling optimisation (RACS) is a feature that is optional at both the UE and the network and which aims to optimise the transmission of UE radio capability over the radio interface (see 3GPP TS 23.501 [8]). RACS works by assigning an identifier to represent a set of UE radio capabilities. This identifier is called the UE radio capability ID. A UE radio capability ID can be either manufacturer-assigned or network-assigned. The UE radio capability ID is an alternative to the signalling of the radio capabilities container over the radio interface.

In this release of the specification, RACS is applicable to neither NB-N1 mode nor non-3GPP access.

If the UE supports RACS:

a) the UE shall indicate support for RACS by setting the RACS bit to "RACS supported" in the 5GMM capability IE of the REGISTRATION REQUEST message;

c) if the radio configuration at the UE changes (for instance because the UE has disabled a specific radio capability) then:

1) if the UE has an applicable UE radio capability ID for the new UE radio configuration, the UE shall initiate a registration procedure for mobility and periodic registration update. The UE shall include the applicable UE radio capability ID in the UE radio capability ID IE of the REGISTRATION REQUEST message and shall include the 5GS update type IE in the REGISTRATION REQUEST message with the NG-RAN-RCU bit set to "UE radio capability update needed". If both a network-assigned UE radio capability ID and a manufacturer-assigned UE Radio Capability ID are applicable, the UE shall include the network-assigned UE radio capability ID in the REGISTRATION REQUEST message; and

2) if the UE does not have an applicable UE radio capability ID for the new UE radio configuration, the UE shall initiate a registration procedure for mobility and periodic registration update and include the 5GS update type IE in the REGISTRATION REQUEST message with the NG-RAN-RCU bit set to "UE radio capability update needed";

NOTE: Performing the registration procedure for mobility and periodic registration update and including the 5GS update type IE in the REGISTRATION REQUEST message with the NG-RAN-RCU bit set to "UE radio capability update needed" without a UE radio capability ID included in the REGISTRATION REQUEST message can trigger the network to assign a new UE radio capability ID to the UE.

…

If the network supports RACS:

a) the network may assign a network-assigned UE radio capability ID to a UE which supports RACS by including a UE radio capability ID IE in the REGISTRATION ACCEPT message or in the CONFIGURATION UPDATE COMMAND message;

[TS 24.501, clause 5.5.1.3.2]

m) when the UE needs to indicate PDU session status to the network after performing a local release of PDU session(s) as specified in subclauses 6.4.1.5 and 6.4.3.5;

n) when the UE in 5GMM-IDLE mode changes the radio capability for NG-RAN or E-UTRAN;

…

For case n), the UE shall include the 5GS update type IE in the REGISTRATION REQUEST message with the NG-RAN-RCU bit set to " UE radio capability update needed". Additionally, if the UE is not in NB-N1 mode, the UE supports RACS and the UE has an applicable UE radio capability ID for the new UE radio configuration in the serving PLMN or SNPN, the UE shall include the applicable UE radio capability ID in the UE radio capability ID of the REGISTRATION REQUEST message.

…

If the UE is not in NB-N1 mode and the UE has set the RACS bit to "RACS supported" in the 5GMM Capability IE of the REGISTRATION REQUEST message, the AMF may include either a UE radio capability ID IE or a UE radio capability ID deletion indication IE in the REGISTRATION ACCEPT message. If the UE radio capability ID IE or the UE radio capability ID deletion indication IE is included in the REGISTRATION ACCEPT message, the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3.

…

9.1.9.6.3 Test description

9.1.9.6.3.1 Pre-test conditions

System Simulator:

- NGC Cell A configured according to Table 6.3.2.2-1 and Table 6.3.2.2-3 in TS 38.508-1 [4] belongs to Home PLMN and set as serving cell;

UE:

None

Preamble:

- The UE is in state 1N-A on NGC cell A according to TS 38.508-1 [4].

9.1.9.6.3.2 Test procedure sequence

Table 9.1.9.6.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U – S | Message |  |  |
| 1 | Cause the UE to change the radio capability configuration. (Note 1) | - | - | - | - |
| 2 | Check: Does the UE transmit REGISTRATION REQUEST message including ‘NG-RAN-RCU’ bit? | --> | REGISTRATION REQUEST | 1 | P |
| 3 | SS transmits a REGISTRATION ACCEPT message with a UE radio capability ID 2. | <-- | REGISTRATION ACCEPT | - | - |
| 4 | The UE transmits a REGISTRATION COMPLETE message. | --> | REGISTRATION COMPLETE | - | - |
| Note 1: The request to change radio capability configuration be performed by MMI or AT Command. | | | | | |

9.1.9.6.3.3 Specific message contents

Table 9.1.9.6.3.3-1: REGISTRATION REQUEST (Preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type | '001'B | Initial registration |  |
| 5GMM capability |  |  |  |
| RACS | ‘1’B | RACS supported |  |

Table 9.1.9.6.3.3-1A: REGISTRATION ACCEPT (preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/Remark | Comment | Condition |
| UE radio capability ID | ‘01000000000010’O | Type Field (TF): 1  Version ID: 00  Radio Configuration Identifier (RCI): 000000000001 |  |

Table 9.1.9.6.3.3-2: REGISTRATION REQUEST (Step 2, Table 9.1.9.6.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type | '010'B | mobility registration updating |  |
| 5GS update type |  |  |  |
| NG-RAN-RCU | UE radio capability update needed |  |  |

Table 9.1.9.6.3.3-3: REGISTRATION ACCEPT (Step 3, Table 9.1.9.6.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/Remark | Comment | Condition |
| UE radio capability ID | ‘01000000000020’O | Type Field (TF): 1  Version ID: 00  Radio Configuration Identifier (RCI): 000000000002 |  |

#### 9.1.9.7 RACS / Inter-system mobility registration update / Handling of UE radio capability ID

9.1.9.7.1 Test Purpose (TP)

(1)

**with** { UE in state EMM-REGISTERED and EMM-IDLE on an E-UTRA cell and has been previously registered on 5GC, UE supporting S1 and N1 and operating in single-registration mode, NWK supporting Single-registration mode with N26 interface and a UE Radio Capability ID assigned in the ATTACH ACCEPT message}

**ensure that** {

**when** { UE detects a suitable NGC cell after the serving E-UTRA cell becomes not suitable }

**then** { UE performs a Inter-system change from S1 mode to N1 mode by initiating and successfully completing a mobility and periodic registration update procedure, and includes the UE radio capability ID in the REGISTRATION REQUEST message }

}

(2)

**with** { UE in state 5GMM-REGISTERED and 5GMM-IDLE on a 5GC NR cell and has been previously registered on EPC as well, UE supporting S1 and N1 and operating in single-registration mode, NWK supporting Single-registration mode with N26 interface, having assigned a new UE Radio Capability ID in the Registration Accept message }

**ensure that** {

**when** { UE detects a suitable EPC E-UTRA cell after the serving NGC cell becomes not suitable }

**then** { UE performs a Inter-system change from N1 mode to S1 mode by initiating and successfully completing a TAU procedure, and the UE shall indicate that the UE has a radio capability ID available in the radio capability ID availability IE in the TRACKING AREA UPDATE REQUEST message. }

}

9.1.9.7.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501, clauses 4.16, 5.4.4.1, 5.4.4.2, 5.4.4.3, 5.5.1.2.4. Unless otherwise stated these are Rel-16 requirements.

[TS 24.501, clause 4.16]

UE radio capability signalling optimisation (RACS) is a feature that is optional at both the UE and the network and which aims to optimise the transmission of UE radio capability over the radio interface (see 3GPP TS 23.501 [8]). RACS works by assigning an identifier to represent a set of UE radio capabilities. This identifier is called the UE radio capability ID. A UE radio capability ID can be either manufacturer-assigned or network-assigned. The UE radio capability ID is an alternative to the signalling of the radio capabilities container over the radio interface.

In this release of the specification, RACS is applicable to neither NB-N1 mode nor non-3GPP access.

If the UE supports RACS:

a) the UE shall indicate support for RACS by setting the RACS bit to "RACS supported" in the 5GMM capability IE of the REGISTRATION REQUEST message;

b) if the UE performs a registration procedure for initial registration and the UE has an applicable UE radio capability ID for the current UE radio configuration in the selected network, the UE shall include the UE radio capability ID in the UE radio capability ID IE as a non-cleartext IE in the REGISTRATION REQUEST message. If both a network-assigned UE radio capability ID and a manufacturer-assigned UE Radio Capability ID are applicable, the UE shall include the network-assigned UE radio capability ID in the REGISTRATION REQUEST message;

...

d) upon receiving a network-assigned UE radio capability ID in the REGISTRATION ACCEPT message or the CONFIGURATION UPDATE COMMAND message, the UE shall store the network-assigned UE radio capability ID and the PLMN ID or SNPN identity of the serving network along with a mapping to the current UE radio configuration in its non-volatile memory as specified in annex C. The UE shall be able to store at least the last 16 received network-assigned UE radio capability IDs with the associated PLMN ID or SNPN identity and the mapping to the corresponding UE radio configuration;

…

f) upon receiving a UE radio capability ID deletion indication IE set to "delete network-assigned UE radio capability IDs" in the REGISTRATION ACCEPT message or the CONFIGURATION UPDATE COMMAND message, the UE shall delete all network-assigned UE radio capability IDs stored at the UE for the serving network, initiate a registration procedure for mobility and periodic registration update and include an applicable manufacturer-assigned UE radio capability ID for the current UE radio configuration, if available at the UE, in the UE radio capability ID IE of the REGISTRATION REQUEST message; and

g) if the UE performs a registration procedure for mobility and periodic registration update due to entering a tracking area that is not in the list of tracking areas that the UE previously registered in the AMF and the UE has an applicable UE radio capability ID for the current UE radio configuration in the selected network, the UE shall include the UE radio capability ID in the UE radio capability ID IE as a non-cleartext IE in the REGISTRATION REQUEST message. If both a network-assigned UE radio capability ID and a manufacturer-assigned UE Radio Capability ID are applicable, the UE shall include the network-assigned UE radio capability ID in the REGISTRATION REQUEST message.

If the network supports RACS:

a) the network may assign a network-assigned UE radio capability ID to a UE which supports RACS by including a UE radio capability ID IE in the REGISTRATION ACCEPT message or in the CONFIGURATION UPDATE COMMAND message;

[TS 24.501, clause 5.5.1.2.4]

If the UE is not in NB-N1 mode, the UE has set the RACS bit to "RACS supported" in the 5GMM Capability IE of the REGISTRATION REQUEST message and the REGISTRATION ACCEPT message includes:

a) a UE radio capability ID deletion indication IE set to "Network-assigned UE radio capability IDs deletion requested", the UE shall delete any network-assigned UE radio capability IDs associated with the RPLMN or RSNPN stored at the UE, then the UE shall, after the completion of the ongoing registration procedure, initiate a registration procedure for mobility and periodic registration update as specified in subclause 5.5.1.3.2 over the existing N1 NAS signalling connection; and

b) a UE radio capability ID IE, the UE shall store the UE radio capability ID as specified in annex C.

c) if the UE:

1) does not have an applicable network-assigned UE radio capability ID for the current UE radio configuration in the selected PLMN or SNPN; and

2) has an applicable manufacturer-assigned UE radio capability ID for the current UE radio configuration,

include the applicable manufacturer-assigned UE radio capability ID in the UE radio capability ID IE of the REGISTRATION REQUEST message.

[TS 24.301, clause 5.3.20]

UE radio capability signalling optimisation (RACS) is a feature that is optional at both the UE and the network and which aims to optimise the transmission of UE radio capability over the radio interface (see 3GPP TS 23.401 [10]). RACS works by assigning an identifier to represent a set of UE radio capabilities. This identifier is called the UE radio capability ID. A UE radio capability ID can be either manufacturer-assigned or network-assigned. The UE radio capability ID is an alternative to the signalling of the radio capabilities container over the radio interface.

In this release of the specification, RACS is not applicable to NB-S1 mode.

If the UE supports RACS:

- the UE shall indicate support for RACS by setting the RACS bit to "RACS supported" in the UE network capability IE of the ATTACH REQUEST and TRACKING AREA UPDATE REQUEST messages;

- if the UE performs an attach procedure and the UE has an applicable UE radio capability ID for the current UE radio configuration in the selected network, the UE shall include the UE radio capability ID availability IE in the ATTACH REQUEST message and set the IE to "UE radio capability ID available";

- if the UE performs a tracking area updating procedure and the UE has an applicable UE radio capability ID for the current UE radio configuration in the selected network, the UE shall include the UE radio capability ID availability IE in the TRACKING AREA UPDATE REQUEST message and set the IE to "UE radio capability ID available";

- If the UE is requested to provide its UE radio capability ID by the network during a security mode control procedure, the UE shall include its UE radio capability ID in the UE radio capability ID IE of the SECURITY MODE COMPLETE message. If both a network-assigned UE radio capability ID and a manufacturer-assigned UE radio capability ID are applicable, the UE shall include the network-assigned UE radio capability ID in the SECURITY MODE COMPLETE message;

- if the radio configuration at the UE changes (for instance because the UE has disabled a specific radio capability) then:

a) if the UE has an applicable UE radio capability ID for the new UE radio configuration, the UE shall initiate a tracking area updating procedure, include a UE radio capability information update needed IE in the TRACKING AREA UPDATE REQUEST message and include a UE radio capability ID availability IE set to "UE radio capability ID available" in the TRACKING AREA UPDATE REQUEST message. If both a network-assigned UE radio capability ID and a manufacturer-assigned UE Radio Capability ID are applicable, the UE shall include the network-assigned UE radio capability ID in the TRACKING AREA UPDATE REQUEST message; and

b) if the UE does not have an applicable UE radio capability ID for the new UE radio configuration, the UE shall initiate a tracking area updating procedure and shall include a UE radio capability information update needed IE in the TRACKING AREA UPDATE REQUEST message;

NOTE: Performing the tracking area updating procedure with the UE radio capability information update needed IE included in the TRACKING AREA UPDATE REQUEST message and without the UE radio capability ID availability IE set to "UE radio capability ID available" in the TRACKING AREA UPDATE REQUEST message as specified in b) above can trigger the network to assign a new UE radio capability ID to the UE.

….

[TS 24.301, clause 5.5.3.3.2]

The UE operating in CS/PS mode 1 or CS/PS mode 2, in state EMM-REGISTERED, shall initiate the combined tracking area updating procedure:

…

zf) in WB-S1 mode, when the applicable UE radio capability ID for the current UE radio configuration changes due to a reselection to a new PLMN or a revocation of the network-assigned UE radio capability IDs by the serving PLMN; or

…

For cases n, zc, ze and zf, the UE shall include a UE radio capability information update needed IE in the TRACKING AREA UPDATE REQUEST message.

…

9.1.9.7.3 Test description

9.1.9.7.3.1 Pre-test conditions

System Simulator:

- 2 cells

- NGC Cell A as defined in TS 38.508-1 [4] Table 6.3.2.2-1. System information combination NR-6 as defined in TS 38.508-1 [4], subclause 4.4.3.1.2.

- E-UTRA Cell A as defined in TS 36.508 [7] Table 6.3.2.2-1. System information combination 31 as defined in TS 36.508 [7], subclause 4.4.3.1.1.

UE:

None.

Preamble:

- With NGC Cell A "Serving cell" and E-UTRA Cell A "Non-suitable "Off" cell", the UE is brought to state 0N-B as defined in 38.508-1 [4], subclause 4.4A on NGC Cell A.

- With E-UTRA Cell A "Serving cell" and NGC Cell A "Non-suitable "Off" cell", the UE is brought to state RRC\_IDLE using generic procedure parameters Connectivity (*E-UTRA/EPC*) and Unrestricted nr PDN (*On*)in accordance with the procedure described in TS 38.508-1 [4], clause 4.5.2.

9.1.9.7.3.2 Test procedure sequence

Table 9.1.9.7.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS configures:  - NGC Cell A as "Serving cell"  - E-UTRA Cell A as "Non-suitable "off" cell". | - | - | - | - |
| 2 | Check: Does the UE perform test procedure for UE Tracking area updating for Inter-system change from S1 mode to N1 mode in 5GMM/EMM-IDLE mode as described in TS 38.508-1 [4], Table 4.9.9.2.2-1 on NGC Cell A? | - | - | 1 | - |
| 3 | The SS configures:  - E-UTRA Cell A as "Serving cell"  - NGC Cell A as "Non-suitable "off" cell". | - | - | - | - |
| 4 | Check: Does the UE perform Test procedure for UE Tracking area updating for Inter-system change from N1 mode to S1 mode in 5GMM/EMM-IDLE mode as described in TS 38.508-1 [4], Table 4.9.7.2.2-1, '*connected without release*' on E-UTRA Cell A? | - | - | 2 | - |

9.1.9.7.3.3 Specific message contents

Table 9.1.9.7.3.3-1: ATTACH ACCEPT (Preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 36.508, Table 4.7.2-1 | | | |
| Information Element | Value/Remark | Comment | Condition |
| UE radio capability ID | ‘01000000000010’O | Type Field (TF): 1  Version ID: 00  Radio Configuration Identifier (RCI): 00000000001 |  |

Table 9.1.9.7.3.3-2: REGISTRATION REQUEST (step 2, Table 9.1.9.7.3.2-1; step 3, TS 38.508-1 [4], Table 4.9.9.2.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type | '010'B | Mobility registration updating |  |
| 5GMM capability |  |  |  |
| RACS | ‘1’B | RACS supported |  |
| UE radio capability ID | ‘01000000000010’O | Type Field (TF): 1  Version ID: 00  Radio Configuration Identifier (RCI): 00000000001 |  |

Table 9.1.9.7.3.3-3: REGISTRATION ACCEPT (step 2, Table 9.1.9.7.3.2-1; step 10, TS 38.508-1 [4], Table 4.9.9.2.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/Remark | Comment | Condition |
| UE radio capability ID | ‘01000000000020’O | Type Field (TF): 1  Version ID: 00  Radio Configuration Identifier (RCI): 00000000002 |  |

Table 9.1.9.7.3.3-4: TRACKING AREA UPDATE REQUEST (step 4, Table 9.1.9.7.3.2-1; step 3, TS 38.508-1 [4], Table 4.9.7.2.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| UE radio capability ID availability | ’001’B | UE radio capability available |  |

### 9.1.10 Network slice-specific authentication and authorization

#### 9.1.10.1 NSSAA / EAP message transport / Success

9.1.10.1.1 Test Purpose (TP)

(1)

**with** { UE in 5GMM-DEREGISTERED state and supports network slice-specific authentication and authorization }

**ensure that** {

**when** { UE is switched on }

**then** { UE transmits REGISTRATION REQUEST message with NSSAA bit in the 5GMM capability IE set to "network slice-specific authentication and authorization supported" }

}

(2)

**with** { UE is in 5GMM-REGISTERED state }

**ensure that** {

**when** { SS sends NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message with EAP message IE set to EAP-request message }

**then** { UE sends NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE message with EAP message IE set to the EAP-response message }

}

(3)

**with** { UE is in 5GMM-REGISTERED state }

**ensure that** {

**when** { SS sends NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message }

**then** { UE sends NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE message with S-NSSAI IE set to the S-NSSAI value received in NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message }

}

(4)

**with** { UE is in 5GMM-REGISTERED state }

**ensure that** {

**when** { SS sends CONFIGURATION UPDATE COMMAND message with allowed NSSAI for which the network slice-specific authentication and authorization has been successfully performed }

**then** { UE considers the new allowed NSSAI as valid and store the allowed NSSAI }

}

(5)

**with** { UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { SS sends REGISTRATION ACCEPT message with pending NSSAI and "NSSAA to be performed" indicator set to indicate that the network slice-specific authentication and authorization procedure will be performed }

**then** { UE shall store the S-NSSAI(s) in the pending NSSAI }

}

(6)

**with** { UE in 5GMM-REGISTERED state and configured with allowed NSSAI }

**ensure that** {

**when** { UE receives CONFIGURATION UPDATE COMMAND message with allowed NSSAI which the network slice-specific authentication and authorization has been successfully performed }

**then** { UE considers the new allowed NSSAI as valid and considers the old allowed NSSAI as invalid }

}

9.1.10.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clause 5.4.4.3, 5.4.7.2.2, 5.5.1.2.2, 5.5.1.2.4 and TS 23.502, clause 4.2.9.2. Unless otherwise stated these are Rel-16 requirements.

[TS 24.501 clause 5.4.4.3]

If the UE receives a new allowed NSSAI for the associated access type in the CONFIGURATION UPDATE COMMAND message, the UE shall consider the new allowed NSSAI as valid for the associated access type, store the allowed NSSAI for the associated access type as specified in subclause 4.6.2.2 and consider the old allowed NSSAI for the associated access type as invalid; otherwise, the UE shall consider the old Allowed NSSAI as valid for the associated access type.

[TS 24.501 clause 5.4.7.2.2]

When the upper layers provide an EAP-response message associated with the HPLMN S-NSSAI, the UE shall create a NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE message.

The UE shall set the EAP message IE of the NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE message to the EAP-response message.

The UE shall set the S-NSSAI IE of the NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE message to the HPLMN S-NSSAI associated with the EAP-response message.

The UE shall send the NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE message. Apart from this action, the network slice-specific authentication and authorization procedure is transparent to the 5GMM layer of the UE.

[TS 24.501 clause 5.5.1.2.2]

The UE initiates the registration procedure for initial registration by sending a REGISTRATION REQUEST message to the AMF, starting timer T3510. If timer T3502 is currently running, the UE shall stop timer T3502. If timer T3511 is currently running, the UE shall stop timer T3511.

…

If the UE supports network slice-specific authentication and authorization, the UE shall set the NSSAA bit to "network slice-specific authentication and authorization supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

[TS 24.501 clause 5.5.1.2.4]

If the UE indicated the support for network slice-specific authentication and authorization, and if the Requested NSSAI IE includes one or more S-NSSAIs subject to network slice-specific authentication and authorization, the AMF shall in the REGISTRATION ACCEPT message include:

a) the allowed NSSAI containing the S-NSSAI(s) or the mapped S-NSSAI(s), if any:

1) which are not subject to network slice-specific authentication and authorization and are allowed by the AMF; or

2) for which the network slice-specific authentication and authorization has been successfully performed;

b) optionally, the rejected NSSAI;

c) pending NSSAI containing one or more S-NSSAIs for which network slice-specific authentication and authorization will be performed or is ongoing, and one or more S-NSSAIs from the pending NSSAI which the AMF provided to the UE during the previous registration procedure for which network slice-specific authentication and authorization will be performed or is ongoing, if any; and

d) the "NSSAA to be performed" indicator in the 5GS registration result IE set to indicate that the network slice-specific authentication and authorization procedure will be performed by the network, if the allowed NSSAI is not included in the REGISTRATION ACCEPT message.

If the UE indicated the support for network slice-specific authentication and authorization, and if:

a) the UE did not include the requested NSSAI in the REGISTRATION REQUEST message or none of the S-NSSAIs in the requested NSSAI in the REGISTRATION REQUEST message are allowed;

b) all subscribed S-NSSAIs marked as default are subject to network slice-specific authentication and authorization; and

c) the network slice-specific authentication and authorization procedure has not been successfully performed for any of the subscribed S-NSSAIs marked as default,

the AMF shall in the REGISTRATION ACCEPT message include:

a) the "NSSAA to be performed" indicator in the 5GS registration result IE to indicate that the network slice-specific authentication and authorization procedure will be performed by the network;

b) pending NSSAI containing one or more subscribed S-NSSAIs marked as default for which network slice-specific authentication and authorization will be performed or is ongoing and one or more S-NSSAIs from the pending NSSAI which the AMF provided to the UE during the previous registration procedure for which network slice-specific authentication and authorization will be performed or is ongoing (if any); and

c) optionally, the rejected NSSAI.

If the UE indicated the support for network slice-specific authentication and authorization, and if:

a) the UE did not include the requested NSSAI in the REGISTRATION REQUEST message or none of the S-NSSAIs in the requested NSSAI in the REGISTRATION REQUEST message are allowed; and

b) one or more subscribed S-NSSAIs marked as default are not subject to network slice-specific authentication and authorization or the network slice-specific authentication and authorization procedure has been successfully performed for one or more subscribed S-NSSAIs marked as default;

the AMF shall in the REGISTRATION ACCEPT message include:

a) pending NSSAI containing one or more subscribed S-NSSAIs marked as default for which network slice-specific authentication and authorization will be performed or is ongoing (if any) and one or more S-NSSAIs from the pending NSSAI which the AMF provided to the UE during the previous registration procedure for which network slice-specific authentication and authorization will be performed or is ongoing (if any);

b) allowed NSSAI containing S-NSSAI(s) for the current PLMN each of which corresponds to a subscribed S-NSSAI marked as default which are not subject to network slice-specific authentication and authorization or for which the network slice-specific authentication and authorization has been successfully performed;

c) allowed NSSAI containing one or more subscribed S-NSSAIs marked as default, as the mapped S-NSSAI(s) for the allowed NSSAI in roaming scenarios, which are not subject to network slice-specific authentication and authorization or for which the network slice-specific authentication and authorization has been successfully performed; and

d) optionally, the rejected NSSAI.

When the REGISTRATION ACCEPT message includes a pending NSSAI, the pending NSSAI shall contain all S-NSSAIs for which network slice-specific authentication and authorization will be performed or is ongoing from the requested NSSAI of the REGISTRATION REQUEST message that was received over the 3GPP access, non-3GPP access, or both the 3GPP access and non-3GPP access

…

The UE that has indicated the support for network slice-specific authentication and authorization receiving the pending NSSAI in the REGISTRATION ACCEPT message shall store the S-NSSAI(s) in the pending NSSAI as specified in subclause 4.6.2.2. If the registration area contains TAIs belonging to different PLMNs, which are equivalent PLMNs, the UE shall store the received pending NSSAI for each of the equivalent PLMNs as specified in subclause 4.6.2.2. If the pending NSSAI is not included in the REGISTRATION ACCEPT message and the "NSSAA to be performed" indicator is not set to "Network slice-specific authentication and authorization is to be performed" in the 5GS registration result IE of the REGISTRATION ACCEPT message, then the UE shall delete the pending NSSAI for the current PLMN or SNPN, if existing, as specified in subclause 4.6.2.2.

[TS 23.502 clause 4.2.9.2]

19a. [Conditional] If a new Allowed NSSAI (i.e. including any new S-NSSAIs in a Requested NSSAI for which the NSSAA procedure succeeded and/or excluding any S-NSSAI(s) in the existing Allowed NSSAI for the UE for which the procedure has failed) and/or new Rejected S-NSSAIs (i.e. including any S-NSSAI(s) in the existing Allowed NSSAI for the UE for which the procedure has failed, or any new requested S-NSSAI(s) for which the NSSAA procedure failed) need to be delivered to the UE, or if the AMF re-allocation is required, the AMF initiates the UE Configuration Update procedure, for each Access Type, as described in clause 4.2.4.2. If the Network Slice-Specific Re-Authentication and Re-Authorization fails and there are PDU session(s) established that are associated with the S-NSSAI for which the NSSAA procedure failed, the AMF shall initiate the PDU Session Release procedure as specified in clause 4.3.4 to release the PDU sessions with the appropriate cause value.

9.1.10.1.3 Test description

9.1.10.1.3.1 Pre-test conditions

System Simulator:

NGC Cell A belongs to Home PLMN and TAI1 and set as serving cell;

UE:

None.

Preamble:

The UE is in state 3N-A according to TS 38.508-1 [4].

9.1.10.1.3.2 Test procedure sequence

Table 9.1.10.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 0A | Test procedure for deleting configured S-NSSAI, default configured S-NSSAI and allowed S-NSSAI is performed as specified in TS 38.508-1 [4], subclause 4.9.35. | - | - | - | - |
| 0B | The UE is switched off by executing generic procedure in Table 4.9.6.3-1 in TS 38.508-1 [4] | - | - | - | - |
| 1 | The UE is switched on. | - | - | - | - |
| 2 | Check: Does UE transmit a REGISTRATION REQUEST message including NSSAA bit? | --> | REGISTRATION REQUEST | 1 | P |
| 3-11 | Steps 5 to 13 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 12 | The SS transmits a REGISTRATION ACCEPT message including Pending NSSAI. | <-- | REGISTRATION ACCEPT | - | - |
| 13 | The UE transmits an *ULInformationTransfer* message and a REGISTRATION COMPLETE message. | --> | REGISTRATION COMPLETE | - | - |
|  | EXCEPTION: Step 14a1 is performed if pc\_noOf\_PDUsSameConnection > 0. |  |  |  |  |
| 14a1 | The generic procedure for UE-requested PDU session establishment, specified in subclause 4.5A.2, takes place performing establishment of UE-requested PDU session(s) with ExpectedNumberOfNewPDUSessions = pc\_noOf\_PDUsSameConnection. | - | - | - | - |
| 15 | The SS transmits a NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message with an EAP-Request message. | <-- | 5GMM: NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND | - | - |
| 16 | Check: Does the UE respond with a NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE message, with an EAP-Response message and NSSAI? | --> | 5GMM: NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE | 2, 3 | P |
| 17 | The SS transmits a NETWORK SLICE-SPECIFIC AUTHENTICATION RESULT message with an EAP-success message. | <-- | 5GMM: NETWORK SLICE-SPECIFIC AUTHENTICATION RESULT | - | - |
| 18 | The SS transmits a CONFIGURATION UPDATE COMMAND message including a new allowed NSSAI list. | <-- | CONFIGURATION UPDATE COMMAND | - | - |
| 19 | The UE transmits a CONFIGURATION UPDATE COMPLETE message. | --> | CONFIGURATION UPDATE COMPLETE | - | - |
| 20 | SS releases the RRC connection | - | - | - | - |
| 21 | Void | - | - | - | - |
| 22 | Check: Does UE transmit a REGISTRATION REQUEST message including S-NSSAI=1 but not including S-NSSAI=2 in Request NSSAI list? | --> | REGISTRATION REQUEST | 4,5,6 | P |
| 23 | The SS transmits a REGISTRATION REJECT message. | <-- | REGISTRATION REJECT |  |  |
| 24 | The SS releases the RRC connection |  |  |  |  |

9.1.10.1.3.3 Specific message contents

Table 9.1.10.1.3.3-1: REGISTRATION REQUEST (step 2, Table 9.1.10.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘001’B | Initial registration |  |
| 5GMM capability |  |  |  |
| NSSAA | ‘1’B | Network slice-specific authentication and authorization supported |  |

Table 9.1.10.1.3.3-2: REGISTRATION ACCEPT (step 12, Table 9.1.10.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result |  |  |  |
| 5GS registration result value | ‘001’B | 3GPP access |  |
| NSSAA Performed | ‘1’B | Network slice-specific authentication and authorization is to be performed |  |
| Allowed NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 3 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000011’B | SST value 3 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Configured NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Pending NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.1.10.1.3.3-3: NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND (step 15, Table 9.1.10.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 Table 4.7.1-31 | | | |
| Information Element | Value/remark | Comment | Condition |
| S-NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.1.10.1.3.3-4: NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE (step 16, Table 9.1.10.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 Table 4.7.1-32 | | | |
| Information Element | Value/remark | Comment | Condition |
| S-NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.1.10.1.3.3-5: NETWORK SLICE-SPECIFIC AUTHENTICATION RESULT (step 17, Table 9.1.10.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1, Table 4.7.1-33 | | | |
| Information Element | Value/remark | Comment | Condition |
| S-NSSAI | Set according to specific message content |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| EAP message | EAP-Success |  |  |

Table 9.1.10.1.3.3-6: CONFIGURATION UPDATE COMMAND (step 18, Table 9.1.10.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1, Table 4.7.1-19 | | | |
| Information Element | Value/remark | Comment | Condition |
| Configuration update indication | 0011 | Acknowledgement requested  Registration Requested |  |
| Allowed NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 3 | Note |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000011’B | SST value 3 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Note: S-NSSAI value 3 will only be included when pc\_noOf\_PDUsSameConnection > 0 | | | |

Table 9.1.10.1.3.3-7: REGISTRATION REQUEST (step 22, Table 9.1.10.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘010’B | Mobility |  |
| 5GMM capability |  |  |  |
| NSSAA | ‘1’B | Network slice-specific authentication and authorization supported |  |
| Requested NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 3 | Note |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000011’B | SST value 3 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Note: S-NSSAI value 3 will only be included when pc\_noOf\_PDUsSameConnection > 0 | | | |

Table 9.1.10.1.3.3-8: REGISTRATION REJECT (step 23, Table 9.1.10.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 Table 4.7.1-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | '0000 0011'B | Illegal UE |  |

Table 9.1.10.1.3.3-9: PDU SESSION ESTABLISHMENT ACCEPT (step 14a1, Table 9.1.10.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 clause 4.7.2-2 | | | |
| Information Element | Value/remark | Comment | Condition |
| S-NSSAI |  |  |  |
| Length of S-NSSAI contents | ‘0000 0001’B | SST |  |
| SST | ‘0000 0011’B | SST value 3 |  |

#### 9.1.10.2 NSSAA / EAP message transport / Abnormal

9.1.10.2.1 Test Purpose (TP)

(1)

**with** { the UE in 5GMM-DEREGISTERED-INITIATED state }

**ensure that** {

**when** { SS sends NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message }

**then** { the UE shall ignore the NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message and proceed with the de-registration procedure }

}

9.1.10.2.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clause 5.4.7.2.4. Unless otherwise stated these are Rel-16 requirements.

[TS 24.501 clause 5.4.7.2.4]

The following abnormal cases can be identified:

a) Transmission failure of the NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE message with TAI change from lower layers

If the current TAI is not in the TAI list, the network slice-specific authentication and authorization procedure shall be aborted and a registration procedure for mobility and periodic registration update indicating "mobility registration updating" in the 5GS registration type IE of the REGISTRATION REQUEST message shall be initiated.

If the current TAI is still part of the TAI list, it is up to the UE implementation how to re-run the ongoing procedure that triggered the network slice-specific authentication and authorization procedure.

b) Transmission failure of NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE message indication without TAI change from lower layers

It is up to the UE implementation how to re-run the ongoing procedure that triggered the network slice-specific authentication and authorization procedure.

c) Network slice-specific authentication and authorization procedure and de-registration procedure collision

If the UE receives NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message after sending a DEREGISTRATION REQUEST message and the access type included in the DEREGISTRATION REQUEST message is the same as the access in which the NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message is received, then the UE shall ignore the NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message and proceed with the de-registration procedure. Otherwise, the UE shall proceed with both procedures.

9.1.10.2.3 Test description

9.1.10.2.3.1 Pre-test conditions

System Simulator:

NGC Cell A;

UE:

None.

Preamble:

The UE is in state Switched OFF (state 0N-B) according to TS 38.508-1 [4].

9.1.10.2.3.2 Test procedure sequence

Table 9.1.10.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2 | Check: Does UE transmit a REGISTRATION REQUEST message including NSSAA bit? | --> | REGISTRATION REQUEST | 1 | P |
| 3-11 | Steps 5 to 13 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 12 | The SS transmits a REGISTRATION ACCEPT message including Pending NSSAI IE. | <-- | REGISTRATION ACCEPT | - | - |
| 13 | The UE transmits an *ULInformationTransfer* message and a REGISTRATION COMPLETE message. | --> | REGISTRATION COMPLETE | - | - |
| - | EXCEPTION: Step 14a1 is performed if pc\_noOf\_PDUsSameConnection > 0. | - | - | - | - |
| 14a1 | The generic procedure for UE-requested PDU session establishment, specified in TS 38.508-1[4], subclause 4.5A.2, takes place performing establishment of UE-requested PDU session(s) with ExpectedNumberOfNewPDUSessions = pc\_noOf\_PDUsSameConnection using the allowed NSSAI. | - | - | - | - |
| 15 | Cause UE De-Registration by AT or MMI command | - | - | - | - |
| 16 | Check: Does the UE transmit a DEREGISTRATION REQUEST with the De-registration type IE indicating "normal de-registration"? | --> | DEREGISTRATION REQUEST | - | - |
| 17 | The SS transmits a NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message. | <-- | NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND | - | - |
| 18 | Check: Does the UE transmit a NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE message within 5 seconds? | --> | NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE | 1 | F |
| 19 | The SS transmits DEREGISTRATION ACCEPT message. | <-- | DEREGISTRATION ACCEPT | - | - |
| 20 | The SS transmits an *RRCRelease* message. | - | - | - | - |
| 21 | Check: Does the test result of the generic procedure in TS 38.508-1 [4] subclause 4.9.13 indicates that the UE doesn’t responds to paging when paged with NG-5G-S-TMSI? | - | - | 1 | P |

9.1.10.2.3.3 Specific message contents

Table 9.1.10.2.3.3-1: REGISTRATION ACCEPT (step 12, Table 9.1.10.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-7 with condition INITIAL | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result |  |  |  |
| 5GS registration result value | ‘001’B | 3GPP access |  |
| NSSAA Performed | ‘1’B | Network slice-specific authentication and authorization is to be performed |  |
| Allowed NSSAI |  |  |  |
| Length of NSSAI contents | '0000 0100'B | 4 octets |  |
| S-NSSAI |  |  |  |
| Length of S-NSSAI contents | ‘0000 0001’B | SST |  |
| SST | ‘0000 0011’B | SST value 3 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI |  |  |  |
| Length of S-NSSAI contents | ‘0000 0001’B | SST |  |
| SST | ‘0000 0100’B | SST value 4 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Configured NSSAI |  |  |  |
| Length of NSSAI contents | '0000 0100'B | 4 octets |  |
| S-NSSAI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Pending NSSAI |  |  |  |
| Length of NSSAI contents | '0000 0100'B | 4 octets |  |
| S-NSSAI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.1.10.3.3.3-1AA: PDU SESSION ESTABLISHMENT ACCEPT (step 14a1, Table 9.1.10.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-2 | | | |
| Information Element | Value/remark | Comment | Condition |
| S-NSSAI |  |  |  |
| Length of S-NSSAI contents | ‘0000 0001’B | SST |  |
| SST | ‘0000 0011’B | SST value 3 |  |

Table 9.1.10.2.3.3-1A: DEREGISTRATION REQUEST (step 16, Table 9.1.10.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-12 | | | |
| Information Element | Value/remark | Comment | Condition |
| De-registration type |  |  |  |
| Switch off | ‘0’B | Normal de-registration |  |
| Access type | ‘01’B | 3GPP access |  |

Table 9.1.10.2.3.3-2: NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND (step 17, Table 9.1.10.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 Table 4.7.1-31 | | | |
| Information Element | Value/remark | Comment | Condition |
| S-NSSAI |  |  |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.1.10.2.3.3-3: REGISTRATION REQUEST (step 2, Table 9.1.10.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘001’B | Initial registration |  |
| 5GMM capability |  |  |  |
| NSSAA | ‘1’B | Network slice-specific authentication and authorization supported |  |

#### 9.1.10.3 NSSAA / Initial registration / Rejected NSSAI, pending NSSAI

9.1.10.3.1 Test Purpose (TP)

(1)

**with** { UE has sent REGISTRATION REQUEST message with NSSAA bit and Request NSSAI }

**ensure that** {

**when** { SS sends REGISTRATION ACCEPT message contains rejected NSSAI with rejection cause of "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization" }

**then** { UE stores the rejected S-NSSAI(s) in the rejected NSSAI and shall not attempt to use this S-NSSAI in the current PLMN over any access }

}

(2)

**with** { UE receives rejected NSSAI in the REGISTRATION ACCEPT message with rejection cause of "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization" }

**ensure that** {

**when** { UE is switched off and switched on }

**then** { UE deletes the stored Rejected NSAAI for the current PLMN }

}

(3)

**with** { UE receives rejected NSSAI in the REGISTRATION ACCEPT message with rejection cause of "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization" }

**ensure that** {

**when** { The UICC containing the USIM is removed }

**then** { UE deletes the stored Rejected NSAAI for the current PLMN }

}

(4)

**with** { UE stores pending NSSAI }

**ensure that** {

**when** { SS sends REGISTRATION ACCEPT message with the pending NSSAI is not included and "NSSAA to be performed" indicator is not set to "Network slice-specific authentication and authorization is to be performed" }

**then** { deletes the stored pending NSSAI for the current PLMN }

9.1.10.3.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clause 5.5.1.2.4.

[TS 24.501 clause 5.5.1.2.4]

If the REGISTRATION ACCEPT message contains the Network slicing indication IE with the Network slicing subscription change indication set to "Network slicing subscription changed", or contains a configured NSSAI IE with a new configured NSSAI for the current PLMN and optionally the mapped S-NSSAI(s) for the configured NSSAI for the current PLMN, the UE shall return a REGISTRATION COMPLETE message to the AMF to acknowledge the successful update of the network slicing information.

…

The AMF shall include the allowed NSSAI for the current PLMN and shall include the mapped S-NSSAI(s) for the allowed NSSAI contained in the requested NSSAI from the UE if available, in the REGISTRATION ACCEPT message if the UE included the requested NSSAI in the REGISTRATION REQUEST message and the AMF allows one or more S-NSSAIs in the requested NSSAI.

The AMF may also include rejected NSSAI in the REGISTRATION ACCEPT message. Rejected NSSAI contains S-NSSAI(s) which was included in the requested NSSAI but rejected by the network associated with rejection cause(s) with the following restrictions:

a) rejected NSSAI for the current PLMN or SNPN shall not include an S-NSSAI for the current PLMN or SNPN which is associated to multiple mapped S-NSSAIs and some of these mapped S-NSSAIs are not allowed; and

b) rejected NSSAI for the current registration area shall not include an S-NSSAI for the current PLMN or SNPN which is associated to multiple mapped S-NSSAIs and some of these mapped S-NSSAIs are not allowed.

NOTE 6: The UE can avoid requesting an S-NSSAI associated with a mapped S-NSSAI, which was included in the previous requested NSSAI but neither in the allowed NSSAI nor in the rejected NSSAI in the consequent registration procedures.

If the UE indicated the support for network slice-specific authentication and authorization, and if the Requested NSSAI IE includes one or more S-NSSAIs subject to network slice-specific authentication and authorization, the AMF shall in the REGISTRATION ACCEPT message include:

a) the allowed NSSAI containing the S-NSSAI(s) or the mapped S-NSSAI(s), if any:

1) which are not subject to network slice-specific authentication and authorization and are allowed by the AMF; or

2) for which the network slice-specific authentication and authorization has been successfully performed;

b) optionally, the rejected NSSAI;

c) pending NSSAI containing one or more S-NSSAIs for which network slice-specific authentication and authorization will be performed or is ongoing, and one or more S-NSSAIs from the pending NSSAI which the AMF provided to the UE during the previous registration procedure for which network slice-specific authentication and authorization will be performed or is ongoing, if any; and

d) the "NSSAA to be performed" indicator in the 5GS registration result IE set to indicate whether network slice-specific authentication and authorization procedure will be performed by the network, if the allowed NSSAI is not included in the REGISTRATION ACCEPT message.

If the UE indicated the support for network slice-specific authentication and authorization, and if:

a) the UE did not include the requested NSSAI in the REGISTRATION REQUEST message or none of the S-NSSAIs in the requested NSSAI in the REGISTRATION REQUEST message are allowed;

b) all subscribed S-NSSAIs marked as default are subject to network slice-specific authentication and authorization;

c) the network slice-specific authentication and authorization procedure has not been successfully performed for any of the subscribed S-NSSAIs marked as default; and

d) the network slice-specific authentication and authorization procedure has not failed or been revoked for all subscribed S-NSSAI marked as default;

the AMF shall in the REGISTRATION ACCEPT message include:

a) the "NSSAA to be performed" indicator in the 5GS registration result IE to indicate whether network slice-specific authentication and authorization procedure will be performed by the network; and

b) pending NSSAI containing one or more subscribed S-NSSAIs marked as default for which network slice-specific authentication and authorization will be performed or is ongoing and one or more S-NSSAIs from the pending NSSAI which the AMF provided to the UE during the previous registration procedure for which network slice-specific authentication and authorization will be performed or is ongoing (if any).

If the UE indicated the support for network slice-specific authentication and authorization, and if:

a) the UE did not include the requested NSSAI in the REGISTRATION REQUEST message or none of the S-NSSAIs in the requested NSSAI in the REGISTRATION REQUEST message are allowed; and

b) one or more subscribed S-NSSAIs marked as default are not subject to network slice-specific authentication and authorization or the network slice-specific authentication and authorization procedure has been successfully performed for one or more subscribed S-NSSAIs marked as default;

the AMF shall in the REGISTRATION ACCEPT message include:

a) pending NSSAI containing one or more subscribed S-NSSAIs marked as default for which network slice-specific authentication and authorization will be performed or is ongoing (if any) and one or more S-NSSAIs from the pending NSSAI which the AMF provided to the UE during the previous registration procedure for which network slice-specific authentication and authorization will be performed or is ongoing (if any);

b) allowed NSSAI containing S-NSSAI(s) for the current PLMN each of which corresponds to a subscribed S-NSSAI marked as default which are not subject to network slice-specific authentication and authorization or for which the network slice-specific authentication and authorization has been successfully performed; and

c) allowed NSSAI containing one or more subscribed S-NSSAIs marked as default, as the mapped S-NSSAI(s) for the allowed NSSAI in roaming scenarios, which are not subject to network slice-specific authentication and authorization or for which the network slice-specific authentication and authorization has been successfully performed.

When the REGISTRATION ACCEPT message includes a pending NSSAI, the pending NSSAI shall contain all S-NSSAIs for which network slice-specific authentication and authorization will be performed or is ongoing from the requested NSSAI of the REGISTRATION REQUEST message that was received over the 3GPP access, non-3GPP access, or both the 3GPP access or non-3GPP access.

The AMF may include a new configured NSSAI for the current PLMN in the REGISTRATION ACCEPT message if:

a) the REGISTRATION REQUEST message did not include the requested NSSAI;

b) the REGISTRATION REQUEST message included the requested NSSAI containing an S-NSSAI that is not valid in the serving PLMN;

c) the REGISTRATION REQUEST message included the requested NSSAI containing S-NSSAI(s) with incorrect mapped S-NSSAI(s); or

d) the REGISTRATION REQUEST message included the Network slicing indication IE with the Default configured NSSAI indication bit set to "Requested NSSAI created from default configured NSSAI".

If a new configured NSSAI for the current PLMN is included in the REGISTRATION ACCEPT message, the AMF shall also include the mapped S-NSSAI(s) for the configured NSSAI for the current PLMN if available in the REGISTRATION ACCEPT message. In this case the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3.

If the UE requests ciphering keys for ciphered broadcast assistance data in the REGISTRATION REQUEST message and the AMF has valid ciphering key data applicable to the UE's subscription and current tracking area, then the AMF shall include the ciphering key data in the Ciphering key data IE of the REGISTRATION ACCEPT message.

The AMF shall include the Network slicing indication IE with the Network slicing subscription change indication set to "Network slicing subscription changed" in the REGISTRATION ACCEPT message if the UDM has indicated that the subscription data for network slicing has changed. In this case the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3.

The UE that has indicated the support for network slice-specific authentication and authorization receiving the pending NSSAI in the REGISTRATION ACCEPT message shall store the S-NSSAI(s) in the pending NSSAI as specified in subclause 4.6.2.2. If the registration area contains TAIs belonging to different PLMNs, which are equivalent PLMNs, the UE shall store the received pending NSSAI for each of the equivalent PLMNs as specified in subclause 4.6.2.2. If the pending NSSAI is not included in the REGISTRATION ACCEPT message and the "NSSAA to be performed" indicator is not set to "Network slice-specific authentication and authorization is to be performed" in the 5GS registration result IE of the REGISTRATION ACCEPT message, then the UE shall delete the pending NSSAI for the current PLMN or SNPN, if existing, as specified in subclause 4.6.2.2.

The UE receiving the rejected NSSAI in the REGISTRATION ACCEPT message takes the following actions based on the rejection cause in the rejected S-NSSAI(s):

"S-NSSAI not available in the current PLMN or SNPN"

The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current PLMN as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current PLMN until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.2.2.

"S-NSSAI not available in the current registration area"

The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current registration area as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current registration area until switching off the UE, the UE moving out of the current registration area, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.2.2.

"S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization"

The UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the failed or revoked NSSAA as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN over any access until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.1 and 4.6.2.2.

If the UE sets the NSSAA bit in the 5GMM capability IE to "Network slice-specific authentication and authorization not supported", and:

a) if the Requested NSSAI IE only includes the S-NSSAI(s) subject to network slice-specific authentication and authorization and one or more subscribed S-NSSAIs (containing one or more S-NSSAIs each of which may be associated with a new S-NSSAI) marked as default which are not subject to network slice-specific authentication and authorization are available, the AMF shall in the REGISTRATION ACCEPT message include:

1) the allowed NSSAI containing S-NSSAI(s) for the current PLMN each of which corresponds to a subscribed S-NSSAI marked as default which are not subject to network slice-specific authentication and authorization;

2) the allowed NSSAI containing the subscribed S-NSSAIs marked as default, as the mapped S-NSSAI(s) for the allowed NSSAI in roaming scenarios, which are not subject to network slice-specific authentication and authorization; and

3) the rejected NSSAI containing the S-NSSAI(s) subject to network slice specific authentication and authorization with the rejection cause indicating "S-NSSAI not available in the current PLMN or SNPN", except if the S-NSSAI(s) is associated to multiple mapped S-NSSAIs and some of these mapped S-NSSAIs are not subject to NSSAA; or

b) if the Requested NSSAI IE includes one or more S-NSSAIs subject to network slice-specific authentication and authorization, the AMF shall in the REGISTRATION ACCEPT message include:

1) the allowed NSSAI containing the S-NSSAI(s) or the mapped S-NSSAI(s) which are not subject to network slice-specific authentication and authorization; and

2) the rejected NSSAI containing:

i) the S-NSSAI(s) subject to network slice specific authentication and authorization with the rejection cause indicating "S-NSSAI not available in the current PLMN or SNPN", except if the S-NSSAI is associated to multiple mapped S-NSSAIs and some of these mapped S-NSSAIs are not subject to NSSAA; and

ii) the S-NSSAI(s) which was included in the requested NSSAI but rejected by the network associated with the rejection cause indicating "S-NSSAI not available in the current PLMN or SNPN" or the rejection cause indicating "S-NSSAI not available in the current registration area", if any.

If the UE does not indicate support for network slice-specific authentication and authorization, and if:

a) the UE did not include the requested NSSAI in the REGISTRATION REQUEST message; or

b) none of the S-NSSAIs in the requested NSSAI in the REGISTRATION REQUEST message are allowed;

and one or more subscribed S-NSSAIs (containing one or more S-NSSAIs each of which may be associated with a new S-NSSAI) marked as default which are not subject to network slice-specific authentication and authorization are available, the AMF shall:

a) put the allowed S-NSSAI(s) for the current PLMN each of which corresponds to a subscribed S-NSSAI marked as default and not subject to network slice-specific authentication and authorization in the allowed NSSAI of the REGISTRATION ACCEPT message;

b) put the subscribed S-NSSAIs marked as default and not subject to network slice-specific authentication and authorization, as the mapped S-NSSAI(s) for the allowed NSSAI in roaming scenarios, in the allowed NSSAI of the REGISTRATION ACCEPT message; and

c) determine a registration area such that all S-NSSAIs of the allowed NSSAI are available in the registration area.

If the REGISTRATION ACCEPT message contains the Network slicing indication IE with the Network slicing subscription change indication set to "Network slicing subscription changed", the UE shall delete the network slicing information for each and every PLMN except for the current PLMN as specified in subclause 4.6.2.2.

If the REGISTRATION ACCEPT message contains the allowed NSSAI, then the UE shall store the included allowed NSSAI together with the PLMN identity of the registered PLMN and the registration area as specified in subclause 4.6.2.2. If the registration area contains TAIs belonging to different PLMNs, which are equivalent PLMNs, the UE shall store the received allowed NSSAI in each of allowed NSSAIs which are associated with each of the PLMNs.

If the REGISTRATION ACCEPT message contains a configured NSSAI IE with a new configured NSSAI for the current PLMN and optionally the mapped S-NSSAI(s) for the configured NSSAI for the current PLMN, the UE shall store the contents of the configured NSSAI IE as specified in subclause 4.6.2.2.

If the REGISTRATION ACCEPT message:

a) includes the "NSSAA to be performed" indicator in the 5GS registration result IE;

b) includes a pending NSSAI; and

c) does not include an allowed NSSAI,

the UE shall not initiate a:

a) 5GSM procedure except for emergency services or high priority access until the UE receives an allowed NSSAI; and

b) service request procedure except for cases f) and i) in subclause 5.6.1.1.

…

If required by operator policy, the AMF shall include the NSSAI inclusion mode IE in the REGISTRATION ACCEPT message (see table 4.6.2.3.1 of subclause 4.6.2.3). Upon receipt of the REGISTRATION ACCEPT message:

a) if the message includes the NSSAI inclusion mode IE, the UE shall operate in the NSSAI inclusion mode indicated in the NSSAI inclusion mode IE over the current access within the current PLMN and its equivalent PLMN(s), if any, in the current registration area; or

b) otherwise:

1) if the UE has NSSAI inclusion mode for the current PLMN and access type stored in the UE, the UE shall operate in the stored NSSAI inclusion mode;

2) if the UE does not have NSSAI inclusion mode for the current PLMN and the access type stored in the UE and if the UE is performing the registration procedure over:

i) 3GPP access, the UE shall operate in NSSAI inclusion mode D in the current PLMN and the current access type;

ii) untrusted non-3GPP access, the UE shall operate in NSSAI inclusion mode B in the current PLMN and the current access type; or

iii) trusted non-3GPP access, the UE shall operate in NSSAI inclusion mode D in the current PLMN and the current access type; or

3) if the 5G-RG does not have NSSAI inclusion mode for the current PLMN and wireline access stored in the 5G-RG, and the 5G-RG is performing the registration procedure over wireline access, the 5G-RG shall operate in NSSAI inclusion mode B in the current PLMN and the current access type.

9.1.10.3.3 Test description

9.1.10.3.3.1 Pre-test conditions

System Simulator:

NGC Cell A belongs to Home PLMN and TAI1 and set as serving cell;

UE:

None.

Preamble:

The UE is in state 3N-A according to TS 38.508-1 [4].

9.1.10.3.3.2 Test procedure sequence

Table 9.1.10.3.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 0A | Test procedure for deleting configured S-NSSAI, default configured S-NSSAI and allowed S-NSSAI is performed as specified in TS 38.508-1 [4], subclause 4.9.35. | - | - | - | - |
| 0B | The UE is switched off by executing generic procedure in Table 4.9.6.3-1 in TS 38.508-1 [4] | - | - | - | - |
| 1 | The UE is switched on. | - | - | - | - |
| 2 | The UE transmits a REGISTRATION REQUEST message including NSSAA bit | --> | REGISTRATION REQUEST | - | - |
| 3-11 | Steps 5 to 13 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 12 | The SS transmits a REGISTRATION ACCEPT message including Rejected S-NSSAI=1 | <-- | REGISTRATION ACCEPT | - | - |
| 13 | The UE transmits an *ULInformationTransfer* message and a REGISTRATION COMPLETE message. | --> | REGISTRATION COMPLETE | - | - |
|  | EXCEPTION: Step 14a1 is performed if pc\_noOf\_PDUsSameConnection > 0. |  |  |  |  |
| 14a1 | The generic procedure for UE-requested PDU session establishment, specified in TS 38.508-1 [4] subclause 4.5A.2, takes place performing establishment of UE-requested PDU session(s) with ExpectedNumberOfNewPDUSessions = pc\_noOf\_PDUsSameConnection, using the allowed NSSAI. | - | - | - | - |
| 14A | The SS releases RRC connection. | - | - | - | - |
| 15 | Check: Is S-NSSAI=1 in the Rejected NSSAI list with cause ‘S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization’’ associated with current PLMN using AT/MMI command (+C5GNSSAIRDP)? | - | - | 1 | P |
| 16 | Cause the UE to request establishment of PDU session with S-NSSAI=1.(Note 1) |  |  |  |  |
| 17 | Check: Does the UE transmit a RRCSetupRequest message within 5 seconds? | --> | NR RRC: RRCSetupRequest | 1 | F |
| 18 | Switch off procedure in RRC\_IDLE specified in TS 38.508-1 subclause 4.9.6.1 is performed. | - | - | - | - |
| 19 | The SS configures NGC Cell A as the "Non-suitable OFF cell" |  |  |  |  |
| 20 | The UE is switched on. | - | - | - | - |
| 21 | Check: Is S-NSSAI=1 in the Rejected NSSAI list with cause ‘S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization’’ associated with current PLMN using AT/MMI command (+C5GNSSAIRDP)? | - | - | 2 | F |
| 22 | The SS configures NGC Cell A as the "Serving cell". |  |  |  |  |
| 23 | The UE transmits a REGISTRATION REQUEST message including NSSAA bit | --> | REGISTRATION REQUEST | - | - |
| 24-32 | Steps 5 to 13 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 33 | The SS transmits a REGISTRATION ACCEPT message including Rejected S-NSSAI=2 and Pending S-NSSAI-1. | <-- | REGISTRATION ACCEPT | - | - |
| 34 | The UE transmits an *ULInformationTransfer* message and a REGISTRATION COMPLETE message. | --> | REGISTRATION COMPLETE | - | - |
|  | EXCEPTION: Step 35a1 is performed if pc\_noOf\_PDUsSameConnection > 0. |  |  |  |  |
| 35a1 | The generic procedure for UE-requested PDU session establishment, specified in subclause 4.5A.2, takes place performing establishment of UE-requested PDU session(s) with ExpectedNumberOfNewPDUSessions = pc\_noOf\_PDUsSameConnection. | - | - | - | - |
| 36 | Check: Is S-NSSAI=2 in the Rejected NSSAI list with cause ‘S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization’’ associated with current PLMN using AT/MMI command (+C5GNSSAIRDP)? | - | - | 3 | P |
| 37 | The SS releases the RRC connection. | - | - | - | - |
|  | EXCEPTION: Steps 38a1 to 38b2 take place depending upon UE implementation; the "lower case letter" identifies a step sequence that take place if a particular implementation is under test. |  |  |  |  |
| 38a1 | If pc\_USIM\_Removal = TRUE, cause removal of USIM from the UE without powering down. | - | - | - | - |
| 38a2a1-38a2a4 | Steps 1a2 to 1a5 of generic procedure for Switch off in RRC\_IDLE specified in TS 38.508-1 subclause 4.9.6.1 is performed. | - | - | - | - |
| 38a3 | The SS configures NGC Cell A as the "Non-suitable OFF cell" | - | - | - | - |
| 38a4 | The USIM is inserted into the UE. | - | - | - | - |
| 38a5 | Check: Using AT/MMI command (+C5GNSSAIRDP) verify that S-NSSAI=2 is not in the Rejected NSSAI list associated with current PLMN | - | - | 3 | P |
| 38a6 | The SS configures NGC Cell A as the "Serving cell". | - | - | - | - |
| 38b1 | Else The UE is switched off by executing generic procedure in Table 4.9.6.1 as specified inTS 38.508-1 [4]. | - | - | - | - |
| 38b2 | The UE is switched on. | - | - | - | - |
| 39 | The UE transmits a REGISTRATION REQUEST message | --> | REGISTRATION REQUEST | - | - |
| 40-48 | Steps 5 to 13 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 49 | The SS transmits a REGISTRATION ACCEPT message not including Pending S-NSSAI=1 | <-- | REGISTRATION ACCEPT | - | - |
| 50 | The UE transmits an *ULInformationTransfer* message and a REGISTRATION COMPLETE message. | --> | REGISTRATION COMPLETE | - | - |
|  | EXCEPTION: Step 51a1 is performed if pc\_noOf\_PDUsSameConnection > 0. |  |  |  |  |
| 51a1 | The generic procedure for UE-requested PDU session establishment, specified in subclause 4.5A.2, takes place performing establishment of UE-requested PDU session(s) with ExpectedNumberOfNewPDUSessions = pc\_noOf\_PDUsSameConnection. | - | - | - | - |
| 52 | Cause the UE to request establishment of PDU session with S-NSSAI=1.(Note 1) | - | - | - | - |
| 53 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST message with the S-NSSAI IE set to 1? | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 4 | P |
| 54 | The SS transmits PDU SESSION ESTABLISHMENT REJECT message with 5GSM cause #26. | <-- | PDU SESSION ESTABLISHMENT REJECT |  |  |
| 55 | SS transmits an RRCRelease message to release RRC connection and move the UE to RRC\_IDLE. | <-- | NR RRC: RRCRelease | - | - |
| Note1: The request to establish a PDU session may be performed by MMI or AT Command. | | | | | |

9.1.10.3.3.3 Specific message contents

Table 9.1.10.3.3.3-1: REGISTRATION REQUEST (steps 2, 23 and 39, Table 9.1.10.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘001’B | Initial registration |  |
| 5GMM capability | Not checked |  | Step 39 AND pc\_USIM\_Removal |
| 5GMM capability |  |  |  |
| NSSAA | ‘1’B | Network slice-specific authentication and authorization supported |  |

Table 9.1.10.3.3.3-2: REGISTRATION ACCEPT (step 12, Table 9.1.10.3.3.3-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result |  |  |  |
| 5GS registration result value | ‘001’B | 3GPP access |  |
| NSSAA Performed | ‘1’B | Network slice-specific authentication and authorization is to be performed |  |
| Allowed NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 3 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000011’B | SST value 3 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 4 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000100’B | SST value 4 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Rejected NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of rejected S-NSSAI | ‘0001’B | SST |  |
| Cause value | ‘0010’B | S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization. |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |

Table 9.1.10.3.3.3-2A: PDU SESSION ESTABLISHMENT ACCEPT (step 14a1, Table 9.1.10.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-2 | | | |
| Information Element | | Value/remark | Comment | Condition |
| S-NSSAI | |  |  |  |
| Length of S-NSSAI contents | | ‘0000 0001’B | SST |  |
| SST | | ‘0000 0010’B | SST value 2 |  |

Table 9.1.10.3.3.3-3: REGISTRATION ACCEPT (step 33, Table 9.1.10.3.3.3-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result |  |  |  |
| 5GS registration result value | ‘001’B | 3GPP access |  |
| NSSAA Performed | ‘1’B | Network slice-specific authentication and authorization is to be performed |  |
| Allowed NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 3 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000011’B | SST value 3 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 4 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000100’B | SST value 4 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Configured NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Pending NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Rejected NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 |  |
| Length of rejected S-NSSAI | ‘0001’B | SST |  |
| Cause value | ‘0010’B | S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization. |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |

Table 9.1.10.3.3.3-3A: SECURITY MODE COMPLETE (step 44, Table 9.1.10.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-26 | | | |
| Information Element | Value/Remark | Comment | Condition |
| NAS message container | Contents of Table 9.1.10.3.3.3-3B |  | pc\_USIM\_Removal = TRUE |

9.1.10.3.3.3-3B: REGISTRATION REQUEST (step 44, Table 9.1.10.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-6 using condition CIPHERED\_MESSAGE | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type value | ‘001’B | Initial registration |  |
| 5GMM capability |  |  |  |
| NSSAA | ‘1’B | Network slice-specific authentication and authorization supported |  |

Table 9.1.10.3.3.3-4: REGISTRATION ACCEPT (step 49, Table 9.1.10.3.3.3-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result |  |  |  |
| 5GS registration result value | ‘001’B | 3GPP access |  |
| NSSAA Performed | ‘0’B | Network slice-specific authentication and authorization is not to be performed |  |
| Configured NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| T3512 value |  |  |  |
| Unit | '101'B | value is incremented in multiples of 1 minute |  |
| Timer value | '0 0001'B | 1 minute |  |
| SD | Not Present |  |  |

Table 9.1.10.3.3.3-5: UL NAS TRANSPORT (step 53, Table 9.1.10.3.3.3-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-10 | | | |
| Information Element | Value/remark | Comment | Condition |
| S-NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘0000 0001’B | SST |  |
| SST | ‘0000 0001’B | SST value 1 |  |

Table 9.1.10.3.3.3-6: PDU SESSION ESTABLISHMENT REJECT (step 54, Table 9.1.10.3.3.3-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-3 | | | |
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| 5GSM cause | ‘0001 1010’ | insufficient resources |  |

#### 9.1.10.4 NSSAA / Initial registration / Reject

9.1.10.4.1 Test Purpose (TP)

(1)

**with** { UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { UE receives a REGISTRATION REJECT with cause #62 "No network slices available" to reject all the request NSSAIs and one of the NSSAI is rejected with cause of "S-NSSAI not available in the current registration area" }

**then** { UE abort the initial registration procedure, set the 5GS update status to 5U2 NOT UPDATED, enter state 5GMM-DEREGISTERED.NORMAL-SERVICE or 5GMM-DEREGISTERED.PLMN-SEARCH and reset the registration attempt counter and UE doesn’t attempt to use this NSSAI until UE moving out of the current registration area }

}

(2)

**with** { UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { UE receives a REGISTRATION REJECT with cause #62 "No network slices available" to reject all the request NSSAIs and one of the NSSAI is rejected with cause of "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization" }

**then** { UE stores the rejected NSSAI and doesn't attempt to use this S-NSSAI in the current PLMN over any access }

9.1.10.4.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clause 5.5.1.2.5.

[TS 24.501 clause 5.5.1.2.5]

If the initial registration request is rejected because:

a) all the S-NSSAI(s) included in the requested NSSAI are either rejected for the current PLMN, rejected for the current registration area, or rejected for the failed or revoked NSSAAs; and

b) the UE set the NSSAA bit in the 5GMM capability IE to:

1) "Network slice-specific authentication and authorization supported" and:

i) there are no subscribed S-NSSAIs marked as default;

ii) all subscribed S-NSSAIs marked as default are not allowed; or

iii) network slice-specific authentication and authorization has failed or been revoked for all subscribed S-NSSAIs marked as default and based on network local policy, the network decides not to initiate the network slice-specific re-authentication and re-authorization procedures for any subscribed S-NSSAI marked as default requested by the UE; or

2) "Network slice-specific authentication and authorization not supported"; and

i) there are no subscribed S-NSSAIs which are marked as default; or

ii) all subscribed S-NSSAIs marked as default are either not allowed or are subject to network slice-specific authentication and authorization;

the network shall set the 5GMM cause value to #62 "No network slices available". If the UE had included requested NSSAI in the REGISTRATION REQUEST message, then the network shall include the rejected S-NSSAI(s) in the Rejected NSSAI IE of the REGISTRATION REJECT message. Otherwise, the network may include the rejected NSSAI.

…

#62 (No network slices available).

The UE shall abort the initial registration procedure, set the 5GS update status to 5U2 NOT UPDATED and enter state 5GMM-DEREGISTERED.NORMAL-SERVICE or 5GMM-DEREGISTERED.PLMN-SEARCH. Additionally, the UE shall reset the registration attempt counter.

The UE receiving the rejected NSSAI in the REGISTRATION REJECT message takes the following actions based on the rejection cause in the rejected S-NSSAI(s):

"S-NSSAI not available in the current PLMN or SNPN"

The UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the current PLMN or SNPN as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current PLMN or SNPN until switching off the UE, the UICC containing the USIM is removed, an entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2.

"S-NSSAI not available in the current registration area"

The UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the current registration area as described in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current registration area until switching off the UE, the UE moving out of the current registration area, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.2.2.

"S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization"

The UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the failed or revoked NSSAA as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN over any access until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.1 and 4.6.2.2.

9.1.10.4.3 Test description

9.1.10.4.3.1 Pre-test conditions

System Simulator:

NGC Cell A belongs to Home PLMN and TAI1 and set as serving cell;

NGC Cell B belongs to Home PLMN and TAI-2 and set as Non-Suitable “Off” cell.

UE:

None.

Preamble:

The UE is in state 3N-A according to TS 38.508-1 [4].

9.1.10.4.3.2 Test procedure sequence

Table 9.1.10.4.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 0A1-0A2 | Steps 1-2 of test procedure for deleting configured S-NSSAI, default configured S-NSSAI and allowed S-NSSAI as specified in TS 38.508-1 [4], subclause 4.9.35 are performed. | - | - | - | - |
| 0A3-0A4 | Steps 5-6 of test procedure for deleting configured S-NSSAI, default configured S-NSSAI and allowed S-NSSAI as specified in TS 38.508-1 [4], subclause 4.9.35 are performed. | - | - | - | - |
| 0B | The UE is switched off by executing generic procedure in Table 4.9.6.3-1 in TS 38.508-1 [4] | - | - | - | - |
| 1 | The SS configures:  - NGC cell A as the "Serving cell". | - | - | - | - |
| - | The following messages are to be observed on NGC Cell A unless explicitly stated otherwise. | - | - | - | - |
| 2 | The UE is switched on. | - | - | - | - |
| 3-14 | Steps 2-13 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 15 | The SS transmits a REGISTRATION REJECT message with the 5GMM cause set to #62 "No network slices available" | <-- | 5GMM: REGISTRATION REJECT | - | - |
| 16 | Void | - | - | - | - |
| 17 | Void | - | - | - | - |
| 18 | The SS configures NGC Cell A as a “Non-suitable OFF cell” and NGC Cell B as the “Serving cell”. | - | - | - | - |
| 19 | The UE transmits a REGISTRATION REQUEST message including S-NSSAI=2 but not including S-NSSAI=1 in Request NSSAI list? | --> | REGISTRATION REQUEST | 1,2 | P |
| 20-28 | Steps 5 to 13 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 29 | The SS transmits a REGISTRATION ACCEPT message including allowed S-NSSAI=2 IE | <-- | REGISTRATION ACCEPT | - | - |
| 30 | The UE transmits an *ULInformationTransfer* message and a REGISTRATION COMPLETE message. | --> | REGISTRATION COMPLETE | - | - |
|  | EXCEPTION: Step 31a1 is performed if pc\_noOf\_PDUsSameConnection > 0. |  |  |  |  |
| 31a1 | The generic procedure for UE-requested PDU session establishment, specified in subclause 4.5A.2, takes place performing establishment of UE-requested PDU session(s) with ExpectedNumberOfNewPDUSessions = pc\_noOf\_PDUsSameConnection. | - | - | - | - |
| 31A | The SS releases the RRC connection. | - | - | - | - |
| 31B | Check: Is S-NSSAI=1 in the Rejected NSSAI list with cause ‘S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization’’ associated with current PLMN using AT/MMI command (+C5GNSSAIRDP)? | - | - | 2 | P |
| 32 | Cause the UE to request establishment of PDU session with S-NSSAI=1.(Note 1) | - | - | - | - |
| 33 | Check: Does the UE transmit an RRCSetupRequest message within 30 seconds? | --> | NR RRC: RRCSetupRequest | 2 | F |
| Note1: The request to establish a PDU session may be performed by MMI or AT Command. | | | | | |

9.1.10.4.3.3 Specific message contents

Table 9.1.10.4.3.3-0: REGISTRATION ACCEPT (preamble, Table 9.1.10.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| Allowed NSSAI |  |  |  |
| Allowed NSSAI IEI |  | NSSAI value 1&2 |  |
| Length of Allowed NSSAI | '0000 0100'B | 4 octets |  |
| Length of S-NSSAI contents | '00000001'B | SST |  |
| SST | '00000001'B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Length of S-NSSAI contents | '00000001'B | SST |  |
| SST | '00000010'B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Configured NSSAI |  |  |  |
| Configured NSSAI IEI |  | NSSAI value 1&2 |  |
| Length of Configured NSSAI | '0000 0100'B | 4 octets |  |
| Length of S-NSSAI contents | '00000001'B | SST |  |
| SST | '00000001'B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Length of S-NSSAI contents | '00000001'B | SST |  |
| SST | '00000010'B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.1.10.4.3.3-1: REGISTRATION REJECT (step 15, Table 9.1.10.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 Table 4.7.1-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | '0011 1110'B | No network slices available |  |
| Rejected NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1&2 |  |
| Length of rejected S-NSSAI | ‘0001’B | SST |  |
| Cause value | ‘0010’B | S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization. |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present | no SD value associated with the SST |  |
| Length of rejected S-NSSAI | ‘0001’B | SST |  |
| Cause value | ‘0001’B | S-NSSAI not available in the current registration area |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present | no SD value associated with the SST |  |

Table 9.1.10.4.3.3-1a: REGISTRATION REQUEST (step 19, Table 9.1.10.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type |  |  |  |
| 5GS registration type value | ‘001’B | Initial registration |  |
| Requested NSSAI |  |  |  |
| S-NSSAI IEI |  |  |  |
| Length of NSSAI contents | ‘00000010’B | 2 octets |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.1.10.4.3.3-2: REGISTRATION ACCEPT (step 29, Table 9.1.10.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result |  |  |  |
| 5GS registration result value | ‘000’B | 3GPP access |  |
| NSSAA Performed | ‘0’B | Network slice-specific authentication and authorization is not to be performed |  |
| Allowed NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.1.10.4.3.3-3: PDU SESSION ESTABLISHMENT ACCEPT (step 31a1, Table 9.1.10.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.2-2 | | | |
| Information Element | Value/remark | Comment | Condition |
| S-NSSAI |  |  |  |
| Length of S-NSSAI contents | ‘0000 0001’B | SST |  |
| SST | ‘0000 0010’B | SST value 2 |  |

#### 9.1.10.5

#### 9.1.10.6 NSSAA / UE configuration update / Rejected NSSAI

9.1.10.6.1 Test Purpose (TP)

(1)

**with** { UE is in 5GMM-REGISTERED state and NSSAA failure }

**ensure that** {

**when** { SS sends the rejected NSSAI in the CONFIGURATION UPDATE COMMAND message with rejection cause of "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization" }

**then** { UE adds the rejected S-NSSAI(s) in the rejected NSSAI and shall not attempt to use this S-NSSAI in the current PLMN over any access }

}

(2)

**with** { UE receives the rejected NSSAI in the CONFIGURATION UPDATE COMMAND message with rejection cause of "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization" }

**ensure that** {

**when** { UE has been switched off, then switched on }

**then** { UE deletes the stored Rejected NSAAI for the current PLMN }

}

(3)

**with** { UE receives the rejected NSSAI in the CONFIGURATION UPDATE COMMAND message with rejection cause of "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization" }

**ensure that** {

**when** { The UICC containing the USIM is removed }

**then** { UE deletes the stored Rejected NSAAI for the current PLMN }

}

9.1.10.6.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clause 5.4.4.3, 5.4.7.2.2, 5.5.1.2.2, 5.5.1.2.4 and TS 23.502, clause 4.2.9.2. Unless otherwise stated these are Rel-16 requirements.

[TS 24.501 clause 5.4.4.3]

The UE receiving the rejected NSSAI in the CONFIGURATION UPDATE COMMAND message takes the following actions based on the rejection cause in the rejected S-NSSAI(s):

"S-NSSAI not available in the current PLMN or SNPN"

The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current PLMN as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current PLMN until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.2.2.

"S-NSSAI not available in the current registration area"

The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current registration area as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current registration area until switching off the UE, the UE moving out of the current registration area, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.2.2.

"S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization"

The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the failed or revoked NSSAA as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN over any access until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.1 and 4.6.2.2.

9.1.10.6.3 Test description

9.1.10.6.3.1 Pre-test conditions

System Simulator:

NGC Cell A belongs to Home PLMN and TAI1 and set as serving cell;

UE:

None.

Preamble:

The UE is in state 3N-A according to TS 38.508-1 [4].

9.1.10.6.3.2 Test procedure sequence

Table 9.1.10.6.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 0A | Test procedure for deleting configured S-NSSAI, default configured S-NSSAI and allowed S-NSSAI is performed as specified in TS 38.508-1 [4], subclause 4.9.35. | - | - | - | - |
| 0B | The UE is switched off by executing generic procedure in Table 4.9.6.3-1 in TS 38.508-1 [4] | - | - | - | - |
| 1 | The UE is switched on. | - | - | - | - |
| 2 | The UE transmits a REGISTRATION REQUEST message including NSSAA bit | --> | REGISTRATION REQUEST | - | - |
| 3-11 | Steps 5 to 13 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 12 | The SS transmits a REGISTRATION ACCEPT message including Allowed NSSAI and Pending NSSAI | <-- | REGISTRATION ACCEPT | - | - |
| 13 | The UE transmits an *ULInformationTransfer* message and a REGISTRATION COMPLETE message. | --> | REGISTRATION COMPLETE | - | - |
| - | EXCEPTION: Step 14a1 is performed if pc\_noOf\_PDUsSameConnection > 0. | - | - | - | - |
| 14a1 | The generic procedure for UE-requested PDU session establishment, specified in subclause 4.5A.2, takes place performing establishment of UE-requested PDU session(s) with ExpectedNumberOfNewPDUSessions = pc\_noOf\_PDUsSameConnection. | - | - | - | - |
| 15 | The SS transmits a NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND message with an EAP-Request message. | <-- | 5GMM: NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND |  |  |
| 16 | The UE responds with a NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE message, with an EAP-Response message and NSSAI | --> | 5GMM: NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE |  |  |
| 17 | The SS transmits a NETWORK SLICE-SPECIFIC AUTHENTICATION RESULT message with an EAP-failure message. | <-- | 5GMM: NETWORK SLICE-SPECIFIC AUTHENTICATION RESULT |  |  |
| 18 | The SS transmits a CONFIGURATION UPDATE COMMAND message including a new rejected NSSAI list. | <-- | CONFIGURATION UPDATE COMMAND | - | - |
| 19 | The UE transmits a CONFIGURATION UPDATE COMPLETE message. | --> | CONFIGURATION UPDATE COMPLETE | - | - |
| 20 | The SS transmits an *RRCRelease* message. | - | - | - | - |
| 21 | Check: Is S-NSSAI=2 in the Rejected NSSAI list with cause ‘S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization’’ associated with current PLMN using AT/MMI command (+C5GNSSAIRDP)? | - | - | 1 | P |
| 22 | Cause the UE to request establishment of PDU session with S-NSSAI=2.(Note 1) | - | - | - | - |
| 23 | Check: Does the UE transmit an RRCSetupRequest message? | --> | NR RRC: RRCSetupRequest | 1 | F |
| 24 | Switch off procedure in RRC\_IDLE specified in TS 38.508-1 subclause 4.9.6.1 is performed. | - | - | - | - |
| 25 | The SS configures NGC Cell A as the "Non-suitable cell" | - | - | - | - |
| 26 | The UE is switched on. | - | - | - | - |
| 27 | Check: Using AT/MMI command (+C5GNSSAIRDP) verify that S-NSSAI=2 is not in the Rejected NSSAI list associated with current PLMN |  |  | 2 | P |
| 27 | The SS configures NGC Cell A as the "Serving cell". | - | - | - | - |
| - | EXCEPTION: Steps 28a1 to 28a27 take place if pc\_USIM\_Removal = TRUE | - | - | - | - |
| 28a1-a21A | Steps 2 to 23 above are repeated | - | - | - | - |
| 28a22 | Cause removal of USIM from the UE without powering down. | - | - | - | - |
| 28a23 | Steps 1a2 to 1a5 of generic procedure for Switch off in RRC\_IDLE specified in TS 38.508-1[4], subclause 4.9.6.1 is performed. | - | - | - | - |
| 28a24 | The SS configures NGC Cell A as the "Non-suitable cell" | - | - | - | - |
| 28a25 | The USIM is inserted into the UE. | - | - | - | - |
| 28a26 | Check: Using AT/MMI command (+C5GNSSAIRDP) verify that S-NSSAI=2 is not in the Rejected NSSAI list associated with current PLMN | - | - | 3 | P |
| 28a27 | The SS configures NGC Cell A as the "Serving cell". | - | - | - | - |
| 29-47 | Steps 2 to 20a1 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| Note1: The request to establish a PDU session may be performed by MMI or AT Command. | | | | | |

9.1.10.6.3.3 Specific message contents

Table 9.1.10.6.3.3-1: REGISTRATION REQUEST (step 2, Table 9.1.10.6.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘001’B | Initial registration |  |
| 5GMM capability |  |  |  |
| NSSAA | ‘1’B | Network slice-specific authentication and authorization supported |  |

Table 9.1.10.6.3.3-2: REGISTRATION ACCEPT (step 12, Table 9.1.10.6.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result |  |  |  |
| 5GS registration result value | ‘001’B | 3GPP access |  |
| NSSAA Performed | ‘1’B | Network slice-specific authentication and authorization is to be performed |  |
| Allowed NSSAI |  | 1 S-NSSAI |  |
| Allowed NSSAI IEI |  | NSSAI value 1 |  |
| Length of Allowed NSSAI | '0000 0010'B | 2 octets |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Configured NSSAI |  | 2 S-NSSAI |  |
| S-NSSAI IEI |  | NSSAI value 2 |  |
| Length of Configured NSSAI | '0000 010'B | 4 octets |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Pending NSSAI |  |  |  |
| Pending NSSAI IEI |  | NSSAI value 2 |  |
| Length of Pending NSSAI contents | '0000 0010'B | 2 octets |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.1.10.6.3.3-3: NETWORK SLICE-SPECIFIC AUTHENTICATION COMMAND (step 15, Table 9.1.10.6.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 Table 4.7.1-31 | | | |
| Information Element | Value/remark | Comment | Condition |
| S-NSSAI |  |  |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.1.10.6.3.3-4: NETWORK SLICE-SPECIFIC AUTHENTICATION COMPLETE (step 16, Table 9.1.10.6.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 Table 4.7.1-32 | | | |
| Information Element | Value/remark | Comment | Condition |
| S-NSSAI IEI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.1.10.6.3.3-5: NETWORK SLICE-SPECIFIC AUTHENTICATION RESULT (step 17, Table 9.1.10.6.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1, Table 4.7.1-33 | | | |
| Information Element | Value/remark | Comment | Condition |
| S-NSSAI | Set according to specific message content |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| EAP message | EAP-failure |  |  |

Table 9.1.10.6.3.3-6: CONFIGURATION UPDATE COMMAND (step 18, Table 9.1.10.6.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1, Table 4.7.1-19 | | | |
| Information Element | Value/remark | Comment | Condition |
| Configuration update indication | 0001 | Acknowledgement requested |  |
| Rejected NSSAI |  |  |  |
| Rejected NSSAI IEI |  | Rejected S-NSSAI value 1 |  |
| Length of Rejected NSSAI contents | ‘00000010’B | 2 octets |  |
| Length of rejected S-NSSAI[1] | ‘0001’B | 1 octest |  |
| Cause value | ‘0010’B | S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization |  |
| SST | ‘00000010’B | 2 |  |
| SD | Not present |  |  |

### 9.1.11 SNPN / Mobility management aspects

#### 9.1.11.1 SNPN / Initial registration / Rejected / Temporarily not authorized for this SNPN

9.1.11.1.1 Test Purpose (TP)

(1)

**with** { UE in Automatic SNPN selection mode and a SNPN cell is available for which an entry exists in the "list of subscriber data" and the UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { the SS sends a REGISTRATION REJECT message to the UE including an appropriate 5GMM cause value #74 (Temporarily not authorized for this SNPN) }

**then** { the UE deletes any 5G-GUTI, last visited registered TAI and ngKSI, and stores the SNPN identity in the "temporarily forbidden SNPNs" }

}

(2)

**with** { the initial registration request cannot be accepted by the network }

**ensure that** {

**when** { the SS sends a REGISTRATION REJECT message to the UE including an appropriate 5GMM cause value #74 (Temporarily not authorized for this SNPN) }

**then** { The UE stores the SNPN identity in the "temporarily forbidden SNPNs" and does not remove it at least until 60 minutes or the UE is switched off }

}

(3)

**with** { the UE is in 5GMM-DEREGISTERED.PLMN-SEARCH state and the SNPN identity of the current cell belongs to the list of "temporarily forbidden SNPNs" }

**ensure that** {

**when** { the UE enters a cell belonging to a SNPN cell for which an entry exists in the "list of subscriber data" }

**then** { the UE attempts registration on the SNPN cell }

}

9.1.11.1.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501 clauses 5.5.1.2.5, 5.1.3.2.1, 5.1.3.2.2, TS 23.122 clause 4.9.3.0. Unless otherwise stated these are Rel-16 requirements.

[TS 24.501, clause 5.5.1.2.5]

If the initial registration request cannot be accepted by the network, the AMF shall send a REGISTRATION REJECT message to the UE including an appropriate 5GMM cause value.

If the initial registration request is rejected due to general NAS level mobility management congestion control, the network shall set the 5GMM cause value to #22 "congestion" and assign a back-off timer T3346.

The UE shall take the following actions depending on the 5GMM cause value received in the REGISTRATION REJECT message.

…

#74 (Temporarily not authorized for this SNPN).

5GMM cause #74 is only applicable when received from a cell belonging to an SNPN. 5GMM cause #74 received from a cell not belonging to an SNPN is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.2.7.

The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. The UE shall reset the registration attempt counter and store the SNPN identity in the "temporarily forbidden SNPNs" list for the specific access type for which the message was received. The UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection according to 3GPP TS 23.122 [5]. If the message has been successfully integrity checked by the NAS, the UE shall set the SNPN-specific attempt counter for 3GPP access and the SNPN-specific attempt counter for non-3GPP access for the current SNPN to the UE implementation-specific maximum value.

If the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access to the same SNPN, the UE shall in addition handle 5GMM parameters and 5GMM state for this access, as described for this 5GMM cause value.

NOTE 4: When 5GMM cause #74 is received over 3GPP access, the term "other access" in "the UE also supports the registration procedure over the other access to the same SNPN" is used to express access to SNPN services via a PLMN.

…

[TS 24.501, clause 5.1.3.2.1.3.5]

The substate 5GMM-DEREGISTERED.PLMN-SEARCH is chosen in the UE, if the UE is searching for PLMNs or SNPNs. This substate is left either when a cell has been selected (the new substate is NORMAL-SERVICE or LIMITED-SERVICE) or when it has been concluded that no cell is available at the moment (the new substate is NO-CELL-AVAILABLE).

This substate is not applicable to non-3GPP access.

[TS 24.501, clause 5.1.3.2.2]

In order to describe the detailed UE behaviour, the 5GS update (5U) status pertaining to a specific subscriber is defined.

If the UE is not operating in SNPN access operation mode (see 3GPP TS 23.501 [8]), the 5GS update status is stored in a non-volatile memory in the USIM if the corresponding file is present in the USIM, else in the non-volatile memory in the ME, as described in annex C.

If the UE is operating in SNPN access operation mode, the 5GS update status for each SNPN whose SNPN identity is included in the "list of subscriber data" configured in the ME (see 3GPP TS 23.122 [5]) is stored in the non-volatile memory in the ME as described in annex C.

The 5GS update status value is changed only after the execution of a registration, network-initiated de-registration, 5GS based primary authentication and key agreement, service request, paging procedure or due to change in TAI which does not belong to the current registration area while T3346 is running.

5U1: UPDATED

The last registration attempt was successful.

5U2: NOT UPDATED

The last registration attempt failed procedurally, e.g. no response or reject message was received from the AMF.

5U3: ROAMING NOT ALLOWED

The last registration, service request, or registration for mobility or periodic registration update attempt was correctly performed, but the answer from the AMF was negative (because of roaming or subscription restrictions).

[TS 23.122, clause 4.9.3.0]

The ME is configured with a "list of subscriber data" containing zero or more entries. Each entry of the "list of subscriber data" consists of:

…The MS shall maintain a list of "temporarily forbidden SNPNs" and a list of "permanently forbidden SNPNs" in the ME. Each entry of those lists consists of an SNPN identity.

The MS shall add an SNPN to the list of "temporarily forbidden SNPNs", if a message with cause value #74 "Temporarily not authorized for this SNPN" (see 3GPP TS 24.501 [64]) is received by the MS in response to an LR request from the SNPN. In addition, if:

- the message is integrity-protected; or

- the message is not integrity-protected, and the value of the SNPN-specific attempt counter for that SNPN is equal to the MS implementation specific maximum value as defined in 3GPP TS 24.501 [64];

then the MS shall start an MS implementation specific timer not shorter than 60 minutes. The MS shall remove an SNPN from the list of "temporarily forbidden SNPNs", if:

a) there is a successful LR after a subsequent manual selection of the SNPN;

b) the MS implementation specific timer not shorter than 60 minutes expires;

c) the timer T3247 expires and the value of the SNPN-specific attempt counter for that SNPN is less than the MS implementation specific maximum value as defined in 3GPP TS 24.501 [64];

d) the MS is switched off; or

e) an entry of the "list of subscriber data" with the SNPN identity of the SNPN is updated or the USIM is removed if:

- EAP based primary authentication and key agreement procedure using EAP-AKA'; or

- 5G AKA based primary authentication and key agreement procedure;

was performed in the selected SNPN.

If an SNPN is removed from the list of "temporarily forbidden SNPNs" list, the MS shall stop the MS implementation specific timer not shorter than 60 minutes, if running.

9.1.11.1.3 Test description

9.1.11.1.3.1 Pre-test conditions

System Simulator:

- 2 SNPN cells NGC Cell A and NGC Cell B are configured according to Table 6.3.2.2-1 broadcasting default SNPN IDs as indicated in TS 38.508-1 [4] Table 4.4.2-4.

- System information combination NR-12 as defined in TS 38.508-1 [4] clause 4.4.3.1.2 is used in NGC Cells.

UE:

- The UE is in Automatic SNPN selection mode.

- The UE is provisioned with a “list of subscriber data” to allow access to SNPN identified by NGC Cell A and NGC Cell B.

Preamble:

- Ensure that the UE has cleared the Registered SNPN. And the UE is in state Switched OFF (state 0-A).

9.1.11.1.3.2 Test procedure sequence

Table 9.1.11.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS configures:  - NGC Cell A as the "Serving cell ".  - NGC Cell B as “Non-suitable cell”. | - | - | - | - |
| 2 | The UE is switched on. | - | - | - | - |
| 3-14 | Steps 2-13 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed | - | - | - | - |
| 15 | The SS transmits a REGISTRATION REJECT message, 5GMM cause value = #74 "Temporarily not authorized for this SNPN". | <-- | REGISTRATION REJECT | - | - |
| 16 | The SS starts timer 1 = 60 min. | - | - | - | - |
| 17 | The SS releases the RRC connection. | - | - | - | - |
| 18 | Check: Does the UE transmit the REGISTRATION REQUEST message on NGC Cell A in the next 60 seconds? | --> | REGISTRATION REQUEST | 1 | F |
| 19 | The SS reconfigures:  - NGC cell B as the "Serving cell". | - | - | - | - |
| 20 | Check: Does the UE transmit the REGISTRATION REQUEST message on NGC Cell B? | --> | REGISTRATION REQUEST | 3 | P |
| 21-27 | Steps 5 to 11 from procedure in TS 38.508-1 [4] Table 4.5.2.2-2 are performed. | - | - | - | - |
| 28 | The SS transmits a REGISTRATION REJECT message, 5GMM cause value = #74 " Temporarily not authorized for this SNPN". | <-- | REGISTRATION REJECT | - | - |
| 29 | The SS releases the RRC connection. | - | - | - | - |
| 30 | The SS reconfigures:  - NGC cell B as the " Non-suitable cell". | - | - | - | - |
| 31 | Check: Does the UE transmit the REGISTRATION REQUEST message on NGC Cell A in the next 60 seconds? | --> | REGISTRATION REQUEST | 2 | F |
| 32 | The SS stops timer 1. | - | - | - | - |
| 33 | The UE is switched OFF | - | - | - | - |
| 34 | The UE is Switched ON | - | - | - | - |
| 35 | Check: Does the UE transmit the REGISTRATION REQUEST message on NGC Cell A? | --> | REGISTRATION REQUEST | 2 | P |
| 36-51 | Steps 5-20a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed on NGC Cell A. | - | - | - | - |

9.1.11.1.3.3 Specific message contents

Table 9.1.11.1.3.3-1: REGISTRATION REJECT (step 15 and step 28, Table 9.1.11.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] table 4.7.1-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | ‘01001010’B | #74 "Temporarily not authorized for this SNPN" |  |

Table 9.1.11.1.3.3-2: REGISTRATION REQUEST (step 20 and step 35, Table 9.1.11.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| ngKSI |  |  |  |
| NAS key set identifier | '111'B | no key is available |  |
| TSC | Any allowed value | TSC does not apply for NAS key set identifier value "111" |  |
| 5GS mobile identity | The valid SUCI | Only SUCI is available. |  |
| Last visited registered TAI | Not present |  |  |

#### 9.1.11.2 SNPN / Initial registration / Rejected / Permanently not authorized for this SNPN

9.1.11.2.1 Test Purpose (TP)

(1)

**with** { UE in Automatic SNPN selection mode and a and SNPN cell is available for which an entry exists in the "list of subscriber data" and the UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { the SS sends a REGISTRATION REJECT message to the UE including an appropriate 5GMM cause value #75 (Permanently not authorized for this SNPN) }

**then** { the UE deletes any 5G-GUTI, last visited registered TAI and ngKSI, and store the SNPN identity in the "permanently forbidden SNPNs" }

}

(2)

**with** { the UE is in 5GMM-DEREGISTERED.PLMN-SEARCH state }

**ensure that** {

**when** { User manually selects the SNPN cell which belongs to the "permanently forbidden SNPNs" list }

**then** { the UE attempts registration on the SNPN cell }

}

9.1.11.2.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501 clauses 5.5.1.2.5, 5.1.3.2.1, 5.1.3.2.2, TS 23.122 clause 4.9.3.0. Unless otherwise stated these are Rel-16 requirements.

[TS 24.501, clause 5.5.1.2.5]

If the initial registration request cannot be accepted by the network, the AMF shall send a REGISTRATION REJECT message to the UE including an appropriate 5GMM cause value.

If the initial registration request is rejected due to general NAS level mobility management congestion control, the network shall set the 5GMM cause value to #22 "congestion" and assign a back-off timer T3346.

The UE shall take the following actions depending on the 5GMM cause value received in the REGISTRATION REJECT message.

…

#75 (Permanently not authorized for this SNPN).

5GMM cause #75 is only applicable when received from a cell belonging to an SNPN with a globally-unique SNPN identity. 5GMM cause #75 received from a cell not belonging to an SNPN or a cell belonging to an SNPN with a non-globally-unique SNPN identity is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.2.7.

The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. The UE shall reset the registration attempt counter and store the SNPN identity in the "permanently forbidden SNPNs" list for the specific access type for which the message was received and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription. If the registration request is not for onboarding services in SNPN, the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection according to 3GPP TS 23.122 [5]. If the registration request is for onboarding services in SNPN, the UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform an SNPN selection for onboarding services according to 3GPP TS 23.122 [5]. If the message has been successfully integrity checked by the NAS, the UE shall set the SNPN-specific attempt counter for 3GPP access and the SNPN-specific attempt counter for non-3GPP access for the current SNPN to the UE implementation-specific maximum value.

If the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access to the same SNPN, the UE shall in addition handle 5GMM parameters and 5GMM state for this access, as described for this 5GMM cause value.

NOTE 6: When 5GMM cause #75 is received over 3GPP access, the term "other access" in "the UE also supports the registration procedure over the other access to the same SNPN" is used to express access to SNPN services via a PLMN.

…

[TS 24.501, clause 5.1.3.2.1.3.5]

The substate 5GMM-DEREGISTERED.PLMN-SEARCH is chosen in the UE, if the UE is searching for PLMNs or SNPNs. This substate is left either when a cell has been selected (the new substate is NORMAL-SERVICE or LIMITED-SERVICE) or when it has been concluded that no cell is available at the moment (the new substate is NO-CELL-AVAILABLE).

This substate is not applicable to non-3GPP access.

[TS 24.501, clause 5.1.3.2.2]

In order to describe the detailed UE behaviour, the 5GS update (5U) status pertaining to a specific subscriber is defined.

If the UE is not operating in SNPN access operation mode (see 3GPP TS 23.501 [8]), the 5GS update status is stored in a non-volatile memory in the USIM if the corresponding file is present in the USIM, else in the non-volatile memory in the ME, as described in annex C.

If the UE is operating in SNPN access operation mode, the 5GS update status for each SNPN whose SNPN identity is included in the "list of subscriber data" configured in the ME (see 3GPP TS 23.122 [5]) is stored in the non-volatile memory in the ME as described in annex C.

The 5GS update status value is changed only after the execution of a registration, network-initiated de-registration, 5GS based primary authentication and key agreement, service request, paging procedure or due to change in TAI which does not belong to the current registration area while T3346 is running.

5U1: UPDATED

The last registration attempt was successful.

5U2: NOT UPDATED

The last registration attempt failed procedurally, e.g. no response or reject message was received from the AMF.

5U3: ROAMING NOT ALLOWED

The last registration, service request, or registration for mobility or periodic registration update attempt was correctly performed, but the answer from the AMF was negative (because of roaming or subscription restrictions).

[TS 23.122, clause 4.9.3.0]

The ME is configured with a "list of subscriber data" containing zero or more entries. Each entry of the "list of subscriber data" consists of:

… The MS shall add an SNPN to the list of "permanently forbidden SNPNs" which is, if the MS supports access to an SNPN using credentials from a credentials holder, associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription, if a message with cause value #75 "Permanently not authorized for this SNPN" (see 3GPP TS 24.501 [64]) is received by the MS in response to an LR request from the SNPN.

The MS shall remove an SNPN from the list of "permanently forbidden SNPNs" which is, if the MS supports access to an SNPN using credentials from a credentials holder, associated with the selected entry of the "list of subscriber data" or the selected PLMN subscription, if:

a) there is a successful LR after a subsequent manual selection of the SNPN;

b) the MS is configured to use timer T3245 and timer T3245 expires;

c) the MS is not configured to use timer T3245, the timer T3247 expires and the value of the SNPN-specific attempt counter for that SNPN is less than the MS implementation specific maximum value as defined in 3GPP TS 24.501 [64] ;

d) an entry of the "list of subscriber data" with the subscribed SNPN identity identifying the SNPN is updated or the USIM is removed if:

- EAP based primary authentication and key agreement procedure using EAP-AKA'; or

- 5G AKA based primary authentication and key agreement procedure;

was performed in the selected SNPN; or

e) the selected entry of the "list of subscriber data" is updated or USIM is removed for the selected PLMN subscription.

9.1.11.2.3 Test description

9.1.11.2.3.1 Pre-test conditions

System Simulator:

- SNPN cell NGC Cell A is configured according to Table 6.3.2.2-2 broadcasting globally-unique SNPN IDs as per Table 9.1.11.2.3.1-1.

Table 9.1.11.2.3.1–1: SNPN Identifier

|  |  |  |
| --- | --- | --- |
| cell ID | Network Identifier (NID) | |
| Assignment mode | NID value |
| NGC Cell A | 0 | 1 |

- System information combination NR-12 as defined in TS 38.508-1 [4] clause 4.4.3.1.2 is used in the NGC Cell.

UE:

- The UE is in Automatic SNPN selection mode.

- The UE is provisioned with a “list of subscriber data” to allow access to SNPN identified by NGC Cell A.

Preamble:

- NGC Cell A is set to “Serving Cell”.

- The UE is in state Switched OFF (state 0-A).

9.1.11.2.3.2 Test procedure sequence

Table 9.1.11.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2-13 | Steps 2-13 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed | - | - | - | - |
| 14 | The SS transmits a REGISTRATION REJECT message, 5GMM cause value = #75 "Permanently not authorized for this SNPN ". | <-- | REGISTRATION REJECT | - | - |
| 15 | The SS releases the RRC connection. | - | - | - | - |
| 16 | Check: Does the UE transmit the REGISTRATION REQUEST message on NGC Cell A in the next 60 seconds? | --> | REGISTRATION REQUEST | 1 | F |
| 17 | The UE is made to perform manual SNPN search and select SNPN identified by NGC Cell A. |  |  |  |  |
| 18 | Check: Does the UE transmit the REGISTRATION REQUEST message on NGC Cell A? | --> | REGISTRATION REQUEST | 2 | P |
| 19-34a1 | Steps 5-20a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed on NGC Cell A. | - | - | - | - |
| 35 | The user sets the UE in Automatic SNPN/Network selection mode. | - | - | - | - |

9.1.11.2.3.3 Specific message contents

Table 9.1.11.2.3.3-1: REGISTRATION REJECT (step 14, Table 9.1.11.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] table 4.7.1-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | ‘01001011’B | #75 "Permanently not authorized for this SNPN" |  |

Table 9.1.11.2.3.3-2: REGISTRATION REQUEST (step 18, Table 9.1.11.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| ngKSI |  |  |  |
| NAS key set identifier | '111'B | no key is available |  |
| TSC | Any allowed value | TSC does not apply for NAS key set identifier value "111" |  |
| 5GS mobile identity | The valid SUCI | Only SUCI is available. |  |
| Last visited registered TAI | Not present |  |  |

#### 9.1.11.3 SNPN / EAP based primary authentication and key agreement / EAP-AKA' related procedures

9.1.11.3.1 Test Purpose (TP)

(1)

**with** { the UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { the SS sends an EAP-request/AKA'-challenge message within AUTHENTICATION REQUEST }

**then** { the UE sends an EAP-response/AKA'-challenge message within AUTHENTICATION RESPONSE }

}

(2)

**with** { the UE in 5GMM-REGISTERED-INITIATED state and SS initiates an EAP based primary authentication and key agreement procedure }

**ensure that** {

**when** { the SS sends an EAP-success message within AUTHENTICATION RESULT }

**then** { the UE considers the procedure complete and authentication procedure succeed }

}

(3)

**with** { the UE in 5GMM-REGISTERED-INITIATED state and SS initiates an EAP based primary authentication and key agreement procedure}

**ensure that** {

**when** { the SS sends an EAP-failure message within AUTHENTICATION REJECT }

**then** { the UE shall consider the entry of the "list of subscriber data" with/without the SNPN identity of the current SNPN as invalid for 3GPP access until the UE is switched off or the entry is updated, and the USIM is considered invalid until switching off the UE }

}

9.1.11.3.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501 clauses 5.4.1.2.2.3, 5.4.1.2.2.8, 5.4.1.2.2.11 , 9.12.1

[TS 24.501, clause 5.4.1.2.2.3 ]

If a USIM is present and the SNN check is successful, the UE shall handle the EAP-request/AKA'-challenge message as specified in IETF RFC 5448 [40]. The USIM shall derive CK and IK and compute the authentication response (RES) using the 5G authentication challenge data received from the ME, and pass RES to the ME. The ME shall derive CK' and IK' from CK and IK, and EMSK from CK' and IK'. Furthermore, the ME may generate KAUSF from the EMSK, the KSEAF from the KAUSF, and the KAMF from the ABBA received together with the EAP-request/AKA'-challenge message, and the KSEAF as described in 3GPP TS 33.501 [24], and create a partial native 5G NAS security context identified by the ngKSI value received together with the EAP-request/AKA'-challenge message in subclause 5.4.1.2.4.2 in the volatile memory of the ME. If the KAMF and the partial native 5G NAS security context are created, the ME shall store the KAMF in the created partial native 5G NAS security context, and shall send an EAP-response/AKA'-challenge message as specified in IETF RFC 5448 [40].

If the EAP-request/AKA'-challenge message contains AT\_RESULT\_IND attribute, the UE may include AT\_RESULT\_IND attribute in the EAP-response/AKA'-challenge message as specified in IETF RFC 5448 [40].

[TS 24.501, clause 5.4.1.2.2.8]

Upon receiving an EAP-success message, if the ME has not generated a partial native 5G NAS security context as described in subclause 5.4.1.2.2.3, the ME shall:

a) generate the KAUSF from the EMSK, the KSEAF from the KAUSF, and the KAMF from the ABBA that was received with the EAP-success message, and the KSEAF as described in 3GPP TS 33.501 [24];

b) create a partial native 5G NAS security context identified by the ngKSI value in the volatile memory of the ME; and

c) store the KAMF in the created partial native 5G NAS security context.

The UE shall consider the procedure complete.

[TS 24.501, clause 5.4.1.2.2.11]

Upon receiving an EAP-failure message, the UE shall delete the partial native 5G NAS security context if any was created as described in subclause 5.4.1.2.2.3.

The UE shall consider the procedure complete.

If the EAP-failure message is received in an AUTHENTICATION REJECT message:

1) if the AUTHENTICATION REJECT message has been successfully integrity checked by the NAS:

- The UE shall set the update status to 5U3 ROAMING NOT ALLOWED, delete the stored 5G-GUTI, TAI list, last visited registered TAI and ngKSI;

In case of PLMN, the USIM shall be considered invalid until switching off the UE or the UICC containing the USIM is removed;

In case of SNPN, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN shall be considered invalid until the UE is switched off or the entry is updated. Additionally, the UE shall consider the USIM as invalid for the current SNPN until switching off or the UICC containing the USIM is removed;

- The UE shall set:

i) the counter for "SIM/USIM considered invalid for GPRS services" events, the counter for "USIM considered invalid for 5GS services over non-3GPP access" events, and the counter for "SIM/USIM considered invalid for non-GPRS services" events if maintained by the UE, in case of PLMN; or

ii) the counter for "the entry for the current SNPN considered invalid for 3GPP access" events and the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events in case of SNPN;

to UE implementation-specific maximum value;

[TS 24.501, clause 9.12.1]

The serving network name (SNN) is used:

- in the Network name field of the AT\_KDF\_INPUT attribute defined in IETF RFC 5448 [40];

- in KAUSF derivation function as specified in 3GPP TS 33.501 [24] annex A; and

- in RES\* and XRES\* derivation function as specified in 3GPP TS 33.501 [24] annex A.

SNN shall contain a UTF-8 string without terminating null characters.

SNN is of maximum length of 1020 octets.

SNN consists of SNN-service-code and SNN-network-identifier, delimited by a colon.

SNN-network-identifier identifies the serving PLMN or the serving SNPN.

MCC and MNC in the SNN-PLMN-ID are MCC and MNC of the serving PLMN. If the MNC of the serving PLMN has two digits, then a zero is added at the beginning.

MCC and MNC in the SNN-SNPN-ID are MCC and MNC of the serving SNPN. If the MNC of the serving SNPN has two digits, then a zero is added at the beginning.

SNN-NID contains an NID in hexadecimal digits.

ABNF syntax of SNN is specified in table 9.12.1.1

Table 9.12.1.1: ABNF syntax of SNN

SNN = SNN-service-code ":" SNN-network-identifier

SNN-service-code = %x35.47 ; "5G"

SNN-network-identifier = SNN-PLMN-ID / SNN-SNPN-ID

SNN-PLMN-ID = SNN-mnc-string SNN-mnc-digits "." SNN-mcc-string SNN-mcc-digits "." SNN-3gppnetwork-string "." SNN-org-string ; applicable when not operating in SNPN access operation mode.

SNN-SNPN-ID = SNN-mnc-string SNN-mnc-digits "." SNN-mcc-string SNN-mcc-digits "." SNN-3gppnetwork-string "." SNN-org-string ":" SNN-NID ; applicable when operating in SNPN access operation mode.

SNN-mnc-digits = DIGIT DIGIT DIGIT ; MNC of the PLMN ID

SNN-mcc-digits = DIGIT DIGIT DIGIT ; MCC of the PLMN ID

SNN-mnc-string = %x6d.6e.63 ; "mnc" in lower case

SNN-mcc-string = %x6d.63.63 ; "mcc" in lower case

SNN-3gppnetwork-string = %x33.67.70.70.6e.65.74.77.6f.72.6b ; "3gppnetwork" in lower case

SNN-org-string = %x6f.72.67 ; "org" in lower case

SNN-NID = 11SNN-hexadecimal-digit ; NID in hexadecimal digits

SNN-hexadecimal-digit = DIGIT / %x41 / %x42 / %x43 / %x44 / %x45 / %x46

NOTE: SNN-service-code allows for distinguishing of ANID specified in 3GPP TS 24.302 [16] and SNN as either of SNN or ANID can be carried in the AT\_KDF\_INPUT attribute.

EXAMPLE 1: In case of a PLMN, if PLMN ID contains MCC = 234 and MNC = 15, SNN is 5G:mnc015.mcc234.3gppnetwork.org.

EXAMPLE 2: In case of an SNPN, if SNPN ID contains a PLMN ID of MCC = 234 and MNC = 15 and an NID of 123456ABCDEH, SNN is 5G:mnc015.mcc234.3gppnetwork.org:123456ABCDE.

9.1.11.3.3 Test description

9.1.11.3.3.1 Pre-test conditions

System Simulator:

- SNPN cell NGC Cell A is configured according to Table 6.3.2.2-1 broadcasting default SNPN ID as indicated in TS 38.508-1 [4] Table 4.4.2-4.

- System information combination NR-12 as defined in TS 38.508-1 [4] clause 4.4.3.1.2 is used in NGC Cells.

UE:

- The UE is in Automatic SNPN selection mode.

- The UE is provisioned with a “list of subscriber data” to allow access to SNPN identified by NGC Cell A.

Preamble:

- NGC Cell A is set to “Serving Cell”.

- The UE is in state Switched OFF (state 0-A).

9.1.11.3.3.2 Test procedure sequence

Table 9.1.11.3.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2-4 | The UE establishes RRC connection and initiates registration procedure by executing steps 2-4 of Table 4.5.2.2-2 in TS 38.508-1 [4]. | - | - | - | - |
| 5 | SS transmits a correct AUTHENTICATION REQUEST message with an EAP-Request/AKA'-challenge message. | <-- | 5GMM: AUTHENTICATION REQUEST | - | - |
| 6 | Check: Does the UE respond with a correct AUTHENTICATION RESPONSE message, with an EAP-Response/AKA'-challenge message? | --> | 5GMM: AUTHENTICATION RESPONSE | 1 | P |
| 7 | The SS transmits an “EAP-failure” message within AUTHENTICATION REJECT | <-- | 5GMM: AUTHENTICATION REJECT | - | - |
| 8 | SS releases the RRC connection | - | - | - | - |
| 9 | Check: Does the UE transmit an RRCSetupRequest message for initial registration procedure within the next 30 seconds? | --> | NR RRC: RRCSetupRequest | 3 | F |
| 10 | The UE is switched off by executing generic procedure in Table 4.9.6.4-1 in TS 38.508-1 [4]. | - | - | - | - |
| 11 | The UE is switched on. | - | - | - | - |
| 12-14 | The UE establishes RRC connection and initiates registration procedure by executing steps 2-4 of Table 4.5.2.2-2 in TS 38.508-1 [4]. | - | - | - | - |
| 15 | SS transmits a correct AUTHENTICATION REQUEST message with an EAP-Request/AKA'-challenge message. | <-- | 5GMM: AUTHENTICATION REQUEST | - | - |
| 16 | Check: Does the UE respond with a correct AUTHENTICATION RESPONSE message, with an EAP-Response/AKA'-challenge message? | --> | 5GMM: AUTHENTICATION RESPONSE | 1 | P |
| 17 | SS transmits an AUTHENTICATION RESULT message with an EAP-success message. | <-- | 5GMM: AUTHENTICATION RESULT | - | - |
| 18-24 | The registration procedure is performed by executing steps 8-14 of Table 4.5.2.2-2 in TS 38.508-1 [4]. | - | - | - | - |
| 25 | Check: Does the UE transmit a REGISTRATION COMPLETE message? | --> | 5GMM: REGISTRATION COMPLETE | 2 | P |
| 26 | Steps 19a1 of Table 4.5.2.2-2 in TS 38.508-1 [4] are performed | - | - | - | - |

9.1.11.3.3.3 Specific message contents

Table 9.1.11.3.3.3-1: Message AUTHENTICATION RESPONSE (step 6, 16, Table 9.1.11.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-2 | | | |
| Information Element | Value/Remark | Comment | Condition |
| EAP message | EAP-Response/AKA'-Challenge | RES\* equal to the XRES\* calculated in the SS with the parameters provided/indicated in the AUTHENTICATION REQUEST | EAP-AKA |

Table 9.1.11.3.3.3-2: Message AUTHENTICATION RESULT (step 17, Table 9.1.11.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-3 | | | |
| Information Element | Value/Remark | Comment | Condition |
| EAP message | EAP-Success |  | EAP-AKA |

Table 9.1.11.3.3.3-3: AUTHENTICATION REJECT (step 7, Table 9.1.11.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-5 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Extended protocol discriminator | 5GMM |  |  |
| Security header type | ’0000’B | Plain 5GS NAS message, not security protected |  |
| Spare half octet | '0000'B |  |  |
| EAP message | EAP-failure | EAP-failure |  |
| NOTE: This message is sent within SECURITY PROTECTED 5GS NAS MESSAGE message with Integrity protected and ciphered. | | | |

#### 9.1.11.5 SNPN / Initial registration / Rejected / Illegal ME / Access to an SNPN for onboarding services

9.1.11.5.1 Test Purpose (TP)

(1)

**with** { UE in Automatic SNPN selection mode and a SNPN cell is available for which an entry exists in the "list of subscriber data" and the UE in 5GMM-REGISTERED-INITIATED state for onboarding service}

**ensure that** {

**when** { the SS sends a REGISTRATION REJECT message to the UE including an appropriate 5GMM cause value #6 (Illegal ME) }

**then** { The UE store the SNPN identity in the "permanently forbidden SNPNs" list for onboarding services and enter state 5GMM-DEREGISTERED.PLMN-SEARCH }

}

(2)

**with** { the UE is in 5GMM-DEREGISTERED.PLMN-SEARCH state }

**ensure that** {

**when** { User manually selects the SNPN cell which belongs to the "permanently forbidden SNPNs" list }

**then** { the UE attempts registration on the SNPN cell }

}

9.1.11.5.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501 clauses 5.5.1.2.5 and TS 23.122 clause 4.9.3.1.3 and 4.9.3.1.4. Unless otherwise stated these are Rel-17 requirements.

[TS 24.501, clause 5.5.1.2.5]

If the initial registration request cannot be accepted by the network, the AMF shall send a REGISTRATION REJECT message to the UE including an appropriate 5GMM cause value.

If the initial registration request is rejected due to general NAS level mobility management congestion control, the network shall set the 5GMM cause value to #22 "congestion" and assign a value for back-off timer T3346.

…#6 (Illegal ME).

The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI.

In case of PLMN, the UE shall consider the USIM as invalid for 5GS services until switching off, the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.19a.1;

In case of SNPN, if the UE is not performing initial registration for onboarding services in SNPN and the UE does not support access to an SNPN using credentials from a credentials holder, the UE shall consider the entry of the "list of subscriber data" with the SNPN identity of the current SNPN as invalid until the UE is switched off, the entry is updated or the timer T3245 expires as described in clause 5.3.19a.2. In case of SNPN, if the UE is not performing initial registration for onboarding services in SNPN and the UE supports access to an SNPN using credentials from a credentials holder, the UE shall consider the selected entry of the "list of subscriber data" as invalid for 3GPP access until the UE is switched off, the entry is updated or the timer T3245 expires as described in clause 5.3.19a.2. Additionally, if EAP based primary authentication and key agreement procedure using EAP-AKA' or 5G AKA based primary authentication and key agreement procedure was performed in the current SNPN, the UE shall consider the USIM as invalid for the current SNPN until switching off, the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.19a.2.

If the UE is not performing initial registration for onboarding services in SNPN and the UE shall delete the list of equivalent PLMNs (if any) and enter the state 5GMM-DEREGISTERED.NO-SUPI. If the message has been successfully integrity checked by the NAS, then the UE shall:

1) set the counter for "SIM/USIM considered invalid for GPRS services" events and the counter for "USIM considered invalid for 5GS services over non-3GPP access" events in case of PLMN if the UE maintains these counters; or

2) set the counter for "the entry for the current SNPN considered invalid for 3GPP access" events and the counter for "the entry for the current SNPN considered invalid for non-3GPP access" events in case of SNPN if the UE maintains these counters;

to a UE implementation-specific maximum value.

3) delete the 5GMM parameters stored in non-volatile memory of the ME as specified in annex C.

If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status, 4G-GUTI, last visited registered TAI, TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the EPS attach request procedure is rejected with the EMM cause with the same value. The USIM shall be considered as invalid also for non-EPS services until switching off, the UICC containing the USIM is removed or the timer T3245 expires as described in clause 5.3.7a in 3GPP TS 24.301 [15]. If the message has been successfully integrity checked by the NAS and the UE maintains a counter for "SIM/USIM considered invalid for non-GPRS services", then the UE shall set this counter to a UE implementation-specific maximum value.

If the UE is performing initial registration for onboarding services in SNPN, the UE shall reset the registration attempt counter, store the SNPN identity in the "permanently forbidden SNPNs" list for onboarding services, enter state 5GMM-DEREGISTERED.PLMN-SEARCH, and perform an SNPN selection or an SNPN selection for onboarding services according to 3GPP TS 23.122 [5]. If the message has been successfully integrity checked by the NAS, the UE shall set the SNPN-specific attempt counter for the current SNPN to the UE implementation-specific maximum value.

If the message has been successfully integrity checked by the NAS and the UE also supports the registration procedure over the other access, the UE shall in addition handle 5GMM parameters and 5GMM state for this access, as described for this 5GMM cause value.[TS 23.122, clause 4.9.3.1.3]

When the MS needs to access an SNPN for onboarding services in SNPN, the MS shall select an SNPN indicating that onboarding is allowed and, if the onboarding SNPN selection information is pre-configured, also matching the onboarding SNPN selection information. If more than one such SNPNs are available, how the MS selects one of those SNPNs is MS implementation specific. The MS shall not select an SNPN not indicating that onboarding is allowed or not matching the onboarding SNPN selection information, if pre-configured, for onboarding services in SNPN.

The MS shall limit its search for the SNPN to the NG-RAN access technology.

Once the MS selects the SNPN, the MS shall attempt initial registration for onboarding services in SNPN on the selected SNPN using the NG-RAN access technology and the default UE credentials for primary authentication.

If successful registration is achieved, the MS may indicate to upper layers the selected SNPN. How this indication is displayed by upper layers is implementation specific.

If successful registration is not achieved and one or more other SNPNs indicating that onboarding is allowed and matching the onboarding SNPN selection information, if pre-configured, are available, the MS can select such other SNPN and attempt initial registration for onboarding services in SNPN on the selected SNPN using the NG-RAN access technology and the default UE credentials for primary authentication, or the MS can perform SNPN selection not for onboarding services in SNPN as specified in clause 4.9.3.1.1 or clause 4.9.3.1.2 depending on its SNPN selection mode.

If:

- registration cannot be achieved because no SNPNs indicating that onboarding is allowed and matching the onboarding SNPN selection information, if pre-configured, are available; or

- there were one or more SNPNs indicating that onboarding is allowed and matching the onboarding SNPN selection information, if pre-configured, but an LR failure made registration on all those SNPNs unsuccessful;

the MS can indicate no onboarding services to upper layers, enter limited service state and wait until a new SNPN indicating that onboarding is allowed and matching the onboarding SNPN selection information, if pre-configured, is available and then repeat the procedure, or the MS can perform SNPN selection not for onboarding services in SNPN as specified in clause 4.9.3.1.1 or clause 4.9.3.1.2 depending on its SNPN selection mode.

[TS 23.122, clause 4.9.3.1.4]

The MS shall indicate to upper layers one or more SNPNs, which are available and indicate that onboarding is allowed.

These include SNPNs in the list of "permanently forbidden SNPNs" for onboarding services and the list of "temporarily forbidden SNPNs" for onboarding services. The MS may indicate to the user whether the available SNPNs are present in the list of "temporarily forbidden SNPNs" or the list of "permanently forbidden SNPNs".

The MS shall limit its search for the SNPN to the NG-RAN access technology.

For each SNPN indicated to upper layers, the MS shall indicate to the upper layers along with the SNPN identity:

a) whether the SNPN matches the onboarding SNPN selection information, if pre-configured; and

b) the human-readable network name, if the system information broadcast includes the human-readable network name for the SNPN.

9.1.11.5.3 Test description

9.1.11.5.3.1 Pre-test conditions

System Simulator:

- 1 SNPN cell: NGC Cell A is configured broadcasting default SNPN IDs as indicated in TS 38.508-1 [4] Table 4.4.2-4.

- System information combination NR-26 as defined in TS 38.508-1 [4] clause 4.4.3.1.2 is used in NGC Cell A.

- NGC Cell A is set to “Serving cell”.

UE:

- The UE is in Automatic SNPN selection mode.

- The UE is provisioned default UE credentials and pre-configured with onboarding SNPN selection information to allow access to SNPN identified by NGC Cell A.

Preamble:

- Ensure that the UE has cleared the Registered SNPN, and the UE is in state Switched OFF (state 0-A).

9.1.11.5.3.2 Test procedure sequence

**Table 9.1.11.5.3.2-1: Main behaviour**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **St** | **Procedure** | **Message Sequence** | | **TP** | **Verdict** |
|  |  | **U - S** | **Message** |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2-13 | Steps 2-13 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed | - | - | - | - |
| 14 | The SS transmits a REGISTRATION REJECT message, 5GMM cause value = #6 "Illegal ME". | <-- | REGISTRATION REJECT | - | - |
| 15 | The SS releases the RRC connection. | - | - | - | - |
| 16 | Check: Does the UE transmit the REGISTRATION REQUEST message on NGC Cell A in the next 60 seconds? | --> | REGISTRATION REQUEST | 1 | F |
| 17 | The UE is made to perform manual SNPN search and select SNPN identified by NGC Cell A. |  |  |  |  |
| 18 | Check: Does the UE transmit the REGISTRATION REQUEST message on NGC Cell A? | --> | REGISTRATION REQUEST | 2 | P |
| 19-34a1 | Steps 5-20a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed on NGC Cell A. | - | - | - | - |
| 35 | The user sets the UE in Automatic SNPN/Network selection mode. | - | - | - | - |

9.1.11.5.3.3 Specific message contents

**Table 9.1.11.5.3.3-1: *SIB1 for NGC Cell A* (preamble and all steps in Table 9.1.11.5.3.2-1)**

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.6.1-28 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| cellAccessRelatedInfo | CellAccessRelatedInfo |  |  |
| } |  |  |  |

**Table 9.1.11.5.3.3-2: *CellAccessRelatedInfo* for NGC Cell A (Table 9.1.11.5.3.2-1)**

|  |
| --- |
| Derivation path: TS 38.508-1 [4], Table 4.6.3-16 with condition SNPN and eNPN |

Table 9.1.11.5.3.3-3: REGISTRATION REQUEST (step 2 and 18, Table 9.1.11.5.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-6 with condition SNPN\_ONBOARDING | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | '101'B |  | SNPN\_ONBOARDING |

Table 9.1.11.5.3.3-4: REGISTRATION REJECT (step 14, Table 9.1.11.5.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] table 4.7.1-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | ‘00001100’B | #6 " Illegal ME " |  |

### 9.1.12 NSAC / Mobility management aspects

#### 9.1.12.1 NSAC / Initial registration / Back-off timer

9.1.12.1.1 Test Purpose (TP)

(1)

**with** { UE in UE in 5GMM-DEREGISTERED state }

**ensure that** {

**when** { UE is switched on }

**then** { UE transmits REGISTRATION REQUEST message with ER-NSSAI bit set to "Extended rejected NSSAI supported" in the 5GMM capability IE }

}

(2)

**with** { UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { UE receives the rejected NSSAI in the REGISTRATION ACCEPT message with the rejection cause of "S-NSSAI not available due to maximum number of UEs reached" and the back-off timer value received along with the S-NSSAI is not zero }

**then** { UE shall stores the rejected NSSAI and start the timer T3526 }

}

(3)

**with** { UE in 5GMM-REGISTERED state and UE stores one or more S-NSSAIs in the rejected NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" }

**ensure that** {

**when** { The timer T3526 associated with the S-NSSAI expires }

**then** { UE remove the S-NSSAI from the rejected NSSAI for the maximum number of UEs reached }

}

(4)

**with** { UE in 5GMM-REGISTERED state and UE stores one or more S-NSSAIs in the rejected NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" }

**ensure that** {

**when** { UE is switched off }

**then** { UE remove the S-NSSAI from the rejected NSSAI for the maximum number of UEs reached }

}

9.1.12.1.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501 clauses 5.5.1.2.2, 5.5.1.2.4 and 10.2. Unless otherwise stated these are Rel-17 requirements.

[TS 24.501 clause 5.5.1.2.2]

The UE initiates the registration procedure for initial registration by sending a REGISTRATION REQUEST message to the AMF, starting timer T3510. If timer T3502 is currently running, the UE shall stop timer T3502. If timer T3511 is currently running, the UE shall stop timer T3511.

…

The UE shall set the ER-NSSAI bit to "Extended rejected NSSAI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

[TS 24.501 clause 5.5.1.2.4]

If the UE supports extended rejected NSSAI and the AMF determines that maximum number of UEs reached for one or more S-NSSAI(s) in the requested NSSAI as specified in subclause 4.6.2.5, the AMF shall include the rejected NSSAI containing one or more S-NSSAIs with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" in the Extended rejected NSSAI IE in the REGISTRATION ACCEPT message. In addition, the AMF may include a back-off timer value for each S-NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" included in the Extended rejected NSSAI IE of the REGISTRATION ACCEPT message. To avoid that large numbers of UEs simultaneously initiate deferred requests, the network should select the value for the backoff timer for each S-NSSAI for the informed UEs so that timeouts are not synchronised.

…

The UE receiving the rejected NSSAI in the REGISTRATION ACCEPT message takes the following actions based on the rejection cause in the rejected S-NSSAI(s):

"S-NSSAI not available in the current PLMN or SNPN"

The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current PLMN or SNPN as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current PLMN or SNPN until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.2.2.

"S-NSSAI not available in the current registration area"

The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current registration area as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current registration area until switching off the UE, the UE moving out of the current registration area, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.2.2.

"S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization"

The UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the failed or revoked NSSAA as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN or SNPN over any access until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.1 and 4.6.2.2.

"S-NSSAI not available due to maximum number of UEs reached"

Unless the back-off timer value received along with the S-NSSAI is zero, the UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the maximum number of UEs reached as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN or SNPN over the current access until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2.

NOTE 15: If the back-off timer value received along with the S-NSSAI in the rejected NSSAI for the maximum number of UEs reached is zero as specified in subclause 10.5.7.4a of TS 24.008, the UE does not consider the S-NSSAI as the rejected S-NSSAI.

If there is one or more S-NSSAIs in the rejected NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached", then for each S-NSSAI, the UE shall behave as follows:

a) stop the timer T3526 associated with the S-NSSAI, if running;

b) start the timer T3526 with:

1) the back-off timer value received along with the S-NSSAI, if a back-off timer value is received along with the S-NSSAI that is neither zero nor deactivated; or

2) an implementation specific back-off timer value, if no back-off timer value is received along with the S-NSSAI; and

c) remove the S-NSSAI from the rejected NSSAI for the maximum number of UEs reached when the timer T3526 associated with the S-NSSAI expires.

[TS 24.501, clause 10.2]

Table 10.2.1: Timers of 5GS mobility management – UE side

| TIMER NUM. | TIMER VALUE | STATE | CAUSE OF START | NORMAL STOP | ON  EXPIRY |
| --- | --- | --- | --- | --- | --- |
| T3526 | NOTE 9 | 5GMM-DEREGISTERED 5GMM-REGISTERED | Rejected S-NSSAI with rejection cause "maximum number of UEs per network slice reached" received. | The associated rejected S-NSSAI for the maximum number of UEs reached as specified in subclause 4.6.2.2 deleted. | Remove the S-NSSAI in the rejected NSSAI for the maximum number of UEs reached associated with the T3526 timer. |
| …  NOTE 9: The value of this timer is provided by the network operator during the registration procedure or the generic UE configuration update procedure along with the rejected S-NSSAI with rejection cause "maximum number of UEs per network slice reached". The default value of this timer is implementation specific with a minimum value of 12 minutes and used if the network does not provide a value in the REGISTRATION ACCEPT message, the REGISTRATION REJECT message, or the CONFIGURATION UPDATE COMMAND message along with the rejected S-NSSAI with rejection cause "maximum number of UEs per network slice reached".  … | | | | | |

9.1.12.1.3 Test description

9.1.12.1.3.1 Pre-test conditions

System Simulator:

- NGC Cell A belongs to Home PLMN and TAI1 and set as serving cell;

UE:

- None.

Preamble:

The UE is in state Switched OFF (state 0-A) according to TS 38.508-1 [4].

9.1.12.1.3.2 Test procedure sequence

Table 9.1.12.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2-6 | Steps 4 to 8 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 7 | The UE transmits an *ULInformationTransfer* message and a SECURITY MODE COMPLETE message including REGISTRATION REQUEST message including ER-NSSAI bit? | --> | REGISTRATION REQUEST | 1 | P |
| 8Aa1-11A | Steps 9Aa1 to 13 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 12 | The SS transmits a REGISTRATION ACCEPT message including S-NSSAI=1 in extended rejected NSSAI with back-off timer set to 60 seconds and S-NSSAI=2 in extended rejected NSSAI with back-off timer set to 1 hour  Note: Now UE should start timer T3526 associated with S-NSSAI=1 and T3526 associated with S-NSSAI=2. | <-- | REGISTRATION ACCEPT | - | - |
| 13 | The UE transmits an *ULInformationTransfer* message and a REGISTRATION COMPLETE message. | --> | REGISTRATION COMPLETE | - | - |
|  | EXCEPTION: Step 14a1 is performed if pc\_noOf\_PDUsSameConnection > 0. |  |  |  |  |
| 14a1 | The generic procedure for UE-requested PDU session establishment, specified in subclause 4.5A.2, takes place performing establishment of UE-requested PDU session(s) with ExpectedNumberOfNewPDUSessions = pc\_noOf\_PDUsSameConnection. | - | - | - | - |
| 15 | SS releases the RRC connection | - | - | - | - |
| 16 | Check: Are S-NSSAI=1 and S-NSSAI=2 in the Rejected NSSAI list with cause ‘S-NSSAI not available due to maximum number of UEs reached’’ associated with current PLMN using AT/MMI command (+C5GNSSAIRDP)? | - | - | 2 | P |
| 17 | Cause the UE to request establishment of PDU session with S-NSSAI=1.(Note 1) | - | - | - | - |
| 18 | Check: Does the UE transmit an RRCSetupRequest message within T3526 associated with S-NSSAI=1 in the next 15 seconds? | --> | NR RRC: RRCSetupRequest | 2 | F |
| 19 | Cause the UE to request establishment of PDU session with S-NSSAI=2.(Note 1) | - | - | - | - |
| 20 | Check: Does the UE transmit an RRCSetupRequest message within T3526 associated with S-NSSAI=2 in the next 15 seconds? | --> | NR RRC: RRCSetupRequest | 2 | F |
| 21 | Wait for the expiry of T3526 associated with S-NSSAI=1. | - | - | - | - |
| 22 | Check: Using AT/MMI command (+C5GNSSAIRDP) verify that S-NSSAI=1 is not in the Rejected NSSAI list associated with current PLMN | - | - | 3 | P |
| 22A | Void |  |  |  |  |
| 22B | Void |  |  |  |  |
| 23 | Switch off procedure in RRC\_IDLE specified in TS 38.508-1 subclause 4.9.6.1 is performed. | - | - | - | - |
| 24 | The SS configures NGC Cell A as the “Non-suitable "Off" cell” | - | - | - | - |
| 25 | The UE is switched on.(Note2) | - | - | - | - |
| 26 | Check: Using AT/MMI command (+C5GNSSAIRDP) verify that S-NSSAI=2 is not in the Rejected NSSAI list associated with current PLMN |  |  | 4 | P |
| 27 | Void | - | - | - | - |
| 28 | Void |  |  |  |  |
| 29 | Void |  |  |  |  |
| Note1: The request to establish a PDU session may be performed by MMI or AT Command.  Note2: UE is switched on before the expiry of T3526 associated with S-NSSAI=2 | | | | | |

9.1.12.1.3.3 Specific message contents

Table 9.1.12.1.3.3-0: SECURITY MODE COMPLETE (step 7, Table 9.1.12.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-26 | | | |
| Information Element | Value/Remark | Comment | Condition |
| NAS message container | Contents of Table 9.1.12.1.3.3-1 |  |  |

Table 9.1.12.1.3.3-1: REGISTRATION REQUEST (step 7, Table 9.1.12.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘001’B | Initial registration |  |
| 5GMM capability |  |  |  |
| ER-NSSAI | ‘1’B | Extended rejected NSSAI supported |  |

Table 9.1.12.1.3.3-2: REGISTRATION ACCEPT (step 12, Table 9.1.12.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result |  |  |  |
| 5GS registration result value | ‘001’B | 3GPP access |  |
| Allowed NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 3 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000011’B | SST value 3 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Configured NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Extended rejected NSSAI |  |  |  |
| Length of Extended rejected NSSAI contents | 2 entries |  |  |
| Partial extended rejected NSSAI list |  | entry 1 |  |
| Type of list | ‘001’B | S-NSSAIs with back-off timer |  |
| Number of elements | ‘0000’B | 1 element |  |
| Back-off timer value | ’10000010’B | 60 seconds |  |
| Rejected S-NSSAI 1 |  | S-NSSAI value 1 |  |
| Length of rejected S-NSSAI | ‘0001’B | SST |  |
| Cause value | ‘0011’B | S-NSSAI not available due to maximum number of UEs reached |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped HPLMN SST | Not present |  |  |
| Mapped HPLMN SD | Not present |  |  |
| Partial extended rejected NSSAI list |  | entry 2 |  |
| Type of list | ‘001’B | S-NSSAIs with back-off timer |  |
| Number of elements | ‘0000’B | 1 element |  |
| Back-off timer value | ’00100001’B | 1 hour |  |
| Rejected S-NSSAI 1 |  | S-NSSAI value 2 |  |
| Length of rejected S-NSSAI | ‘0001’B | SST |  |
| Cause value | ‘0011’B | S-NSSAI not available due to maximum number of UEs reached |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped HPLMN SST | Not present |  |  |
| Mapped HPLMN SD | Not present |  |  |

#### 9.1.12.2 NSAC / Initial registration / Back-off timer is not provided or zero

9.1.12.2.1 Test Purpose (TP)

(1)

**with** { UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { UE receives the rejected NSSAI in the REGISTRATION ACCEPT message with the rejection cause of "S-NSSAI not available due to maximum number of UEs reached" and the back-off timer value is not provided }

**then** { UE shall store the rejected NSSAI and start the timer T3526 }

}

(2)

**with** { UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { UE receives the rejected NSSAI in the REGISTRATION ACCEPT message with the rejection cause of "S-NSSAI not available due to maximum number of UEs reached" and the back-off timer value the back-off timer value received along with the S-NSSAI is zero }

**then** { UE shall not consider the S-NSSAI as the rejected S-NSSAI }

}

9.1.12.1.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501 clauses 5.5.1.2.4 and 10.2. Unless otherwise stated these are Rel-17 requirements.

[TS 24.501 clause 5.5.1.2.4]

If the UE supports extended rejected NSSAI and the AMF determines that maximum number of UEs reached for one or more S-NSSAI(s) in the requested NSSAI as specified in subclause 4.6.2.5, the AMF shall include the rejected NSSAI containing one or more S-NSSAIs with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" in the Extended rejected NSSAI IE in the REGISTRATION ACCEPT message. In addition, the AMF may include a back-off timer value for each S-NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" included in the Extended rejected NSSAI IE of the REGISTRATION ACCEPT message. To avoid that large numbers of UEs simultaneously initiate deferred requests, the network should select the value for the backoff timer for each S-NSSAI for the informed UEs so that timeouts are not synchronised.

…

The UE receiving the rejected NSSAI in the REGISTRATION ACCEPT message takes the following actions based on the rejection cause in the rejected S-NSSAI(s):

"S-NSSAI not available in the current PLMN or SNPN"

The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current PLMN or SNPN as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current PLMN or SNPN until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.2.2.

"S-NSSAI not available in the current registration area"

The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current registration area as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current registration area until switching off the UE, the UE moving out of the current registration area, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.2.2.

"S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization"

The UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the failed or revoked NSSAA as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN or SNPN over any access until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.1 and 4.6.2.2.

"S-NSSAI not available due to maximum number of UEs reached"

Unless the back-off timer value received along with the S-NSSAI is zero, the UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the maximum number of UEs reached as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN or SNPN over the current access until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2.

NOTE 15: If the back-off timer value received along with the S-NSSAI in the rejected NSSAI for the maximum number of UEs reached is zero as specified in subclause 10.5.7.4a of TS 24.008, the UE does not consider the S-NSSAI as the rejected S-NSSAI.

If there is one or more S-NSSAIs in the rejected NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached", then for each S-NSSAI, the UE shall behave as follows:

a) stop the timer T3526 associated with the S-NSSAI, if running;

b) start the timer T3526 with:

1) the back-off timer value received along with the S-NSSAI, if a back-off timer value is received along with the S-NSSAI that is neither zero nor deactivated; or

2) an implementation specific back-off timer value, if no back-off timer value is received along with the S-NSSAI; and

c) remove the S-NSSAI from the rejected NSSAI for the maximum number of UEs reached when the timer T3526 associated with the S-NSSAI expires.

[TS 24.501, clause 10.2]

Table 10.2.1: Timers of 5GS mobility management – UE side

| TIMER NUM. | TIMER VALUE | STATE | CAUSE OF START | NORMAL STOP | ON  EXPIRY |
| --- | --- | --- | --- | --- | --- |
| T3526 | NOTE 9 | 5GMM-DEREGISTERED 5GMM-REGISTERED | Rejected S-NSSAI with rejection cause "maximum number of UEs per network slice reached" received. | The associated rejected S-NSSAI for the maximum number of UEs reached as specified in subclause 4.6.2.2 deleted. | Remove the S-NSSAI in the rejected NSSAI for the maximum number of UEs reached associated with the T3526 timer. |
| …  NOTE 9: The value of this timer is provided by the network operator during the registration procedure or the generic UE configuration update procedure along with the rejected S-NSSAI with rejection cause "maximum number of UEs per network slice reached". The default value of this timer is implementation specific with a minimum value of 12 minutes and used if the network does not provide a value in the REGISTRATION ACCEPT message, the REGISTRATION REJECT message, or the CONFIGURATION UPDATE COMMAND message along with the rejected S-NSSAI with rejection cause "maximum number of UEs per network slice reached".  … | | | | | |

9.1.12.2.3 Test description

9.1.12.2.3.1 Pre-test conditions

System Simulator:

- NGC Cell A belongs to Home PLMN and TAI1 and set as serving cell;

UE:

- UE is previously registered on NGC Cell A using default message contents according to TS 38.508-1 [4];

Preamble:

- The UE is in state Switched OFF (state 0N-B) according to TS 38.508-1 [4].

9.1.12.2.3.2 Test procedure sequence

Table 9.1.12.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2 | The UE transmits a REGISTRATION REQUEST message including ER-NSSAI bit | --> | REGISTRATION REQUEST | - | - |
| 3-11 | Steps 5 to 13 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 [4] subclause 4.5.2 are performed. | - | - | - | - |
| 12 | The SS transmits a REGISTRATION ACCEPT message including S-NSSAI-1 in extended rejected NSSAI without back-off timer and S-NSSAI-2 in extended rejected NSSAI with back-off timer set to zero.  Note: Now UE should start timer T3526 associated with S-NSSAI-1. | <-- | REGISTRATION ACCEPT | - | - |
| 13 | The UE transmits an *ULInformationTransfer* message and a REGISTRATION COMPLETE message. | --> | REGISTRATION COMPLETE | - | - |
| - | EXCEPTION: Step 14a1 is performed if pc\_noOf\_PDUsSameConnection > 0. | - | - | - | - |
| 14a1 | The generic procedure for UE-requested PDU session establishment, specified in TS 38.508-1 [4] subclause 4.5A.2, takes place performing establishment of UE-requested PDU session(s) with ExpectedNumberOfNewPDUSessions = pc\_noOf\_PDUsSameConnection. | - | - | - | - |
| 15 | SS releases the RRC connection. | - | - | - | - |
| 16 | Check: Is S-NSSAI-1 in the Rejected NSSAI list with cause ‘S-NSSAI not available due to maximum number of UEs reached’’ associated with current PLMN using AT/MMI command (+C5GNSSAIRDP)? | - | - | 1 | P |
| 17 | Cause the UE to request establishment of PDU session with S-NSSAI-1. (Note 1) | - | - | - | - |
| 18 | Check: Does the UE transmit an RRCSetupRequest message within T3526 associated with S-NSSAI-1 in the next 30 seconds? | --> | NR RRC: RRCSetupRequest | 1 | F |
| 19 | Check: Using AT/MMI command (+C5GNSSAIRDP) verify that S-NSSAI-2 is not in the Rejected NSSAI list associated with current PLMN? | - | - | 2 | P |
| Note1: The request to establish a PDU session may be performed by MMI or AT Command. | | | | | |

9.1.12.2.3.3 Specific message contents

Table 9.1.12.2.3.3-1: REGISTRATION REQUEST (step 2, Table 9.1.12.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-6 with CIPHERED\_MESSAGE | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘001’B | Initial registration |  |
| 5GMM capability |  |  |  |
| ER-NSSAI | ‘1’B | Extended rejected NSSAI supported |  |

Table 9.1.12.2.3.3-2: REGISTRATION ACCEPT (step 12, Table 9.1.12.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result |  |  |  |
| 5GS registration result value | ‘001’B | 3GPP access |  |
| Allowed NSSAI |  |  |  |
| Length of NSSAI contents | '0000 0010'B | 1 entry |  |
| S-NSSAI |  | S-NSSAI value 3 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000011’B | SST value 3 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Configured NSSAI |  |  |  |
| Length of NSSAI contents | '0000 0100'B | 2 entries |  |
| S-NSSAI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Extended rejected NSSAI |  |  |  |
| Length of Extended rejected NSSAI contents | ‘00000111’B | 2 entries |  |
| Partial extended rejected NSSAI list 1 |  | entry 1 |  |
| Type of list | ‘000’B | S-NSSAI without any associated back-off timer value |  |
| Number of elements | ‘0000’B | 1 element |  |
| Rejected S-NSSAI 1 |  | S-NSSAI value 1 |  |
| Length of rejected S-NSSAI | ‘0001’B | SST |  |
| Cause value | ‘0011’B | S-NSSAI not available due to maximum number of UEs reached |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped HPLMN SST | Not present |  |  |
| Mapped HPLMN SD | Not present |  |  |
| Partial extended rejected NSSAI list 2 |  | entry 2 |  |
| Type of list | ‘001’B | S-NSSAIs with back-off timer |  |
| Number of elements | ‘0000’B | 1 element |  |
| Back-off timer value | ’00000000’B | 0 |  |
| Rejected S-NSSAI 1 |  | S-NSSAI value 2 |  |
| Length of rejected S-NSSAI | ‘0001’B | SST |  |
| Cause value | ‘0011’B | S-NSSAI not available due to maximum number of UEs reached |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped HPLMN SST | Not present |  |  |
| Mapped HPLMN SD | Not present |  |  |

#### 9.1.12.3 NSAC / Initial registration / Rejected / equivalent PLMNs

9.1.12.3.1 Test Purpose (TP)

(1)

**with** { UE in 5GMM-REGISTERED-INITIATED state }

**ensure that** {

**when** { UE receives the rejected NSSAI in the REGISTRATION REJECT message with rejection cause of “S-NSSAI not available due to maximum number of UEs reached” }

**then** { UE shall store the rejected NSSAI and start the timer T3526 }

}

(2)

**with** { UE receives rejected NSSAI with rejection cause of “S-NSSAI not available due to maximum number of UEs reached” }

**ensure that** {

**when** { UE selects to the equivalent PLMN in the same registration area }

**then** { UE shall treat the received rejected NSSAI for the maximum number of UEs reached as applicable to equivalent PLMNs }

}

(3)

**with** { UE receives rejected NSSAI with rejection cause of “S-NSSAI not available due to maximum number of UEs reached” }

**ensure that** {

**when** { UE timer T3526 expires }

**then** { Remove the S-NSSAI in the rejected NSSAI for the maximum number of UEs reached and initiates a registration procedure }

}

9.1.12.3.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501, clauses 5.5.1.2.5, 4.6.1. Unless otherwise stated these are Rel-17 requirements.

[TS 24.501, clause 5.5.1.2.5]

#62 (No network slices available).

The UE shall abort the initial registration procedure, set the 5GS update status to 5U2 NOT UPDATED and enter state 5GMM-DEREGISTERED. ATTEMPTING-REGISTRATION or 5GMM-DEREGISTERED.PLMN-SEARCH. Additionally, the UE shall reset the registration attempt counter.

The UE receiving the rejected NSSAI in the REGISTRATION REJECT message takes the following actions based on the rejection cause in the rejected S-NSSAI(s):

"S-NSSAI not available in the current PLMN or SNPN"

The UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the current PLMN or SNPN as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current PLMN or SNPN until switching off the UE, the UICC containing the USIM is removed, an entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.2.2.

"S-NSSAI not available in the current registration area"

The UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the current registration area as described in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI(s) in the current registration area until switching off the UE, the UE moving out of the current registration area, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.2.2.

"S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization"

The UE shall store the rejected S-NSSAI(s) in the rejected NSSAI for the failed or revoked NSSAA as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN or SNPN over any access until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed or deleted as described in subclause 4.6.1 and 4.6.2.2.

"S-NSSAI not available due to maximum number of UEs reached"

Unless the back-off timer value received along with the S-NSSAI is zero, the UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the maximum number of UEs reached as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN or SNPN over the current access until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2.

NOTE 6: If the back-off timer value received along with the S-NSSAI in the rejected NSSAI for the maximum number of UEs reached is zero as specified in subclause 10.5.7.4a of TS 24.008, the UE does not consider the S-NSSAI as the rejected S-NSSAI.

If there is one or more S-NSSAIs in the rejected NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached", then for each S-NSSAI, the UE shall behave as follows:

a) stop the timer T3526 associated with the S-NSSAI, if running;

b) start the timer T3526 with:

1) the back-off timer value received along with the S-NSSAI, if a back-off timer value is received along with the S-NSSAI that is neither zero nor deactivated; or

2) an implementation specific back-off timer value, if no back-off timer value is received along with the S-NSSAI; and

c) remove the S-NSSAI from the rejected NSSAI for the maximum number of UEs reached when the timer T3526 associated with the S-NSSAI expires.

If the UE has an allowed NSSAI or configured NSSAI that contains S-NSSAI(s) which are not included in the rejected NSSAI the UE may stay in the current serving cell, apply the normal cell reselection process and start an initial registration with a requested NSSAI that includes any S-NSSAI from the allowed NSSAI or the configured NSSAI that is not in the rejected NSSAI. Otherwise the UE may perform a PLMN selection or SNPN selection according to 3GPP TS 23.122 [5] and additionally, the UE may disable the N1 mode capability for the current PLMN or SNPN if the UE does not have an allowed NSSAI and each S-NSSAI in configured NSSAI, if available, was rejected with cause "S-NSSAI not available in the current PLMN or SNPN" or "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization" as described in subclause 4.9.

If the UE has neither allowed NSSAI for the current PLMN or SNPN nor configured NSSAI for the current PLMN or SNPN and,

1) if at least one S-NSSAI in the default configured NSSAI is not rejected, the UE may stay in the current serving cell, apply the normal cell reselection process, and start an initial registration with a requested NSSAI with that default configured NSSAI; or

2) if all the S-NSSAI(s) in the default configured NSSAI are rejected and at least one S-NSSAI is rejected due to "S-NSSAI not available in the current registration area",

i) if the REGISTRATION REJECT message is integrity protected and the UE is not operating in SNPN access operation mode, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE; or

ii) if the REGISTRATION REJECT message is integrity protected and the UE is operating in SNPN access operation mode, the UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" for the current SNPN and enter the state 5GMM-DEREGISTERED.LIMITED-SERVICE.

Otherwise, the UE may perform a PLMN selection or SNPN selection according to 3GPP TS 23.122 [5] and additionally, the UE may disable the N1 mode capability for the current PLMN or SNPN if each S-NSSAI in the default configured NSSAI was rejected with cause "S-NSSAI not available in the current PLMN or SNPN" or "S-NSSAI not available due to the failed or revoked network slice-specific authentication and authorization" as described in subclause 4.9.

If the UE has neither allowed NSSAI for the current PLMN or SNPN nor configured NSSAI for the current PLMN or SNPN and has rejected NSSAI for the reached maximum number of UEs, and the UE wants to obtain services in the current serving cell without performing a PLMN selection or SNPN selection, the UE may stay in the current serving cell and attempt to use the rejected S-NSSAI(s) for the maximum number of UEs reached in the current serving cell after the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2.

If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall in addition set the EPS update status to EU2 NOT UPDATED, reset the attach attempt counter and enter the state EMM-DEREGISTERED.

[TS 24.501, clause 4.6.1]

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

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

[TS 24.501, clause 10.2]

Table 10.2.1: Timers of 5GS mobility management – UE side

| TIMER NUM. | TIMER VALUE | STATE | CAUSE OF START | NORMAL STOP | ON  EXPIRY |
| --- | --- | --- | --- | --- | --- |
| T3502 | Default 12 min.  NOTE 1 | 5GMM-DEREGISTERED 5GMM-REGISTERED | At registration failure and the attempt counter is equal to 5 | Transmission of REGISTRATION REQUEST message | Initiation of the registration procedure, if still required |
| … |  |  |  |  |  |
| T3526 | NOTE 9 | 5GMM-DEREGISTERED 5GMM-REGISTERED | Rejected S-NSSAI with rejection cause "maximum number of UEs per network slice reached" received. | The associated rejected S-NSSAI for the maximum number of UEs reached as specified in subclause 4.6.2.2 deleted. | Remove the S-NSSAI in the rejected NSSAI for the maximum number of UEs reached associated with the T3526 timer. |

9.1.12.3.3 Test description

9.1.12.3.3.1 Pre-test conditions

System Simulator:

- NGC Cell A (home PLMN) and NGC Cell E are configured according to Table 6.3.2.2-1 in TS 38.508-1 [4].

- System information combination NR-2 in accordance with TS 38.508-1 [4] sub-clause 4.4.3.1.2 is used in NGC Cell A and NGC Cell E.

- The UE is last authenticated and registered on NGC Cell A and NGC Cell E PLMN is provided as equivalent PLMN.

Preamble:

- The UE is in state 3N-A according to TS 38.508-1 [4] on NGC Cell A.

9.1.12.3.3.2 Test procedure sequence

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 0A | Test procedure for deleting configured S-NSSAI and default configured S-NSSAI is performed as specified in TS 38.508-1 [4], subclause 4.9.35. | - | - | - | - |
| 0B | The UE is switched off by executing generic procedure in Table 4.9.6.3-1 in TS 38.508-1 [4]. | - | - | - | - |
| 1 | The SS configures:  - NGC Cell A as the "Serving cell ".  - NGC Cell E as “Non-suitable "Off" cell”. | - | - | - | - |
| 2 | The UE is switched on. | - | - | - | - |
| 3-14 | Steps 2-13 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 15 | The SS transmits a REGISTRATION REJECT message, 5GMM cause value = #62 "No network slices available" and rejection cause in the Extended rejected S-NSSAI is set =’0011’B “S-NSSAI not available due to maximum number of UEs reached”, T3526 is present with a value of 2 minutes. | <-- | REGISTRATION REJECT | - | - |
| 16 | SS starts timer of t\_Waits= T3526. | - | - | - | - |
| 17 | The SS releases the RRC connection. | - | - | - | - |
| 18 | Void | - | - | - | - |
| 19 | The SS reconfigures:  - NGC cell E as the "Serving cell".  - NGC cell A as a "Non-suitable "Off" cell". | - | - | - | - |
| 20 | Steps 2-20a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 20A | Cause the UE to request establishment of PDU session with S-NSSAI=1. (Note 1) | - | - | - | - |
| 20B | Check: Does the UE transmit an RRCSetupRequest message within T3526 associated with S-NSSAI=1 in the next 30s seconds? | --> | NR RRC: RRCSetupRequest | 1, 2 | F |
| 21 | SS waits for the expiration of t\_Waits. | - | - | - | - |
| 21A | Cause the UE to request establishment of PDU session with S-NSSAI=1. (Note 1) | - | - | - | - |
| 22 | Check: Does the UE transmit an RRCSetupRequest message in the next 30s seconds on NGC Cell E? | --> | NR RRC: RRCSetupRequest | 3 | P |
| 23-28 | Steps 3-8 of Table 4.5.2.2-4 in TS 38.508-1 [4] are performed. | - | - | - | - |
| Note 1: The request to establish a PDU session may be performed by MMI or AT Command. | | | | | |

9.1.12.3.3.3 Specific message contents

Table 9.1.12.3.3.3-0: REGISTRATION ACCEPT (preamble, Table 9.1.12.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| Equivalent PLMNs | MCC=002, MNC=101 | PLMN ID of NGC Cell E |  |
| TAI list |  |  |  |
| Length of tracking area identity list contents | '0000 1100'B | 2 entries |  |
| Partial tracking area identity list 1 | entry 1 | TAI-1 |  |
| Number of elements | '0 0000'B | 1 element |  |
| Type of list | '00'B | list of TACs belonging to one PLMN, with non-consecutive TAC values |  |
| MCC | 001 | MCC of NGC Cell A |  |
| MNC | 01 | MNC of NGC Cell A |  |
| TAC 1 | 1 | TAC of NGC Cell A |  |
| Partial tracking area identity list 2 | entry 2 | TAI-12 |  |
| Number of elements | '0 0000'B | 1 element |  |
| Type of list | '00'B | list of TACs belonging to one PLMN, with non-consecutive TAC values |  |
| MCC | 002 | MCC of NGC Cell E |  |
| MNC | 101 | MNC of NGC Cell E |  |
| TAC 1 | 3 | TAC of NGC Cell E |  |
| Allowed NSSAI |  |  |  |
| Length of NSSAI contents | '0000 0100'B | 2 entries |  |
| S-NSSAI |  |  |  |
| Length of S-NSSAI contents | '00000001'B | SST |  |
| SST | '00000001'B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI |  |  |  |
| Length of S-NSSAI contents | '00000001'B | SST |  |
| SST | '00000010'B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Configured NSSAI |  |  |  |
| Length of Configured NSSAI contents | '0000 0010'B | 1 entry |  |
| S-NSSAI |  |  |  |
| Length of S-NSSAI contents | '00000001'B | SST |  |
| SST | '00000001'B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.1.12.3.3.3-1: REGISTRATION REJECT (step 15, Table 9.1.12.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | ‘0011 1110’B | #62 “No network slices available” |  |
| Extended rejected NSSAI |  |  |  |
| Length of Extended rejected NSSAI contents | ‘00000100’B |  |  |
| Partial extended rejected NSSAI list |  | entry 1 |  |
| Type of list | ‘001’B | S-NSSAIs with one associated back-off timer value that applies to all S-NSSAIs in the list |  |
| Number of elements | ‘0000’B | 1 element |  |
| Back-off timer value |  |  |  |
| Unit | '101'B | value is incremented in multiples of 1 minute |  |
| Timer value | '0 0010'B | 2 minutes |  |
| Rejected S-NSSAI 1 |  | entry 1 |  |
| Length of rejected S-NSSAI | ‘0100’B |  |  |
| Cause value | ‘0011’B | S-NSSAI not available due to maximum number of UEs reached. |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | ’FFFFFF’H | no SD value associated with the SST |  |
| Mapped HPLMN SST | Not Present |  |  |
| Mapped HPLMN SD | Not Present |  |  |

Table 9.1.12.3.3.3-2: REGISTRATION REQUEST (Step 20, Table 9.1.12.3.3.2-1, step 4 in TS 38.508-1 Table 4.5.2.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘001’B | Initial registration |  |
| 5GMM capability |  |  |  |
| ER-NSSAI | ‘1’B | Extended rejected NSSAI supported |  |
| Requested NSSAI |  |  |  |
| Length of NSSAI contents | '0000 0010'B | 1 entry |  |
| S-NSSAI |  |  |  |
| Length of S-NSSAI contents | '00000001'B | SST |  |
| SST | '00000010'B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.1.12.3.3.3-3: REGISTRATION ACCEPT (Step 20, Table 9.1.12.3.3.2-1, step 14 in TS 38.508-1 Table 4.5.2.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| Allowed NSSAI |  |  |  |
| Length of NSSAI contents | '0000 0010'B | 1 entry |  |
| S-NSSAI |  |  |  |
| Length of S-NSSAI contents | '00000001'B | SST |  |
| SST | '00000010'B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Configured NSSAI | Not present |  |  |

#### 9.1.12.4 NSAC / Generic UE configuration update / Rejected NSSAI

9.1.12.4.1 Test Purpose (TP)

(1)

**with** { UE in 5GMM-REGISTERED state and stores one or more S-NSSAIs in the allowed NSSAI }

**ensure that** {

**when** { UE receives the rejected NSSAI containing S-NSSAI(s) which are in UE allowed NSSAI list in the CONFIGURATION UPDATE COMMAND message with the rejection cause of "S-NSSAI not available due to maximum number of UEs reached" and the back-off timer value received along with the S-NSSAI is not zero }

**then** { UE shall add the rejected S-NSSAI(s) in the rejected NSSAI and start the timer T3526 }

}

(2)

**with** { UE in 5GMM-REGISTERED state and UE stores one or more S-NSSAIs in the rejected NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" }

**ensure that** {

**when** { The timer T3526 associated with the S-NSSAI expires }

**then** { UE removes the S-NSSAI from the rejected NSSAI for the maximum number of UEs reached }

}

9.1.12.4.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501, clauses 5.4.4.3 & 10.2. Unless otherwise stated these are Rel-17 requirements

[TS 24.501, clause 5.4.4.3]

The UE receiving the rejected NSSAI in the CONFIGURATION UPDATE COMMAND message takes the following actions based on the rejection cause in the rejected S-NSSAI(s):

…

"S-NSSAI not available due to maximum number of UEs reached"

Unless the back-off timer value received along with the S-NSSAI is zero, the UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the maximum number of UEs reached as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN or SNPN over the current access until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2.

NOTE 3: If the back-off timer value received along with the S-NSSAI in the rejected NSSAI for the maximum number of UEs reached is zero as specified in subclause 10.5.7.4a of TS 24.008, the UE does not consider the S-NSSAI as the rejected S-NSSAI.

If there is one or more S-NSSAIs in the rejected NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached", then for each S-NSSAI, the UE shall behave as follows:

a) stop the timer T3526 associated with the S-NSSAI, if running;

b) start the timer T3526 with:

1) the back-off timer value received along with the S-NSSAI, if back-off timer value is received along with the S-NSSAI that is neither zero nor deactivated; or

2) an implementation specific back-off timer value, if no back-off timer value is received along with the S-NSSAI; and

c) remove the S-NSSAI from the rejected NSSAI for the maximum number of UEs reached when the timer T3526 associated with the S-NSSAI expires.

[TS 24.501, clause 10.2]

Table 10.2.1: Timers of 5GS mobility management – UE side

| TIMER NUM. | TIMER VALUE | STATE | CAUSE OF START | NORMAL STOP | ON  EXPIRY |
| --- | --- | --- | --- | --- | --- |
| T3526 | NOTE 9 | 5GMM-DEREGISTERED 5GMM-REGISTERED | Rejected S-NSSAI with rejection cause "maximum number of UEs per network slice reached" received. | The associated rejected S-NSSAI for the maximum number of UEs reached as specified in subclause 4.6.2.2 deleted. | Remove the S-NSSAI in the rejected NSSAI for the maximum number of UEs reached associated with the T3526 timer. |
| …  NOTE 9: The value of this timer is provided by the network operator during the registration procedure or the generic UE configuration update procedure along with the rejected S-NSSAI with rejection cause "maximum number of UEs per network slice reached". The default value of this timer is implementation specific with a minimum value of 12 minutes and used if the network does not provide a value in the REGISTRATION ACCEPT message, the REGISTRATION REJECT message, or the CONFIGURATION UPDATE COMMAND message along with the rejected S-NSSAI with rejection cause "maximum number of UEs per network slice reached".  … | | | | | |

9.1.12.4.3 Test description

9.1.12.4.3.1 Pre-test conditions

System Simulator:

- NGC Cell A belongs to Home PLMN and TAI1 and set as serving cell;

UE:

- None.

Preamble:

- The UE is in state 3N-A on NGC cell A according to TS 38.508-1 [4].

9.1.12.4.3.2 Test procedure sequence

Table 9.1.12.4.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS transmits CONFIGURATION UPDATE COMMAND including S-NSSAI=1 in rejected NSSAI with back-off timer set to 120 seconds. | <-- | CONFIGURATION UPDATE COMMAND | - | - |
| 2 | Check: Does UE transmit CONFIGURATION UPDATE COMPLETE?  Note: UE starts timer T3526 associated with S-NSSAI=1. | --> | CONFIGURATION UPDATE COMPLETE | 1 | P |
| 3 | The SS transmits an *RRCRelease* message. | - | - | - | - |
| 4 | Void | - | - | - | - |
| 5 | Cause the UE to request establishment of PDU session with S-NSSAI=1. (Note 1) | - | - | - | - |
| 6 | Check: Does the UE transmit an RRCSetupRequest message within T3526 associated with S-NSSAI=1 in the next 15 seconds? | --> | NR RRC: RRCSetupRequest | 1 | F |
| 6A | Check:Is S-NSSAI=1 in the Rejected NSSAI list with cause ‘S-NSSAI not available due to maximum number of UEs reached’’ associated with current PLMN using AT/MMI command (+C5GNSSAIRDP)? | - | - | 1 | P |
| 7 | Wait for the expiry of T3526 associated with S-NSSAI=1. | - | - | - | - |
| 8 | Check: Using AT/MMI command (+C5GNSSAIRDP) verify that S-NSSAI=1 is not in the Rejected NSSAI list associated with current PLMN. | - | - | 2 | P |
| 9-27a1 | Void | - | - | - | - |
| Note 1: The request to establish a PDU session may be performed by MMI or AT Command. | | | | | |

9.1.12.4.3.3 Specific message contents

Table 9.1.12.4.3.3-1: CONFIGURATION UPDATE COMMAND (step 1, Table 9.1.12.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] table 4.7.1-19 | | | |
| Information Element | Value/remark | Comment | Condition |
| Configuration update indication | ‘0001’B | Acknowledgement (ACK) requested |  |
| Extended rejected NSSAI |  |  |  |
| Length of Extended rejected NSSAI contents | ‘00000100’B |  |  |
| Partial extended rejected NSSAI list |  | entry 1 |  |
| Type of list | ‘001’B | S-NSSAIs with back-off timer |  |
| Number of elements | ‘0000’B | 1 element |  |
| Back-off timer value | ’10100010’B | 120 seconds |  |
| Rejected S-NSSAI 1 |  | S-NSSAI value 1 |  |
| Length of rejected S-NSSAI | ‘0001’B | Length of rejected S-NSSAI in bytes |  |
| Cause value | ‘0011’B | S-NSSAI not available due to maximum number of UEs reached |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped HPLMN SST | Not Present |  |  |
| Mapped HPLMN SD | Not Present |  |  |

#### 9.1.12.5 NSAC / De-registration / 5GMM cause value #62 and rejected NSSAI

9.1.12.5.1 Test Purpose (TP)

(1)

**with** { UE in 5GMM-REGISTERED state and stores one or more S-NSSAIs in the allowed NSSAI }

**ensure that** {

**when** { UE receives a DEREGISTRATION REQUEST message including 5GMM cause value #62 and rejected NSSAI with rejection cause "S-NSSAI not available due to maximum number of UEs reached" }

**then** { UE shall store the rejected NSSAI and start the timer T3526 }

}

(2)

**with** { UE in 5GMM-DEREGISTERED state }

**ensure that** {

**when** { UE has neither allowed NSSAI nor configured NSSAI and has rejected NSSAI for the reached maximum number of UEs and timer T3526 expires }

**then** { UE removes the S-NSSAI from the rejected NSSAI for the maximum number of UEs reached }

}

9.1.12.5.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501, clauses 5.5.2.3.1, 5.5.2.3.2. Unless otherwise stated these are Rel-17 requirements

[TS 24.501, clause 5.5.2.3.1]

The network initiates the de-registration procedure by sending a DEREGISTRATION REQUEST message to the UE (see example in figure 5.5.2.3.1.1).

NOTE 1: If the AMF performs a local de-registration, it will inform the UE with a 5GMM messages (e.g. SERVICE REJECT message or REGISTRATION REJECT message) with 5GMM cause #10 "implicitly de-registered" only when the UE initiates a 5GMM procedure.

The network may include a 5GMM cause IE to specify the reason for the DEREGISTRATION REQUEST message. The network shall start timer T3522. The network shall indicate whether re-registration is needed or not in the De-registration type IE. The network shall also indicate via the access type whether the de-registration procedure is:

a) for 3GPP access only;

b) for non-3GPP access only; or

c) for 3GPP access, non-3GPP access or both when the UE is registered in the same PLMN for both accesses.

If the network de-registration is triggered due to network slice-specific authentication and authorization failure or revocation as specified in subclause 4.6.2.4, then the network shall set the 5GMM cause value to #62 "No network slices available" in the DEREGISTRATION REQUEST message. In addition, if the UE supports extended rejected NSSAI, the AMF shall include the Extended rejected NSSAI IE in the DEREGISTRATION REQUEST message; otherwise the AMF shall include the Rejected NSSAI IE in the DEREGISTRATION REQUEST message.

If the UE supports extended rejected NSSAI and the network de-registration is triggered due to mobility management based network slice admission control as specified in subclause 4.6.2.5, then the network shall set the 5GMM cause value to #62 "No network slices available" in the DEREGISTRATION REQUEST message. In addition, the network may include a back-off timer value for each S-NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached" in the Extended rejected NSSAI IE of the DEREGISTRATION REQUEST message.

If the network de-registration is triggered for a UE supporting CAG due to CAG restrictions, the network shall set the 5GMM cause value to #76 "Not authorized for this CAG or authorized for CAG cells only" and should include the "CAG information list" in the CAG information list IE or the Extended CAG information list IE in the DEREGISTRATION REQUEST message.

[TS 24.501, clause 5.5.2.3.2]

Upon receiving the DEREGISTRATION REQUEST message, if the DEREGISTRATION REQUEST message includes the rejected NSSAI, the UE takes the following actions based on the rejection cause in the rejected S-NSSAI(s):

…

"S-NSSAI not available due to maximum number of UEs reached"

The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the maximum number of UEs reached as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN or SNPN over the current access until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2.

If there is one or more S-NSSAIs in the rejected NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached", then for each S-NSSAI, the UE shall behave as follows:

a) stop the timer T3526 associated with the S-NSSAI, if running;

b) start the timer T3526 with:

1) the back-off timer value received along with the S-NSSAI, if a back-off timer value is received along with the S-NSSAI that is neither zero nor deactivated; or

2) an implementation specific back-off timer value, if no back-off timer value is received along with the S-NSSAI; and

c) remove the S-NSSAI from the rejected NSSAI for the maximum number of UEs reached when the timer T3526 associated with the S-NSSAI expires.

Upon sending a DEREGISTRATION ACCEPT message, the UE shall delete the rejected NSSAI as specified in subclause 4.6.2.2.

If the de-registration type indicates "re-registration not required", the UE shall take the actions depending on the received 5GMM cause value:

…

#62 (No network slices available).

The UE shall set the 5GS update status to 5U2 NOT UPDATED and enter state 5GMM-DEREGISTERED.NORMAL-SERVICE or 5GMM-DEREGISTERED.PLMN-SEARCH. Additionally, the UE shall reset the registration attempt counter.

The UE receiving the rejected NSSAI in the DEREGISTRATION REQUEST message takes the following actions based on the rejection cause in the rejected S-NSSAI(s):

...

"S-NSSAI not available due to maximum number of UEs reached"

Unless the back-off timer value received along with the S-NSSAI is zero, the UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the maximum number of UEs reached as specified in subclause 4.6.2.2 and shall not attempt to use this S-NSSAI in the current PLMN or SNPN over the current access until switching off the UE, the UICC containing the USIM is removed, the entry of the "list of subscriber data" with the SNPN identity of the current SNPN is updated, or the rejected S-NSSAI(s) are removed as described in subclauses 4.6.1 and 4.6.2.2.

NOTE 3: If the back-off timer value received along with the S-NSSAI in the rejected NSSAI for the maximum number of UEs reached is zero as specified in subclause 10.5.7.4a of 3GPP TS 24.008 [12], the UE does not consider the S-NSSAI as the rejected S-NSSAI.

If there is one or more S-NSSAIs in the rejected NSSAI with the rejection cause "S-NSSAI not available due to maximum number of UEs reached", then for each S-NSSAI, the UE shall behave as follows:

a) stop the timer T3526 associated with the S-NSSAI, if running;

b) start the timer T3526 with:

1) the back-off timer value received along with the S-NSSAI, if a back-off timer value is received along with the S-NSSAI that is neither zero nor deactivated; or

2) an implementation specific back-off timer value, if no back-off timer value is received along with the S-NSSAI; and

c) remove the S-NSSAI from the rejected NSSAI for the maximum number of UEs reached when the timer T3526 associated with the S-NSSAI expires.

...

If

1. the UE has allowed NSSAI for the current PLMN or SNPN or configured NSSAI for the current PLMN or SNPN or both and all the S-NSSAIs included in the allowed NSSAI or the configured NSSAI or both are rejected; or
2. the UE has neither allowed NSSAI for the current PLMN or SNPN nor configured NSSAI for the current PLMN or SNPN and all the S-NSSAIs included in the default configured NSSAI are rejected,

and the UE has rejected NSSAI for the maximum number of UEs reached, and the UE wants to obtain services in the current serving cell without performing a PLMN selection or SNPN selection, the UE may stay in the current serving cell and attempt to use the rejected S-NSSAI(s) for the maximum number of UEs reached in the current serving cell after the rejected S-NSSAI(s) are removed as described in subclause 4.6.2.2.

If the de-registration request is for 3GPP access only or for both 3GPP access and non-3GPP access and the UE is operating in single-registration mode, the UE shall in addition set the EPS update status to EU2 NOT UPDATED, reset the attach attempt counter and enter the state EMM-DEREGISTERED.

9.1.12.5.3 Test description

9.1.12.5.3.1 Pre-test conditions

System Simulator:

- NGC Cell A belongs to Home PLMN and TAI1 and set as serving cell;

UE:

- None.

Preamble:

- The UE is in state 3N-A on NGC cell A according to TS 38.508-1 [4].

9.1.12.5.3.2 Test procedure sequence

Table 9.1.12.5.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 0 | Steps 1-4 of test procedure for deleting configured S-NSSAI, default configured S-NSSAI as specified in TS 38.508-1 [4], subclause 4.9.35 are performed. | - | - | - | - |
| 1 | SS sends a DEREGISTRATION REQUEST message indicates 5GMM cause IE = #62 "No network slices available" including S-NSSAI=1 in rejected NSSAI with back-off timer set to 120 seconds. | <-- | 5GMM: DEREGISTRATION REQUEST | - | - |
| 2 | Check: Does the UE transmit a DEREGISTRATION ACCEPT message?  Note: Now UE should start timer T3526. | --> | 5GMM: DEREGISTRATION ACCEPT | 1 | P |
| 2A | The SS start a timer T1 = 120s (T3526) | - | - | - | - |
| 3 | The SS releases the RRC connection. | - | - | - | - |
| 3A | The SS start a timer T2 = 30s. | - | - | - | - |
| - | EXCEPTION: Steps 3Ba1 to 3Bc1 describe a message sequence that depends on the content of the REGISTRATION REQUEST received. | - | - | - | - |
| 3Ba1 | Check: Does the UE transmit the REGISTRATION REQUEST message on NGC Cell A containing Requested NSSAI or Requested mapped NSSAI IE? | --> | REGISTRATION REQUEST | 1 | F |
| 3Ba2 | Stop timer T2. | - | - | - | - |
| 3Bb1 | Check: Does the UE transmit a REGISTRATION REQUEST message on NGC Cell A without Requested NSSAI or Requested mapped NSSAI IE? | --> | REGISTRATION REQUEST | 1 | P |
| 3Bb2 | The SS transmits a REGISTRATION REJECT message, 5GMM cause value = #62 "No network slices available". | <-- | REGISTRATION REJECT | - | - |
| 3Bb3 | Stop timer T2. | - | - | - | - |
| 3Bc1 | Timer T2 expires | - | - | - | - |
| 3C | Cause the UE to request establishment of PDU session with S-NSSAI=1. (Note 1) | - | - | **-** | **-** |
| 4 | Check: Does the UE transmit an RRCSetupRequest message within T3526 associated with S-NSSAI=1 in the next 30s seconds? | --> | NR RRC: RRCSetupRequest | 1 | F |
| 5 | The SS waits T1 to expire. | - | - | - | - |
| 5A | Void | - | - | **-** | **-** |
| 6-23a1 | Check: Does the UE perform Steps 2-19a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4]? | - | - | 2 | P |
| 24-29 | Void. | - | - | - | - |
| Note1: The request to establish a PDU session may be performed by MMI or AT Command. | | | | | |

9.1.12.5.3.3 Specific message contents

Table 9.1.12.5.3.3-0: REGISTRATION ACCEPT (Preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| Allowed NSSAI |  |  |  |
| Length of NSSAI contents | 1 entriy | Equal to the number of S-NSSAI values included |  |
| S-NSSAI |  |  |  |
| Length of S-NSSAI contents | ‘0000 0001’B | SST |  |
| SST | ‘0000 0001’B | SST value 1 (eMBB) |  |

Table 9.1.12.5.3.3-1: DEREGISTRATION REQUEST (step 1, Table 9.1.12.5.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] table 4.7.1-14 | | | |
| Information Element | Value/remark | Comment | Condition |
| De-registration type |  |  |  |
| Switch off | ‘0’B | In the network to UE direction is spare. The network shall set this bit to zero. |  |
| Re-registration required | ‘0’B | re-registration not required |  |
| Access type | ‘01’B | 3GPP access |  |
| 5GMM cause | 62 | No network slices available |  |
| Extended rejected NSSAI |  |  |  |
| Length of Extended rejected NSSAI contents | 1 entry |  |  |
| Partial extended rejected NSSAI list |  | entry 1 |  |
| Type of list | ‘001’B | S-NSSAIs with back-off timer |  |
| Number of elements | ‘0000’B | 1 element |  |
| Back-off timer value | ’10100010’B | 120 seconds |  |
| Rejected S-NSSAI 1 |  | S-NSSAI value 1 |  |
| Length of rejected S-NSSAI | ‘0100’B | Length of rejected S-NSSAI in bytes |  |
| Cause value | ‘0011’B | S-NSSAI not available due to maximum number of UEs reached |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | ’FFFFFF’H | no SD value associated with the SST |  |
| Mapped HPLMN SST | Not Present |  |  |
| Mapped HPLMN SD | Not Present |  |  |

Table 9.1.12.5.3.3-2: REGISTRATION REQUEST (step 3Bb1, Table 9.1.12.5.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘001’B | Initial registration |  |
| Requested NSSAI | Not present |  |  |
| Requested mapped NSSAI | Not present |  |  |

Table 9.1.12.5.3.3-3: REGISTRATION REJECT (step 3Bb2, Table 9.1.12.5.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | ‘0011 1110’B | #62 “No network slices available” |  |
| Extended rejected NSSAI | Not present |  |  |

Table 9.1.12.5.3.3-4: REGISTRATION REQUEST (Step 8, Table 9.1.12.5.3.2-1, step 4 in TS 38.508-1 Table 4.5.2.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘001’B | Initial registration |  |
| 5GMM capability |  |  |  |
| ER-NSSAI | ‘1’B | Extended rejected NSSAI supported |  |
| Requested NSSAI |  |  |  |
| Length of NSSAI contents | '0000 0010'B | 1 entry |  |
| S-NSSAI |  |  |  |
| Length of S-NSSAI contents | '00000001'B | SST |  |
| SST | '00000001'B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.1.12.5.3.3-5: REGISTRATION ACCEPT (Step 18, Table 9.1.12.5.3.2-1, step 14 in TS 38.508-1 Table 4.5.2.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| Allowed NSSAI |  |  |  |
| Length of NSSAI contents | '0000 0010'B | 1 entry |  |
| S-NSSAI |  |  |  |
| Length of S-NSSAI contents | '00000001'B | SST |  |
| SST | '00000001'B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Configured NSSAI | Not present |  |  |

### 9.1.13 NSSRG / Mobility management aspects

#### 9.1.13.1 NSSRG / Initial registration

9.1.13.1.1 Test Purpose (TP)

(1)

**with** { UE in 5GMM-DEREGISTERED state }

**ensure that** {

**when** { UE is switched on }

**then** { UE transmits REGISTRATION REQUEST message with NSSRG bit set to "NSSRG supported" in the 5GMM capability IE }

}

(2)

**with** { UE has received configured NSSAI and the NSSRG information }

**ensure that** {

**when** { UE needs to initiate registration procedure }

**then** { UE sends REGISTRATION REQUEST message with requested NSSAI which are associated with common NSSRG value }

}

9.1.13.1.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501 clauses 5.5.1.2.2 and 10.2. Unless otherwise stated these are Rel-17 requirements.

[TS 24.501 clause 5.5.1.2.2]

The UE in state 5GMM-DEREGISTERED shall initiate the registration procedure for initial registration by sending a REGISTRATION REQUEST message to the AMF,

a) when the UE performs initial registration for 5GS services;

b) when the UE performs initial registration for emergency services;

c) when the UE performs initial registration for SMS over NAS;

d) when the UE moves from GERAN to NG-RAN coverage or the UE moves from a UTRAN to NG-RAN coverage and the following applies:

1) the UE initiated a GPRS attach or routing area updating procedure while in A/Gb mode or Iu mode; or

2) the UE has performed 5G-SRVCC from NG-RAN to UTRAN as specified in 3GPP TS 23.216 [6A],

and since then the UE did not perform a successful EPS attach or tracking area updating procedure in S1 mode or registration procedure in N1 mode;

e) when the UE performs initial registration for onboarding services in SNPN; and

f) when the UE performs initial registration for disaster roaming services;

...

The subset of configured NSSAI provided in the requested NSSAI consists of one or more S-NSSAIs in the configured NSSAI applicable to the current PLMN or SNPN, if the S-NSSAI is neither in the rejected NSSAI nor associated to the S-NSSAI(s) in the rejected NSSAI. In addition, if the NSSRG information is available, the subset of configured NSSAI provided in the requested NSSAI shall be associated with at least one common NSSRG value. If the UE is in 5GMM-REGISTERED state over the other access and has already an allowed NSSAI for the other access, all the S-NSSAI(s) in the requested NSSAI for the current access shall share at least an NSSRG value common to all the S-NSSAI(s) of the allowed NSSAI for the other access. If the UE is simultaneously performing the registration procedure on the other access, the UE shall include S-NSSAIs that share at least a common NSSRG value across all access types.

...

If the UE supports the NSSRG, then the UE shall set the NSSRG bit to "NSSRG supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

9.1.13.1.3 Test description

9.1.13.1.3.1 Pre-test conditions

System Simulator:

- NGC Cell A belongs to Home PLMN and TAI1 and set as serving cell;

UE:

- None;

Preamble:

- The UE is in state Switched OFF (state 0N-B) according to TS 38.508-1 [4].

9.1.13.1.3.2 Test procedure sequence

Table 9.1.13.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2-4 | Steps 2 to 4 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 5 | Check: Does UE transmit a REGISTRATION REQUEST message including NSSRG bit? | --> | REGISTRATION REQUEST | 1 | P |
| 6-14 | Steps 5 to 13 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 15 | The SS transmits a REGISTRATION ACCEPT message including Configured NSSAI with NSSRG information included. | <-- | REGISTRATION ACCEPT | - | - |
| 16-21a1 | Steps 15 to 20a1 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 22 | The generic test procedure in TS 38.508-1 Table 4.9.6.1-1 of Switch off procedure in RRC\_IDLE are performed. | - | - | - | - |
| 23 | The UE is brought back to operation or the USIM is inserted. | - | - | - | - |
| 24-26 | Steps 2 to 4 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 27 | Check: Does UE transmit a REGISTRATION REQUEST message with requested NSSAI which are associated with common NSSRG value? | --> | REGISTRATION REQUEST | 2 | P |
| 28-43a1 | Steps 5 to 20a1 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |

9.1.13.1.3.3 Specific message contents

Table 9.1.13.1.3.3-1: REGISTRATION REQUEST (step 5, Table 9.1.13.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘001’B | Initial registration |  |
| 5GMM capability |  |  |  |
| NSSRG | ‘1’B | NSSRG supported |  |

Table 9.1.13.1.3.3-2: REGISTRATION ACCEPT (step 15, Table 9.1.13.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result |  |  |  |
| 5GS registration result value | ‘001’B | 3GPP access |  |
| Allowed NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 3 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000011’B | SST value 3 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Configured NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 3 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000011’B | SST value 3 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| NSSRG information |  |  |  |
| Length of NSSRG information contents | 3 entries |  |  |
| NSSRG values for S-NSSAI 1 |  |  |  |
| Length of NSSRG values for S-NSSAI | 1 entry |  |  |
| S-NSSAI value |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| NSSRG value 1 for the S-NSSAI | ‘00000001’B |  |  |
| NSSRG values for S-NSSAI 2 |  |  |  |
| Length of NSSRG values for S-NSSAI | 2 entries |  |  |
| S-NSSAI value |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| NSSRG value 1 for the S-NSSAI | ‘00000010’B |  |  |
| NSSRG value 2 for the S-NSSAI | ‘00000011’B |  |  |
| NSSRG values for S-NSSAI 3 |  |  |  |
| Length of NSSRG values for S-NSSAI | 2 entries |  |  |
| S-NSSAI value |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 3 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000011’B | SST value 3 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| NSSRG value 1 for the S-NSSAI | ‘00000010’B |  |  |
| NSSRG value 2 for the S-NSSAI | ‘00000100’B |  |  |

Table 9.1.13.1.3.3-3: REGISTRATION REQUEST (step 27, Table 9.1.13.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘001’B | Initial registration |  |
| Requested NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 3 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000011’B | SST value 3 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

#### 9.1.13.2 NSSRG / Generic UE configuration update

9.1.13.2.1 Test Purpose (TP)

(1)

**with** { UE has received configured NSSAI }

**ensure that** {

**when** { UE receives new configured NSSAI in the CONFIGURATION UPDATE COMMAND message with NSSRG information }

**then** { UE stores the new configured NSSAI and the NSSRG information }

}

9.1.13.2.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501 clauses 5.5.1.2.2. Unless otherwise stated these are Rel-17 requirements.

[TS 24.501 clause 5.5.1.2.2]

The UE in state 5GMM-DEREGISTERED shall initiate the registration procedure for initial registration by sending a REGISTRATION REQUEST message to the AMF,

a) when the UE performs initial registration for 5GS services;

b) when the UE performs initial registration for emergency services;

c) when the UE performs initial registration for SMS over NAS;

d) when the UE moves from GERAN to NG-RAN coverage or the UE moves from a UTRAN to NG-RAN coverage and the following applies:

1) the UE initiated a GPRS attach or routing area updating procedure while in A/Gb mode or Iu mode; or

2) the UE has performed 5G-SRVCC from NG-RAN to UTRAN as specified in 3GPP TS 23.216 [6A],

and since then the UE did not perform a successful EPS attach or tracking area updating procedure in S1 mode or registration procedure in N1 mode;

e) when the UE performs initial registration for onboarding services in SNPN; and

f) when the UE performs initial registration for disaster roaming services;

…

The subset of configured NSSAI provided in the requested NSSAI consists of one or more S-NSSAIs in the configured NSSAI applicable to the current PLMN or SNPN, if the S-NSSAI is neither in the rejected NSSAI nor associated to the S-NSSAI(s) in the rejected NSSAI. In addition, if the NSSRG information is available, the subset of configured NSSAI provided in the requested NSSAI shall be associated with at least one common NSSRG value. If the UE is in 5GMM-REGISTERED state over the other access and has already an allowed NSSAI for the other access, all the S-NSSAI(s) in the requested NSSAI for the current access shall share at least an NSSRG value common to all the S-NSSAI(s) of the allowed NSSAI for the other access. If the UE is simultaneously performing the registration procedure on the other access, the UE shall include S-NSSAIs that share at least a common NSSRG value across all access types.

If the UE supports the unavailability period, the UE shall set the UN-PER bit to "unavailability period supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

…

[TS 24.501 clause 5.4.4.3]

Upon receiving the CONFIGURATION UPDATE COMMAND message, the UE shall stop timer T3346 if running and use the contents to update appropriate information stored within the UE.

If "acknowledgement requested" is indicated in the Acknowledgement bit of the Configuration update indication IE in the CONFIGURATION UPDATE COMMAND message, the UE shall send a CONFIGURATION UPDATE COMPLETE message.

…

If the UE receives a new configured NSSAI in the CONFIGURATION UPDATE COMMAND message, the UE shall consider the new configured NSSAI for the registered PLMN or SNPN as valid and the old configured NSSAI for the registered PLMN or SNPN as invalid; otherwise, the UE shall consider the old configured NSSAI for the registered PLMN or SNPN as valid. The UE shall store the new configured NSSAI as specified in subclause 4.6.2.2. In addition, if the CONFIGURATION UPDATE COMMAND message contains an NSSRG information IE, the UE shall store the contents of the NSSRG information IE as specified in subclause 4.6.2.2. If the UE receives a new configured NSSAI in the CONFIGURATION UPDATE COMMAND message and no NSSRG information IE, the UE shall delete any stored NSSRG information, if any, as specified in subclause 4.6.2.2.

9.1.13.2.3 Test description

9.1.13.2.3.1 Pre-test conditions

System Simulator:

- NGC Cell A belongs to Home PLMN and TAI1 and set as serving cell;

UE:

- None;

Preamble:

- The UE is in state Switched OFF (state 0N-B) according to TS 38.508-1 [4].

9.1.13.2.3.2 Test procedure sequence

Table 9.1.13.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2-3 | Steps 2 to 3 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 4 | Check: Does UE transmit a REGISTRATION REQUEST message including NSSRG bit? | --> | REGISTRATION REQUEST | 1 | P |
| 5-13 | Steps 5 to 13 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 14 | The SS transmits a REGISTRATION ACCEPT message including Configured NSSAI with NSSRG information included. | <-- | REGISTRATION ACCEPT | - | - |
| 15-19a1 | Steps 15 to 19a1 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 20 | The SS transmits a CONFIGURATION UPDATE COMMAND message including NSSRG information. | <-- | CONFIGURATION UPDATE COMMAND | - | - |
| 21 | Check: Does UE transmit a CONFIGURATION UPDATE COMPLETE message? | --> | CONFIGURATION UPDATE COMPLETE | 1 | P |
| 22 | Switch off procedure in RRC\_CONNECTED specified in TS 38.508-1 subclause 4.9.6.3 is performed. | - | - | - | - |
| 23 | UE is switched on. | - | - | - | - |
| 24-25 | Steps 2 to 3 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 26 | Check: Does UE transmit a REGISTRATION REQUEST message with requested NSSAI which are new configured NSSAI in CONFIGURATION UPDATE COMMAND message and associated with common NSSRG value? | --> | REGISTRATION REQUEST | 1 | P |
| 27-41a1 | Steps 5 to 19a1 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |

9.1.13.2.3.3 Specific message contents

Table 9.1.13.2.3.3-1: REGISTRATION REQUEST (step 4, Table 9.1.13.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘001’B | Initial registration |  |
| 5GMM capability |  |  |  |
| NSSRG | ‘1’B | NSSRG supported |  |

Table 9.1.13.2.3.3-2: REGISTRATION ACCEPT (step 14, Table 9.1.13.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| Allowed NSSAI |  |  |  |
| Length of NSSAI contents | 1 entry |  |  |
| S-NSSAI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Configured NSSAI |  |  |  |
| Length of NSSAI contents | 1 entry |  |  |
| S-NSSAI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| NSSRG information |  |  |  |
| Length of NSSRG information contents | 1 entry |  |  |
| NSSRG values for S-NSSAI 2 |  |  |  |
| Length of NSSRG values for S-NSSAI | 2 entries |  |  |
| S-NSSAI value |  |  |  |
| S-NSSAI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| NSSRG value 1 for the S-NSSAI | ‘00000010’B |  |  |
| NSSRG value 2 for the S-NSSAI | ‘00000011’B |  |  |

Table 9.1.13.2.3.3-3: CONFIGURATION UPDATE COMMAND (step 20, Table 9.1.13.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-19 | | | |
| Information Element | Value/remark | Comment | Condition |
| Configuration update indication | 0011 | Acknowledgement requested  Registration Requested |  |
| Allowed NSSAI |  |  |  |
| Length of NSSAI contents | 2 entries |  |  |
| S-NSSAI |  | S-NSSAI value 4 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000100’B | SST value 4 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI |  | S-NSSAI value5 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000101’B | SST value 5 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| NSSRG information |  |  |  |
| Length of NSSRG information contents | 1 entry |  |  |
| NSSRG values for S-NSSAI 1 |  |  |  |
| Length of NSSRG values for S-NSSAI | 1 entry |  |  |
| S-NSSAI value |  |  |  |
| S-NSSAI |  | S-NSSAI value 4 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000100’B | SST value 4 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| NSSRG value 1 for the S-NSSAI | ‘00000001’B |  |  |

Table 9.1.13.2.3.3-4: REGISTRATION REQUEST (step 26, Table 9.1.13.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘001’B | Initial registration |  |
| Requested NSSAI |  |  |  |
| Length of NSSAI contents | 1 entry |  |  |
| S-NSSAI |  | S-NSSAI value 4 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | SST value 4 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

### 9.1.14 Paging Early Indication with Paging Subgrouping Assistance

9.1.14.1 Paging Early Indication with Paging Subgrouping Assistance / Registration / provision and deletion of PEIPS assistance information9.1.14.1.1 Test Purpose (TP)

(1)

**with** { UE with no PEIPS assistance information provided in 5GMM-REGISTERED-INITIATED state for initial registration on a cell that support PEIPS and subgroupsNumForUEID < subgroupsNumPerPO }

**ensure that** {

**when** { UE receives REGISTRATION ACCEPT message with Negotiated PEIPS assistance information IE, including the Paging subgroup IDs }

**then** { UE monitors its associated PEI which indicates the paged subgroups }

}

(2)

**with** { UE with PEIPS assistance information provided with Paging subgroup IDs in 5GMM-REGISTERED-INITIATED state for mobility registration on a cell that support PEIPS and subgroupsNumForUEID is absent in subgroupConfig }

**ensure that** {

**when** { UE receives REGISTRATION ACCEPT message with Negotiated PEIPS assistance information IE, including the Paging subgroup ID different from previously assigned subgroup ID }

**then** { UE monitors its associated PEI which indicates the paged new subgroup }

}

(3)

**with** { UE with PEIPS assistance information provided in 5GMM-CONNECTED state and subgroupsNumForUEID is absent in subgroupConfig }

**ensure that** {

**when** { UE receives REGISTRATION ACCEPT message without Negotiated PEIPS assistance information IE }

**then** { UE monitors one paging occasion per DRX cycle }

}

(4)

**with** { UE with PEIPS assistance information provided with Paging subgroup ID on a cell that support PEIPS and subgroupsNumForUEID is absent in subgroupConfig }

**ensure that** {

**when** { UE receives a CONFIGURATION UPDATE COMMAND with PEIPS assistance information provided with Paging subgroup ID }

**then** { UE monitors its associated PEI which indicates the paged new subgroup }

9.1.14.1.2 Conformance requirements

References: The conformance requirements covered in the current TC is specified in: TS 24.501 clause 5.3.25, TS 38.304 clauses 7.2.1. Unless otherwise stated these are Rel-17 requirements.

[TS 24.501, clause 7.2]

The UE shall use PEIPS assistance information only if the UE received the Negotiated PEIPS assistance information IE during the last registration procedure. If the UE did not receive the Negotiated PEIPS assistance information IE during the last registration procedure, the UE shall delete any existing PEIPS assistance information received from the network.

[TS 38.304, clause 7.3.0]

If PEI and subgrouping are configured, UEs monitoring the same PO can be divided into one or more subgroups. With subgrouping, the UE monitors the associated PO if the corresponding bit for subgroup the UE belongs to is indicated as 1 by PEI corresponding to its PO, as specified in clause 10.4a in TS 38.213 [4].

The following parameters are used for the determination of subgroup ID:

- subgroupsNumPerPO: total number of subgroups for both CN assigned subgrouping (if any) and UE\_ID based subgrouping (if any) in a PO, which is broadcasted in system information;

- subgroupsNumForUEID: number of subgroups for UE\_ID based subgrouping in a PO, which is broadcasted in system information.

[TS 38.304, clause 7.2.1]

The UE monitors one PEI occasion per DRX cycle. A PEI occasion (PEI-O) is a set of PDCCH monitoring occasions (MOs) and can consist of multiple time slots (e.g. subframes or OFDM symbols) where PEI can be sent (TS 38.213 [4]). In multi-beam operations, the UE assumes that the same PEI is repeated in all transmitted beams and thus the selection of the beam(s) for the reception of the PEI is up to UE implementation.

9.1.14.1.3 Test Description

9.1.14.1.3.1 Pre-test conditions

System Simulator:

- 2 NR cells: NGC Cell A and NGC Cell D

- System information combination NR-2 as defined in TS 38.508-1 [4] clause 4.4.3.1.2 is used in NR cells.

UE:

- None.

Preamble:

- If pc\_IP\_Ping is set to TRUE then the UE is in 5GS state 1N-A, PDU SESSION ACTIVE according to TS 38.508-1 [4], clause 4.4A.2 Table 4.4A.2-1

- Else, the UE is in 5GS state 1N-A and Test Loop Function (*On*) with UE test loop mode B on NGC Cell A according to TS 38.508-1 [4], clause 4.4A.2 Table 4.4A.2-1.

9.1.14.1.3.2 Test procedure sequence

Table 9.1.14.1.3.2-1/2 illustrate the downlink power levels and other changing parameters to be applied for the cell at various time instants of the test execution. The exact instants on which these values shall be applied are described in the texts in this clause.

Table 9.1.14.1.3.2-1: Time instances of cell power level and parameter changes for FR1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter | Unit | NGC Cell A | NGC Cell D | Remark |
| **T0** | SS/PBCH  SSS EPRE | dBm/SCS | -88 | Off |  |
| **T1** | SS/PBCH  SSS EPRE | dBm/SCS | Off | -88 |  |
| **T2** | SS/PBCH  SSS EPRE | dBm/SCS | -88 | Off |  |

Table 9.1.14.1.3.2-2: Time instances of cell power level and parameter changes for FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter | Unit | NGC Cell A | NR Cell D | Remark |
| **T0** | SS/PBCH  SSS EPRE | dBm/SCS | -82 | Off |  |
| **T1** | SS/PBCH  SSS EPRE | dBm/SCS | Off | -82 |  |
| **T2** | SS/PBCH  SSS EPRE | dBm/SCS | -82 | Off |  |

Table 9.1.14.1.3.2-3: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| - | The following messages are sent and received on NGC Cell D unless otherwise stated. | - | *-* | - | - |
| 1 | SS re-adjusts the cell-specific reference signal level according to row "T1" in table 9.1.14.1.3.2-1/2. | - | *-* | - | - |
| 2-7a1 | Steps 1 to 6a1 of the TA update procedure in TS 38.508-1 [4] Table 4.9.5.2.2-1 are executed. | - | *-* | - | - |
| 8 | The SS transmits a PEI with the bit corresponding for the subgroup the UE belongs to is indicated as 1 and the *Paging* message including a matched identity on the associated PO only. | <-- | NR RRC: *Paging* | - | - |
| 9 | Check: Does the UE transmit an *RRCSetupRequest* message? | --> | NR RRC: *RRCSetupRequest* | 1 | P |
| 10 | The SS transmits an *RRCSetup* message. | <-- | NR RRC: *RRCSetup* | - | - |
| 11 | The UE transmits an *RRCSetupComplete* message including SERVICE REQUEST to confirm the successful completion of the connection establishment. | --> | NR RRC: *RRCSetupComplete*  5GMM: SERVICE REQUEST | - | - |
| 12-15 | Steps 5 to 8 of the NR RRC\_CONNECTED procedure in TS 38.508-1 [4] Table 4.5.4.2-3 are executed to successfully complete the service request procedure. | - | - | - | - |
| 16 | SS transmits an *RRCRelease* message. | <-- | NR RRC: *RRCRelease* | - | - |
| 17 | The SS adjusts the cell power levels according to row "T2" in table 9.1.14.1.3.2-1/2. | - | - | - | - |
| - | The following messages are sent and received on NGC Cell A unless otherwise stated. | - | - | - | - |
| 18-23a1 | Steps 1 to 6a1 of the TA update procedure in TS 38.508-1 [4] Table 4.9.5.2.2-1 are executed. | - | *-* | - | - |
| 24 | The SS transmits a PEI with the bit corresponding for the subgroup the UE belongs to is indicated as 1 and the *Paging* message including a matched identity on the associated PO only. | <-- | NR RRC: *Paging* | - | - |
| 25 | Check: Does the UE transmit an *RRCSetupRequest* message? | --> | NR RRC: *RRCSetupRequest* | 2 | P |
| 26 | The SS transmits an *RRCSetup* message. | <-- | NR RRC: *RRCSetup* | - | - |
| 27 | The UE transmits an *RRCSetupComplete* message including SERVICE REQUEST to confirm the successful completion of the connection establishment. | --> | NR RRC: *RRCSetupComplete*  5GMM: SERVICE REQUEST | - | - |
| 28-28C | Steps 5 to 8 of the NR RRC\_CONNECTED procedure in TS 38.508-1 [4] Table 4.5.4.2-3 are executed to successfully complete the service request procedure. | - | - | - | - |
| 29 | SS transmits an *RRCRelease* message. | <-- | NR RRC: *RRCRelease* | - | - |
| 29A | The SS waits 1 minutes. (Expire of T3512) | - | - | - | - |
| 30-35a1 | Steps 1 to 6a1 of the procedure in TS 38.508-1 [4] Table 4.9.5.2.2-1 are executed as the UE performs a periodic registration. | - | *-* | - | - |
| 36 | The SS transmits a PEI with the bit corresponding for the subgroup the UE belongs to after step 23a1 indicated as 0 and the *Paging* message including a matched identity. | <-- | NR RRC: *Paging* | - | - |
| 37 | Check: Does the UE transmit an *RRCSetupRequest* message? | --> | NR RRC: *RRCSetupRequest* | 3 | P |
| 38 | The SS transmits an *RRCSetup* message. | <-- | NR RRC: *RRCSetup* | - | - |
| 39 | The UE transmits an *RRCSetupComplete* message including SERVICE REQUEST to confirm the successful completion of the connection establishment. | --> | NR RRC: *RRCSetupComplete*  5GMM: SERVICE REQUEST | - | - |
| 40-40C | Steps 5 to 8 of the NR RRC\_CONNECTED procedure in TS 38.508-1 [4] Table 4.5.4.2-3 are executed to successfully complete the service request procedure. | - | - | - | - |
| 41 | The SS transmits a CONFIGURATION UPDATE COMMAND containing PEIPS assistance information. | <-- | CONFIGURATION UPDATE COMMAND | - | - |
| 42 | The UE transmits a CONFIGURATION UPDATE COMPLETE message. | --> | CONFIGURATION UPDATE COMPLETE | - | - |
| 43 | The SS transmits an *RRCRelease* message. | <-- | NR RRC: *RRCRelease* | - | - |
| 44 | The SS transmits a PEI with the bit corresponding for the subgroup the UE belongs to is indicated as 1 and the *Paging* message including a matched identity on the associated PO only. | <-- | NR RRC: *Paging* | - | - |
| 45 | Check: Does the UE transmit an *RRCSetupRequest* message? | --> | NR RRC: *RRCSetupRequest* | 4 | P |
| 46 | The SS transmits an *RRCSetup* message. | <-- | NR RRC: *RRCSetup* | - | - |
| 47 | The UE transmit an *RRCSetupComplete* message including SERVICE REQUEST to confirm the successful completion of the connection establishment. | --> | NR RRC: *RRCSetupComplete*  5GMM: SERVICE REQUEST | - | - |
| 48-51 | Steps 5 to 8 of the NR RRC\_CONNECTED procedure in TS 38.508-1 [4] Table 4.5.4.2-3 are executed to successfully complete the service request procedure. | - | - | - | - |

9.1.14.1.3.3 Specific message contents

Table 9.1.14.1.3.3-1: SIB1 for NGC Cell A and NGC Cell D(preamble and all steps, Table 9.1.14.1.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], table 4.6.1-28 with condition PEI | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| servingCellConfigCommon | ServingCellConfigCommonSIB in Table 9.1.14.1.3.3-2 |  |  |
| } |  |  |  |

Table 9.1.14.1.3.3-2: ServingCellConfigCommonSIB(Table 9.1.14.1.3.3-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], table 4.6.3-169 with condition PEI | | | |
| Information Element | Value/remark | Comment | Condition |
| ServingCellConfigCommonSIB ::= SEQUENCE { |  |  |  |
| downlinkConfigCommon | DownlinkConfigCommonSIB in Table 9.1.14.1.3.3-3 |  |  |
| } |  |  |  |

Table 9.1.14.1.3.3-3: DownlinkConfigCommonSIB(Table 9.1.14.1.3.3-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], table 4.6.3-53 with condition PEI | | | |
| Information Element | Value/remark | Comment | Condition |
| DownlinkConfigCommonSIB ::= SEQUENCE { |  |  |  |
| pei-Config-r17 ::= SEQUENCE { |  |  |  |
| subgroupConfig-r17 ::= SEQUENCE { |  |  |  |
| subgroupsNumForUEID-r17 | Not Present |  | NGC Cell A |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.1.14.1.3.3-4: *RRCSetupRequest* (steps 9, 25, 37 and 45, Table 9.1.14.1.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-23 | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCSetupRequest ::= SEQUENCE { |  |  |  |
| rrcSetupRequest SEQUENCE { |  |  |  |
| establishmentCause | mt-Access |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.1.14.1.3.3-4A: REGISTRATION REQUEST (steps 4, 20 and 32, Table 9.1.14.1.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | | Value/remark | Comment | Condition |
| 5GMM capability | |  |  |  |
| NR-PSSI (octet 6, bit 4) | | '1'B | NR paging subgrouping supported |  |

Table 9.1.14.1.3.3-5: REGISTRATION ACCEPT (steps 5, 21 and 33, Table 9.1.14.1.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| T3512 value |  |  | Step 21 |
| Timer value | '00001'B |  |  |
| Unit | '101'B |  |  |
| Negotiated PEIPS assistance information | Not present |  | Step 33 |
| Negotiated PEIPS assistance information |  |  | Step 5, 21 |
| PEIPS assistance information IEI | ‘33’H |  |  |
| Length of PEIPS assistance information contents | ‘01’H |  |  |
| PEIPS assistance information type 1 |  |  |  |
| Type of information | ‘000’B | Paging subgroup ID value |  |
| Paging subgroup ID value | ‘00000’B |  | Step 5 |
|  | ‘00001’B |  | Step 21 |

Table 9.1.14.1.3.3-6: CONFIGURATION UPDATE COMMAND (step 41, Table 9.1.14.1.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-19 | | | |
| Information Element | Value/remark | Comment | Condition |
| Configuration update indication | 'D1’H | Registration not requested and Acknowledgement (ACK) requested |  |
| Updated PEIPS assistance information |  |  |  |
| PEIPS assistance information IEI | ‘1F’H |  |  |
| Length of PEIPS assistance information contents | ‘01’H |  |  |
| PEIPS assistance information type 1 |  |  |  |
| Type of information | ‘000’B | Paging subgroup ID value |  |
| Paging subgroup ID value | ‘00000’B |  |  |

Table 9.1.14.1.3.3-7: REGISTRATION REQUEST (step 32, Table 9.1.14.1.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type |  |  |  |
| 5GS registration type value | '011'B | periodic registration updating |  |

## 9.2 5GS Non-3GPP Access Mobility Management

### 9.2.1 Primary authentication and key agreement procedure

#### 9.2.1.1 EAP based primary authentication and key agreement

9.2.1.1.1 Test Purpose (TP)

Same TP's as clause 9.1.1.1.1

9.2.1.1.2 Conformance requirements

Same Conformance requirements as in clause 9.1.1.1.2.

9.2.1.1.3 Test description

9.2.1.1.3.1 Pre-test conditions

System Simulator:

- WLAN Cell 27

UE:

- None.

Preamble:

- The UE is in state Switched OFF (state 0W-B) according to TS 38.508-1 [4].

9.2.1.1.3.2 Test procedure sequence

Table 9.2.1.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Switch the UE on | - | - | - | - |
| 2-4 | The UE initiates establishment of an IPsec tunnel and registration procedure by executing steps 1-3 of Table 4.5.2.2-3 in TS 38.508-1 [4]. | - | - | - | - |
| 5 | SS transmits an AUTHENTICATION REQUEST message with an EAP-Request/AKA'-Identity message. | <-- | 5GMM: AUTHENTICATION REQUEST |  |  |
| 6 | Check: Does the UE respond with an AUTHENTICATION RESPONSE message, with an EAP-Response/AKA'-Identity message? | --> | 5GMM: AUTHENTICATION RESPONSE | 1 | P |
| 7 | SS transmits an AUTHENTICATION REQUEST message with an EAP-Request/AKA'-challenge message which contains a not correct sequence number. | <-- | 5GMM: AUTHENTICATION REQUEST | - | - |
| 8 | Check: Does the UE respond with an AUTHENTICATION RESPONSE message, with an EAP-Response/AKA’-synchronization-failure? | --> | 5GMM: AUTHENTICATION RESPONSE | 2 | P |
| 9 | SS transmits a correct AUTHENTICATION REQUEST message with an EAP-Request/AKA'-challenge message. | <-- | 5GMM: AUTHENTICATION REQUEST | - | - |
| 10 | Check: Does the UE respond with a correct AUTHENTICATION RESPONSE message, with an EAP-Request/AKA'-challenge message? | --> | 5GMM: AUTHENTICATION RESPONSE | 3 | P |
| 11 | SS transmits an AUTHENTICATION RESULT message with an EAP-success message. | <-- | 5GMM: AUTHENTICATION RESULT | - | - |
| 12-14 | The registration procedure is performed by executing steps 6-8 of Table 4.5.2.2-3 in TS 38.508-1 [4]. | - | - | - | - |
| 15 | Check: Does the UE transmit a REGISTRATION COMPLETE message? | --> | 5GMM: REGISTRATION COMPLETE | 4 | P |
| 16 | The registration procedure is successfully completed by executing steps 10 of Table 4.5.2.2-3 in TS 38.508-1 [4]. | - | - | - | - |

9.2.1.1.3.3 Specific message contents

Table 9.2.1.1.3.3-1: Message AUTHENTICATION REQUEST (step 5, Table 9.2.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-1 | | | |
| Information Element | Value/Remark | Comment | Condition |
| EAP message | EAP-request/AKA'-Identity | See Table 4.7.3.2-7 in TS 38.508-1 [4]. | EAP-AKA |

Table 9.2.1.1.3.3-2: Message AUTHENTICATION RESPONSE (step 6, Table 9.2.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-2 | | | |
| Information Element | Value/Remark | Comment | Condition |
| EAP message | EAP-response/AKA'-Identity | See Table 4.7.3.2-8 in TS 38.508-1 [4]. | EAP-AKA |

Table 9.2.1.1.3.3-3: Message AUTHENTICATION REQUEST (step 7, Table 9.2.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-1 | | | |
| Information Element | Value/Remark | Comment | Condition |
| EAP message | EAP-request/AKA'- challenge | The sequence number in AUTN is not correct | EAP-AKA |

Table 9.2.1.1.3.3-4: Message AUTHENTICATION RESPONSE (step 8, Table 9.2.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-2 | | | |
| Information Element | Value/Remark | Comment | Condition |
| EAP message | EAP-response/AKA'-synchronization-failure | See Table 4.7.3.2-5 in TS 38.508-1 [4]. | EAP-AKA |

Table 9.2.1.1.3.3-5: Message AUTHENTICATION RESPONSE (step 10, Table 9.2.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-2 | | | |
| Information Element | Value/Remark | Comment | Condition |
| EAP message | EAP-Response/AKA'-Challenge | RES\* equal to the XRES\* calculated in the SS with the parameters provided/indicated in the AUTHENTICATION REQUEST | EAP-AKA |

Table 9.2.1.1.3.3-6: Message AUTHENTICATION RESULT (step 11, Table 9.2.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-3 | | | |
| Information Element | Value/Remark | Comment | Condition |
| EAP message | EAP-Success |  | EAP-AKA |

#### 9.2.1.2 5G AKA based primary authentication and key agreement

9.2.1.2.1 Test Purpose (TP)

Same Test purpose as in clause 9.1.1.4.1

9.2.1.2.2 Conformance requirements

Same Conformance requirements as in clause 9.1.1.4.2

9.2.1.2.3 Test description

9.2.1.2.3.1 Pre-test conditions

System Simulator:

- WLAN Cell 27

UE:

- None.

Preamble:

- The UE is in state Switched OFF (state 0W-B) according to TS 38.508-1 [4].

9.2.1.2.3.2 Test procedure sequence

Table 9.2.1.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Switch the UE on | - | - | - | - |
| 2-4 | The UE initiates establishment of an IPsec tunnel and registration procedure by executing steps 1-3 of Table 4.5.2.2-3 in TS 38.508-1 [4]. | - | - | - | - |
| 5 | The SS transmits an AUTHENTICATION REQUEST message which contains an invalid MAC code. | <-- | AUTHENTICATION REQUEST | - | - |
| 6 | Check: Does the UE respond with an AUTHENTICATION FAILURE message with 5GMM cause "MAC failure"? | --> | AUTHENTICATION FAILURE | 1 | P |
| 7 | SS transmits a correct AUTHENTICATION REQUEST message with RAND different to the one send in Step 5 | <-- | AUTHENTICATION REQUEST | - | - |
| 8 | Check: Does the UE respond with a correct AUTHENTICATION RESPONSE message with RES\* that is equal to the XRES\* calculated in the SS? | --> | AUTHENTICATION RESPONSE | 4 | P |
| 9 | SS transmits a NAS SECURITY MODE COMMAND message including the ngKSI of the new 5G NAS security context (as provided in step 7), to proceed with the registration procedure. | <-- | SECURITY MODE COMMAND | - | - |
| 10 | Check: Does the UE respond with NAS SECURITY MODE COMPLETE message integrity protected and ciphered with the new 5G NAS security context identified by the ngKSI received in the SECURITY MODE COMMAND message in step 9. | --> | SECURITY MODE COMPLETE | 5 | P |
| 11 | Steps 10 of the generic procedure (TS 38.508-1 Table 4.5.2.2-3 [4]) are executed to successfully complete the registration procedure. | - | - | - | - |
| 12 | Switch off procedure in Ipsec\_SA\_Established specified in TS 38.508-1 [4] subclause 4.9.6.5 is performed. | - | - | - | - |
| 13-16 | Steps 1-4 above are repeated | - | - | - | - |
| 17 | SS transmits an AUTHENTICATION REQUEST message with "separation bit" in the AMF field is 0. | <-- | AUTHENTICATION REQUEST | - | - |
| 18 | Check: Does the UE respond with an AUTHENTICATION FAILURE message, with 5GMM cause " Non-5G authentication unacceptable "? | --> | AUTHENTICATION FAILURE | 2 | P |
| 19 | SS transmits a correct AUTHENTICATION REQUEST message with RAND different to the one send in Step 22 | <-- | AUTHENTICATION REQUEST | - | - |
| 20 | Check: Does the UE respond with a correct AUTHENTICATION RESPONSE message with RES\* that is equal to the XRES\* calculated in the SS? | --> | AUTHENTICATION RESPONSE | 4 | P |
| 21 | Step 10 of the generic procedure (TS 38.508-1 Table 4.5.2.2-3 [4]) are executed to successfully complete the registration procedure. | - | - | - | - |
| 22 | Switch off procedure in Ipsec\_SA\_Established specified in TS 38.508-1 [4] subclause 4.9.6.5 is performed. | - | - | - | - |
| 23-26 | Steps 1-4 above are repeated | - | - | - | - |
| 27 | SS transmits AUTHENTICATION REQUEST message with the AMF field in the IE "Authentication parameter AUTN" set to "AMFRESYNCH" value to trigger SQN re-synchronisation procedure in test USIM | <-- | AUTHENTICATION REQUEST | - | - |
| 28 | Check: Does the UE respond with an AUTHENTICATION FAILURE message, with 5GMM cause "Synch failure" and Authentication failure parameter? | --> | AUTHENTICATION FAILURE | 3 | P |
| 29 | SS transmits a correct AUTHENTICATION REQUEST message with RAND different to the one send in Step 32. | <-- | AUTHENTICATION REQUEST | - | - |
| 30 | Check: Does the UE respond with a correct AUTHENTICATION RESPONSE message with RES\* that is equal to the XRES\* calculated in the SS? | --> | AUTHENTICATION RESPONSE | 4 | P |
| 31 | Step 10 of the generic procedure (TS 38.508-1 Table 4.5.2.2-3 [4]) are executed to successfully complete the registration procedure. | - | - | - | - |

9.2.1.2.3.3 Specific message contents

Table 9.2.1.2.3.3-1: AUTHENTICATION RESPONSE (step 8, step 20 and step 30，Table 9.2.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508, Table 4.7.1-2 | | | |
| Information Element | Value/remark | Comment | Condition |
| Authentication response parameter | RES\* equal to the XRES\* calculated in the SS with the parameters provided/indicated in the AUTHENTICATION REQUEST |  |  |

Table 9.2.1.2.3.3-2: AUTHENTICATION REQUEST (step 5, Table 9.2.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508, Table 4.7.1-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Authentication parameter AUTN | Invalid MAC | SS shall calculate the correct MAC value as specified in TS 33.102 and use any different value, e.g. correct\_MAC+5. |  |

Table 9.2.1.2.3.3-3: AUTHENTICATION FAILURE (step 6, Table 9.2.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508, Table 4.7.1-4 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | '0001 0100'B | MAC failure |  |

Table 9.2.1.2.3.3-4: AUTHENTICATION REQUEST (step 17, Table 9.2.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508, Table 4.7.1-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Authentication parameter AUTN | "separation bit"=0 | The "separation bit" in the AMF field of AUTN supplied by the core network is 0. |  |

Table 9.2.1.2.3.3-5: AUTHENTICATION FAILURE (step 18, Table 9.2.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508, Table 4.7.1-4 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | '0001 1010'B | Non-5G authentication unacceptable |  |

Table 9.2.1.2.3.3-6: AUTHENTICATION REQUEST (step 27, Table 9.2.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508, Table 4.7.1-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Authentication parameter AUTN | AMF field set to "AMFRESYNCH",  AMFRESYNCH = '1111 1111 1111 1111'B | AMFRESYNCH see TS 34.108, 8.1.2.2 |  |

Table 9.2.1.2.3.3-7: AUTHENTICATION FAILURE (step 28, Table 9.2.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508, Table 4.7.1-4 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | '0001 0101'B | Synch failure |  |
| Authentication failure parameter | AUTS | AUTS see TS 34.108, 8.1.2.2 |  |

### 9.2.2 Security Mode Control

#### 9.2.2.1 NAS security mode command

9.2.2.1.1 Test Purpose (TP)

(1)

**with** { the UE is in 5GMM-REGISTERED-INITIATED state and the SS initiates the NAS security mode control procedure by sending a SECURITY MODE COMMAND message during initial registration procedure }

**ensure that** {

**when** { the UE receives an integrity protected SECURITY MODE COMMAND message including not matching replayed security capabilities }

**then** { the UE send a SECURITY MODE REJECT message and does not start applying the NAS security in both UL and DL }

}

(2)

**with** { the UE is in 5GMM-REGISTERED-INITIATED state and the SS initiates the NAS security mode control procedure by sending a SECURITY MODE COMMAND message during initial registration procedure }

**ensure that** {

**when** { the UE receives an integrity protected SECURITY MODE COMMAND message including IMEISV request }

**then** { the UE send an integrity protected and ciphered SECURITY MODE COMPLETE message including IMEISV **and** starts applying the NAS Security in both UL and DL }

}

9.2.2.1.2 Conformance requirements

References: The conformance requirements covered in the present test case are specified in: TS 24.501, clauses 5.4.2.1, 5.4.2.3 and 5.4.2.5. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.4.2.1]

The purpose of the NAS security mode control procedure is to take a 5G NAS security context into use, and initialise and start NAS signalling security between the UE and the AMF with the corresponding 5G NAS keys and 5G NAS security algorithms.

Furthermore, the network may also initiate the security mode control procedure in the following cases:

a)- in order to change the 5G NAS security algorithms for a current 5G NAS security context already in use;

b) in order to change the value of uplink NAS COUNT used in the latest SECURITY MODE COMPLETE message as described in 3GPP TS 33.501 [24], subclause 6.9.4.4; and

c) in order to provide the Selected EPS NAS security algorithms to the UE

For restrictions concerning the concurrent running of a security mode control procedure with other security related procedures in the AS or inside the core network see 3GPP TS 33.501 [24], subclause 6.9.5.

[TS 24.501, clause 5.4.2.3]

Upon receipt of the SECURITY MODE COMMAND message, the UE shall check whether the security mode command can be accepted or not. This is done by performing the integrity check of the message, and by checking that the received Replayed UE security capabilities IE has not been altered compared to the latest values that the UE sent to the network.

When the SECURITY MODE COMMAND message includes an EAP-success message the UE handles the EAP-success message and the ABBA as described in subclause 5.4.1.2.2.8.

If the UE is registered for emergency services, performing initial registration for emergency services or establishing an emergency PDU session and the SECURITY MODE COMMAND message is received with ngKSI value "000" and 5G-IA0 and 5G-EA0 as selected 5G NAS security algorithms, the UE shall locally derive and take in use 5G NAS security context. The UE shall delete existing current 5G NAS security context.

The UE shall ignore the Replayed S1 UE security capabilities IE if this IE is included in the SECURITY MODE COMMAND message.

The UE shall accept a SECURITY MODE COMMAND message indicating the "null integrity protection algorithm" 5G-EA0 as the selected 5G NAS integrity algorithm only if the message is received when the UE is registered for emergency services, performing initial registration for emergency services or establishing an emergency PDU session.

If the type of security context flag included in the SECURITY MODE COMMAND message is set to "native security context" and if the ngKSI matches a valid non-current native 5G NAS security context held in the UE while the UE has a mapped 5G NAS security context as the current 5G NAS security context, the UE shall take the non-current native 5G NAS security context into use which then becomes the current native 5G NAS security context and delete the mapped 5G NAS security context.

If the SECURITY MODE COMMAND message can be accepted, the UE shall take the 5G NAS security context indicated in the message into use. The UE shall in addition reset the uplink NAS COUNT counter if:

a) the SECURITY MODE COMMAND message is received in order to take a 5G NAS security context into use created after a successful execution of the 5G AKA based primary authentication and key agreement procedure or the EAP based primary authentication and key agreement procedure; or

b) the SECURITY MODE COMMAND message received includes the type of security context flag set to "mapped security context" in the NAS key set identifier IE the ngKSI does not match the current 5G NAS security context, if it is a mapped 5G NAS security context.

If the SECURITY MODE COMMAND message can be accepted and a new 5G NAS security context is taken into use and SECURITY MODE COMMAND message does not indicate the "null integrity protection algorithm" 5G-IA0 as the selected NAS integrity algorithm, the UE shall:

- if the SECURITY MODE COMMAND message has been successfully integrity checked using an estimated downlink NAS COUNT equal to 0, then the UE shall set the downlink NAS COUNT of this new 5G NAS security context to 0;

- otherwise the UE shall set the downlink NAS COUNT of this new 5G NAS security context to the downlink NAS COUNT that has been used for the successful integrity checking of the SECURITY MODE COMMAND message.

If the SECURITY MODE COMMAND message includes the horizontal derivation parameter indicating "KAMF derivation is required", the UE shall derive a new K'AMF, as specified in 3GPP TS 33.501 [24] for KAMF to K'AMF derivation in mobility, and set both uplink and downlink NAS COUNTs to zero. When the new 5G NAS security context is taken into use for current access and the UE is registered with the same PLMN over the 3GPP access and the non-3GPP access:

a) the UE is in 5GMM-IDLE mode over the non-current access, the AMF and the UE shall activate the new 5G NAS security context over the non-current access as described in 3GPP TS 33.501 [24]. The AMF and the UE shall set the downlink NAS COUNT and uplink NAS COUNT to zero for the non-current access; or

b) the UE is in 5GMM-CONNECTED mode over the non-current access, the AMF shall send the SECURITY MODE COMMAND message over the non-current access to activate the new 5G NAS security context that was activated over the current access as described in 3GPP TS 33.501 [24]. The AMF shall include the same ngKSI in the SECURITY MODE COMMAND message to identify the new 5G NAS security context.

If the SECURITY MODE COMMAND message includes the horizontal derivation parameter indicating "KAMF derivation is not required" or the Additional 5G security parameters IE is not included in the message, the UE is registered with the same PLMN over the 3GPP access and non-3GPP access, then after the completion of a security mode control procedure over the current access:

a) the UE is in 5GMM-IDLE mode over the non-current access, the AMF and the UE shall activate the new 5G NAS security context for the non-current access. If a primary authentication and key agreement procedure was completed before the security mode control procedure, the AMF and the UE shall set the downlink NAS COUNT and uplink NAS COUNT to zero for the non-current access, otherwise the downlink NAS COUNT and uplink NAS COUNT for the non-3GPP access are not changed; or

b) the UE is in 5GMM-CONNECTED mode over the non-current access, the AMF shall send the SECURITY MODE COMMAND message over the non-current access to activate the new 5G NAS security context that was activated over the current access as described in 3GPP TS 33.501 [24]. The AMF shall include the same ngKSI in the SECURITY MODE COMMAND message to identify the new 5G NAS security context.

If the SECURITY MODE COMMAND message can be accepted, the UE shall send a SECURITY MODE COMPLETE message integrity protected with the selected 5GS integrity algorithm and the 5G NAS integrity key based on the KAMF or mapped K'AMF if the type of security context flag is set to "mapped security context" indicated by the ngKSI. When the SECURITY MODE COMMAND message includes the type of security context flag set to "mapped security context" in the NAS key set identifier IE, then the UE shall check whether the SECURITY MODE COMMAND message indicates the ngKSI of the current 5GS security context, if it is a mapped 5G NAS security context, in order not to re-generate the K'AMF.

Furthermore, if the SECURITY MODE COMMAND message can be accepted, the UE shall cipher the SECURITY MODE COMPLETE message with the selected 5GS ciphering algorithm and the 5GS NAS ciphering key based on the KAMF or mapped K'AMF indicated by the ngKSI. The UE shall set the security header type of the message to "integrity protected and ciphered with new 5G NAS security context".

From this time onward the UE shall cipher and integrity protect all NAS signalling messages with the selected 5GS integrity and ciphering algorithms.

If the AMF indicated in the SECURITY MODE COMMAND message that the IMEISV is requested, the UE shall include its IMEISV in the SECURITY MODE COMPLETE message.

If, during an ongoing registration procedure or service request procedure, the SECURITY MODE COMMAND message includes the Additional 5G security information IE with the RINMR bit set to "Retransmission of the initial NAS message requested", the UE shall include the entire uncyphered REGISTRATION REQUEST message or SERVICE REQUEST message, which the UE had previously included in the NAS message container IE of the initial NAS message (i.e. REGISTRATION REQUEST message or SERVICE REQUEST message, respectively), in the NAS message container IE of the SECURITY MODE COMPLETE message.

If, prior to receiving the SECURITY MODE COMMAND message, the UE without a valid 5GS NAS security context had sent a REGISTRATION REQUEST message the UE shall include the entire REGISTRATION REQUEST message in the NAS message container IE of the SECURITY MODE COMPLETE message as described in subclause 4.4.6.

If the UE operating in the single-registration mode receives the Selected EPS NAS security algorithms IE, the UE shall use the IE according to 3GPP TS 33.501 [24].

For a UE operating in single-registration mode with N26 interface supported in the network, after an inter-system change from S1 mode to N1 mode in 5GMM-CONNECTED mode, the UE shall set the value of the Selected EPS NAS security algorithms IE in the 5G NAS security context to the NAS security algorithms that were received from the source MME when the UE was in S1 mode.

[TS 24.501, clause 5.4.2.5]

If the security mode command cannot be accepted, the UE shall send a SECURITY MODE REJECT message. The SECURITY MODE REJECT message contains a 5GMM cause that typically indicates one of the following cause values:

#23 UE security capabilities mismatch.

#24 security mode rejected, unspecified.

If the UE detects that the received Replayed UE security capabilities IE has been altered compared to the latest values that the UE sent to the network, the UE shall set the cause value to #23 "UE security capabilities mismatch".

Upon receipt of the SECURITY MODE REJECT message, the AMF shall stop timer T3560. The AMF shall also abort the ongoing procedure that triggered the initiation of the NAS security mode control procedure.

Both the UE and the AMF shall apply the 5G NAS security context in use before the initiation of the security mode control procedure, if any, to protect the SECURITY MODE REJECT message and any other subsequent messages according to the rules in subclause 4.4.4 and 4.4.5.

9.2.2.1.3 Test description

9.2.2.1.3.1 Pre-test conditions

System Simulator:

- WLAN Cell 27

UE:

- None.

Preamble:

- The UE is in state Switched OFF (state 0-A) according to TS 38.508-1 [4].

9.2.2.1.3.2 Test procedure sequence

Table 9.2.2.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 1A | The UE transmits a REGISTRATION REQUEST message. | --> | REGISTRATION REQUEST | - | - |
| 1B | The SS transmits an AUTHENTICATION REQUEST message including EAP-Request/AKA'-Challenge or 5G AKA Challenge. | <-- | AUTHENTICATION REQUEST | - | - |
| 1C | The UE transmits an AUTHENTICATION RESPONSE message including EAP-Response/AKA'-Challenge or 5G AKA Response. | --> | AUTHENTICATION RESPONSE | - | - |
| 1D | The SS transmits a SECURITY MODE COMMAND message including EAP-Success if EAP-AKA' used. | <-- | SECURITY MODE COMMAND | - | - |
| 1E | The UE transmits a SECURITY MODE COMPLETE message. | --> | SECURITY MODE COMPLETE | - | - |
| 1F | The SS transmits a REGISTRATION REJECT message with the cause value set to #6 Illegal ME as default. | <-- | REGISTRATION REJECT | - | - |
| 1G | The UE is switched off. | - | - | - | - |
| 1H | The UE is switched on. | - | - | - | - |
| 2-6 | Steps 1-5 of the generic procedure for UE registration specified in TS 38.508-1 [4] table 4.5.2.2-3 are performed. | - | - | - | - |
| 7 | The SS transmits a SECURITY MODE COMMAND message to activate NAS security. It is integrity protected and includes unmatched replayed security capabilities. | <-- | SECURITY MODE COMMAND | - | - |
| 8 | Check: Does the UE transmit a SECURITY MODE REJECT message with cause’#23: UE security capabilities mismatch’? | --> | SECURITY MODE REJECT | 1 | P |
| 9 | The SS transmits an IDENTITY REQUEST message (Security not applied). | <-- | IDENTITY REQUEST | - | - |
| 10 | Check: Does the UE transmit a non-security protected IDENTIY RESPONSE message? | --> | IDENTITY RESPONSE | 1 | P |
| 11 | The SS transmits a SECURITY MODE COMMAND message to activate NAS security. It is integrity protected and includes IMEISV. | <-- | SECURITY MODE COMMAND | - | - |
| 12 | Check: Does the UE transmit a SECURITY MODE COMPLETE message and does it establish the initial security configuration? | --> | SECURITY MODE COMPLETE | 2 | P |
| 13-15 | Steps 8-10 of the generic procedure for UE registration specified in TS 38.508-1 [4] table 4.5.2.2-3 are performed. | - | - | - | - |
| 16 | The SS transmits an IDENTITY REQUEST message (Security protected as per the algorithms specified in step 11). | <- | IDENTITY REQUEST | - | - |
| 17 | Check: Does the UE transmit an IDENTIY RESPONSE message (Security Protected as per the algorithms specified in step 11)? | -> | IDENTITY RESPONSE | 2 | P |
| Note 1: The UE establishes an IPsec tunnel in parallel to 5GC registration steps 4 to 12 as per the IKEv2 protocol as defined in 3GPP TS 23.502 [31] clause 4.12.2.2 figure 4.12.2.2-1. | | | | | |

9.2.2.1.3.3 Specific message contents

Table 9.2.2.1.3.3-0: REGISTRATION REJECT (Step 1F, Table 9.2.2.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4],table 4.7.1-9 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GMM cause | ‘00000110’B | Illegal ME |  |

Table 9.2.2.1.3.3-1: SECURITY MODE COMMAND (Step 7, Table 9.2.2.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4],table 4.7.1-25 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Replayed UE security capabilities | Set to mismatch the security capability of UE under test |  |  |

Table 9.2.2.1.3.3-2: SECURITY MODE REJECT (Step 8, Table 9.2.2.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4],table 4.7.1-27 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GMM cause | #23 |  |  |

Table 9.2.2.1.3.3-3: IDENTITY REQUEST (Step 9, Table 9.2.2.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4],table 4.7.1-21 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Identity type | '0001'B | SUCI |  |

Table 9.2.2.1.3.3-4: IDENTITY RESPONSE (Step 10, Table 9.2.2.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4],table 4.7.1-22 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Mobile identity |  |  |  |
| Type of identity | '001'B | SUCI |  |

Table 9.2.2.1.3.3-5: SECURITY MODE COMMAND (Step 11, Table 9.2.2.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-25 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Selected NAS security algorithms |  |  |  |
| Type of ciphering algorithm | Set according to PIXIT parameter for default ciphering algorithm if it is set to a value different to 5G-EA0, or, set to any value different to 5G-EA0 otherwise | Non-zero ciphering algorithm |  |
| IMEISV request | Present |  |  |

Table 9.2.2.1.3.3-6: SECURITY MODE COMPLETE (Step 12, Table 9.2.2.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-26 | | | |
| Information Element | Value/Remark | Comment | Condition |
| IMEISV | Present |  |  |

Table 9.2.2.1.3.3-7: IDENTITY REQUEST (Step 16, Table 9.2.2.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4],table 4.7.1-21 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Identity type | '0011'B | IMEI |  |

Table 9.2.2.1.3.3-8: IDENTITY RESPONSE (Step 17, Table 9.2.2.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4],table 4.7.1-22 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Mobile identity |  |  |  |
| Type of identity | '011'B | IMEI |  |

#### 9.2.2.2 Protection of initial NAS signalling messages

9.2.2.2.1 Test Purpose (TP)

Same Test purpose as in clause 9.1.2.2.1

9.2.2.2.2 Conformance requirements

Same conformance requirements as in clause 9.1.2.2.2

9.2.2.2.3 Test description

9.2.2.2.3.1 Pre-test conditions

System Simulator:

- WLAN Cell 27.

UE:

- None.

Preamble:

- The UE is in state 0W-B on WLAN Cell 27 according to TS 38.508-1 [4].

9.2.2.2.3.2 Test procedure sequence

Table 9.2.2.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 1A | The UE transmits a REGISTRATION REQUEST message. | --> | REGISTRATION REQUEST | - | - |
| 1B | The SS transmits an AUTHENTICATION REQUEST message including EAP-Request/AKA'-Challenge or 5G AKA Challenge. | <-- | AUTHENTICATION REQUEST | - | - |
| 1C | The UE transmits an AUTHENTICATION RESPONSE message including EAP-Response/AKA'-Challenge or 5G AKA Response. | --> | AUTHENTICATION RESPONSE | - | - |
| 1D | The SS transmits a SECURITY MODE COMMAND message including EAP-Success if EAP-AKA' used. | <-- | SECURITY MODE COMMAND | - | - |
| 1E | The UE transmits a SECURITY MODE COMPLETE message. | --> | SECURITY MODE COMPLETE | - | - |
| 1F | The SS transmits a REGISTRATION REJECT message with the cause value set to #6 Illegal ME as default. | <-- | REGISTRATION REJECT | - | - |
| 1G | The UE is switched off. | - | - | - | - |
| 1H | The UE is switched on. | - | - | - | - |
| 2-3 | Steps 1-2 of the generic procedure for UE registration specified in TS 38.508-1 [4] table 4.5.2.2-3 are performed. | - | - | - | - |
| - | Exception: The UE establishes an IPsec tunnel in parallel to 5GC registration steps 4 to 8 as per the IKEv2 protocol as defined in 3GPP TS 23.502 [31] clause 4.12.2.2 figure 4.12.2.2-1. | - | - | - | - |
| 4 | The UE transmits a REGISTRATION REQUEST message. | --> | REGISTRATION REQUEST | 1 | P |
| 5 | The SS transmits a *DLInformationTransfer* message and an AUTHENTICATION REQUEST message. | <-- | AUTHENTICATION REQUEST | - | - |
| 6 | The UE transmits an *ULInformationTransfer* message and an AUTHENTICATION RESPONSE message. | --> | AUTHENTICATION RESPONSE | - | - |
| 7 | The SS transmits a *DLInformationTransfer* message and a SECURITY MODE COMMAND message. | <-- | SECURITY MODE COMMAND |  |  |
| 8 | The UE transmits an *ULInformationTransfer* message and a SECURITY MODE COMPLETE message. | --> | SECURITY MODE COMPLETE | 2 | P |
| 9-11 | Steps 8-10 of the generic procedure for UE registration specified in TS 38.508-1 [4] table 4.5.2.2-3 are performed. | - | - | - | - |

9.2.2.2.3.3 Specific message contents

Table 9.2.2.2.3.3-0: REGISTRATION REJECT (Step 1F, Table 9.2.2.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4],table 4.7.1-9 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GMM cause | ‘00000110’B | Illegal ME |  |

Table 9.2.2.2.3.3-1: REGISTRATION REQUEST (Step 4, Table 9.2.2.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4],table 4.7.1-6 using condition NON\_CLEARTEXT\_IE | | | |
| Information Element | Value/Remark | Comment | Condition |

Table 9.2.2.2.3.3-2: SECURITY MODE COMPLETE (Step 8, Table 9.2.2.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4],table 4.7.1-26 | | | |
| Information Element | Value/Remark | Comment | Condition |
| NAS message container | Contents of Table 9.2.2.2.3.3-3 |  |  |

Table 9.2.2.2.3.3-3: REGISTRATION REQUEST (Step 8, Table 9.2.2.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4],table 4.7.1-6 using condition CIPHERED\_MESSAGE | | | |
| Information Element | Value/Remark | Comment | Condition |

### 9.2.3 Void

### 9.2.4 Generic UE configuration

#### 9.2.4.1 Generic UE configuration update

9.2.4.1.1 Test Purpose (TP)

(1)

**with** { UE in 5GMM-REGISTERED state }

**ensure that** {

**when** { UE receives a new 5G-GUTI in the CONFIGURATION UPDATE COMMAND message and acknowledgement from the UE is requested }

**then** { UE sends a CONFIGURATION UPDATE COMPLETE message and UE shall consider new 5G-GUTI as valid }

}

(2)

**with** { UE in 5GMM-REGISTERED state }

**ensure that** {

**when** { UE receives a NITZ information in the CONFIGURATION UPDATE COMMAND message and acknowledgement from the UE is not requested }

**then** { UE updates NITZ information }

}

(3)

**with** { UE in 5GMM-REGISTERED state }

**ensure that** {

**when** { UE receives CONFIGURATION UPDATE COMMAND message indicating “registration requested” and contains no other parameters }

**then** { UE deletes any stored allowed NSSAI for this PLMN and then release the existing N1 NAS signalling connection, starts a mobility registration procedure }

}

(4)

**with** { UE in 5GMM-REGISTERED state }

**ensure that** {

**when** { UE receives a new allowed NSSAI in the CONFIGURATION UPDATE COMMAND message and registration is not requested }

**then** { UE replaces any stored allowed NSSAI for this PLMN with new allowed NSSAI }

}

9.2.4.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clause 4.6.2.2, 5.4.4.1, 5.4.4.2 and 5.4.4.3. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501 clause 4.6.2.2]

If available, the configured NSSAI(s) shall be stored in a non-volatile memory in the ME as specified in annex C.

…

If the UE receives the CONFIGURATION UPDATE COMMAND message indicating "registration requested" and contains no other parameters (see subclauses 5.4.4.2 and 5.4.4.3), the UE shall delete any stored allowed NSSAI for this PLMN, and delete any stored mapping of each S-NSSAI of the allowed NSSAI to the S-NSSAI(s) of the HPLMN, if available;

…

d) When the UE receives the Network slicing indication IE with the Network slicing subscription change indication set to "Network slicing subscription changed" in the REGISTRATION ACCEPT message or in the CONFIGURATION UPDATE COMMAND message, the UE shall delete the network slicing information for each of the PLMNs that the UE has slicing information stored for (excluding the current PLMN). The UE shall not delete the default configured NSSAI. Additionally, the UE shall update the network slicing information for the current PLMN (if received) as specified above in bullets a), b) and c):

[TS 24.501 clause 5.4.4.1]

The purpose of this procedure is to:

a) allow the AMF to update the UE configuration for access and mobility management-related parameters decided and provided by the AMF by providing new parameter information within the command; or

b) request the UE to perform a registration procedure for mobility and periodic registration update towards the network to update access and mobility management-related parameters decided and provided by the AMF (see subclause 5.5.1.3).

This procedure is initiated by the network and can only be used when the UE has an established 5GMM context, and the UE is in 5GMM-CONNECTED mode. When the UE is in 5GMM-IDLE mode, the AMF may use the paging or notification procedure to initiate the generic UE configuration update procedure. The AMF can request a confirmation response in order to ensure that the parameter has been updated by the UE.

This procedure shall be initiated by the network to assign a new 5G-GUTI to the UE after a successful service request procedure invoked as a response to a paging request from the network and before the release of the N1 NAS signalling connection. If the service request procedure was triggered due to 5GSM downlink signalling pending, the procedure for assigning a new 5G-GUTI can be initiated by the network after the transport of the 5GSM downlink signalling.

The following parameters are supported by the generic UE configuration update procedure without the need to request the UE to perform the registration procedure for mobility and periodic registration update:

a) 5G-GUTI;

b) TAI list;

c) Service area list;

d) Network identity and time zone information (Full name for network, short name for network, local time zone, universal time and local time zone, network daylight saving time);

e) LADN information;

f) Rejected NSSAI;r

g) Network slicing indication;

h) Operator-defined access category definitions; and

i) SMS indication.

The following parameters can be sent to the UE with or without a request to perform the registration procedure for mobility and periodic registration update:

a) Allowed NSSAI; or

b) Configured NSSAI.

The following parameter is sent to the UE with a request to perform the registration procedure for mobility and periodic registration update:

a) MICO indication.

The following parameters are sent over 3GPP access only:

a) LADN information;

b) MICO indication;

c) TAI list; and

d) Service area list.

The following parameters are managed and sent per access type i.e., independently over 3GPP access or non 3GPP access:

a) Allowed NSSAI; and

b) Rejected NSSAI (when the NSSAI is rejected for the current registration area).

The following parameters are managed commonly and sent over 3GPP access or non 3GPP access:

a) 5G-GUTI;

b) Network identity and time zone information;

c) Rejected NSSAI (when the NSSAI is rejected for the current PLMN);

d) Configured NSSAI; and

e) SMS indication.



Figure 5.4.4.1.1: Generic UE configuration update procedure

[TS 24.501 clause 5.4.4.2]

The AMF shall initiate the generic UE configuration update procedure by sending the CONFIGURATION UPDATE COMMAND message to the UE.

The AMF shall in the CONFIGURATION UPDATE COMMAND message either:

a) include one or more of the following parameters: 5G-GUTI, TAI list, allowed NSSAI that may include the mapped S-NSSAI(s), LADN information, service area list, MICO indication NITZ information, configured NSSAI that may include the mapped S-NSSAI(s), rejected NSSAI, network slicing indication, operator-defined access category definitions or SMS indication;

b) include the Configuration update indication IE with the Registration requested bit set to "registration requested"; or

c) include a combination of both a) and b).

If an acknowledgement from the UE is requested, the AMF shall indicate "acknowledgement requested" in the Acknowledgement bit of the Configuration update indication IE in the CONFIGURATION UPDATE COMMAND message and shall start timer T3555. Acknowledgement shall be requested for all parameters except when only NITZ is included.

To initiate parameter re-negotiation between the UE and network, the AMF shall indicate "registration requested" in the Registration requested bit of the Configuration update indication IE in the CONFIGURATION UPDATE COMMAND message.

If a new allowed NSSAI information or AMF re-configuration of supported S-NSSAIs requires an AMF relocation, the AMF shall indicate "registration requested" in the Registration requested bit of the Configuration update indication IE and include the Allowed NSSAI IE in the CONFIGURATION UPDATE COMMAND message.

If the AMF includes a new configured NSSAI in the CONFIGURATION UPDATE COMMAND message and the new configured NSSAI requires an AMF relocation as specified in 3GPP TS 23.501 [8], the AMF shall indicate "registration requested" in the Registration requested bit of the Configuration update indication IE in the message.

If the AMF indicates "registration requested" in the Registration requested bit of the Configuration update indication IE, acknowledgement shall be requested.

If changes to the allowed NSSAI require the UE to initiate a registration procedure, but the AMF is unable to determine an allowed NSSAI for the UE as specified in 3GPP TS 23.501 [8], the CONFIGURATION UPDATE COMMAND message shall indicate "registration requested" in the Registration requested bit of the Configuration update indication IE, and shall not contain any other parameters.

If the AMF needs to update the LADN information, the AMF shall include the LADN information in the LADN information IE of the CONFIGURATION UPDATE COMMAND message.

During an established 5GMM context, the network may send none, one, or more CONFIGURATION UPDATE COMMAND messages to the UE. If more than one CONFIGURATION UPDATE COMMAND message is sent, the messages need not have the same content.

[TS 24.501 clause 5.4.4.3]

Upon receiving the CONFIGURATION UPDATE COMMAND message, the UE shall stop timer T3346 if running and use the contents to update appropriate information stored within the UE.

If "acknowledgement requested" is indicated in the Acknowledgement bit of the Configuration update indication IE in the CONFIGURATION UPDATE COMMAND message, the UE shall send a CONFIGURATION UPDATE COMPLETE message.

If the UE receives a new 5G-GUTI in the CONFIGURATION UPDATE COMMAND message, the UE shall consider the new 5G-GUTI as valid, the old 5G-GUTI as invalid, stop timer T3519 if running, and delete any stored SUCI; otherwise, the UE shall consider the old 5G-GUTI as valid. The UE shall provide the 5G-GUTI to the lower layer of 3GPP access if the CONFIGURATION UPDATE COMMAND message is sent over the non-3GPP access, and the UE is in 5GMM-REGISTERED in both 3GPP access and non-3GPP access in the same PLMN.

If the UE receives a new TAI list in the CONFIGURATION UPDATE COMMAND message, the UE shall consider the new TAI list as valid and the old TAI list as invalid; otherwise, the UE shall consider the old TAI list as valid.

If the UE receives a new service area list in the CONFIGURATION UPDATE COMMAND message, the UE shall consider the new service area list as valid and the old service area list as invalid; otherwise, the UE shall consider the old service area list, if any, as valid.

If the UE receives new NITZ information in the CONFIGURATION UPDATE COMMAND message, the UE considers the new NITZ information as valid and the old NITZ information as invalid; otherwise, the UE shall consider the old NITZ information as valid.

If the UE receives a LADN information IE in the CONFIGURATION UPDATE COMMAND message, the UE shall consider the old LADN information as invalid and the new LADN information as valid, if any; otherwise, the UE shall consider the old LADN information as valid.

If the UE receives a new allowed NSSAI for the associated access type in the CONFIGURATION UPDATE COMMAND message, the UE shall consider the new allowed NSSAI as valid for the associated access type, store the allowed NSSAI for the associated access type as specified in subclause 4.6.2.2 and consider the old allowed NSSAI for the associated access type as invalid; otherwise, the UE shall consider the old Allowed NSSAI as valid for the associated access type.

If the UE receives a new configured NSSAI in the CONFIGURATION UPDATE COMMAND message, the UE shall consider the new configured NSSAI for the registered PLMN as valid and the old configured NSSAI for the registered PLMN as invalid; otherwise, the UE shall consider the old configured NSSAI for the registered PLMN as valid The UE shall store the new configured NSSAI as specified in subclause 4.6.2.2.

If the UE receives the Network slicing indication IE in the CONFIGURATION UPDATE COMMAND message with the Network slicing subscription change indication set to "Network slicing subscription changed", the UE shall delete the network slicing information for each and every PLMN except for the current PLMN as specified in subclause 4.6.2.2.

If the UE receives Operator-defined access category definitions IE in the CONFIGURATION UPDATE COMMAND message and the Operator-defined access category definitions IE contains one or more operator-defined access category definitions, the UE shall delete any operator-defined access category definitions stored for the RPLMN and shall store the received operator-defined access category definitions for the RPLMN. If the UE receives the Operator-defined access category definitions IE in the CONFIGURATION UPDATE COMMAND message and the Operator-defined access category definitions IE contains no operator-defined access category definitions, the UE shall delete any operator-defined access category definitions stored for the RPLMN. If the CONFIGURATION UPDATE COMMAND message does not contain the Operator-defined access category definitions IE, the UE shall not delete the operator-defined access category definitions stored for the RPLMN.

If the UE receives the SMS indication IE in the CONFIGURATION UPDATE COMMAND message with the SMS availability indication set to:

a) "SMS over NAS not available", the UE shall consider that SMS over NAS transport is not allowed by the network; and

b) "SMS over NAS available", the UE may request the use of SMS over NAS transport by performing a registration procedure for mobility and periodic registration update as specified in subclause 5.5.1.3, after the completion of the generic UE configuration update procedure.

If the CONFIGURATION UPDATE COMMAND message indicates "registration requested" in the Registration requested bit of the Configuration update indication IE and:

a) contains no other parameters or contains at least one of the following parameters: a new allowed NSSAI, a new configured NSSAI or the Network slicing subscription change indication, and:

1) an emergency PDU session exists, the UE shall, after the completion of the generic UE configuration update procedure and the release of the emergency PDU session, release the existing N1 NAS signalling connection, and start a registration procedure for mobility and periodic registration update as specified in subclause 5.5.1.3; or

2) no emergency PDU Session exists, the UE shall, after the completion of the generic UE configuration update procedure and the release of the existing N1 NAS signalling connection, start a registration procedure for mobility and periodic registration update as specified in subclause 5.5.1.3; or

b) an MICO indication is included without a new allowed NSSAI or a new configured NSSAI, the UE shall, after the completion of the generic UE configuration update procedure, start a registration procedure for mobility and registration update as specified in subclause 5.5.1.3 to re-negotiate MICO mode with the network.

The UE receiving the rejected NSSAI in the CONFIGURATION UPDATE COMMAND message takes the following actions based on the rejection cause in the rejected NSSAI:

"S-NSSAI not available in the current PLMN"

The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current PLMN as specified in subclause 4.6.2.2 and not attempt to use this S-NSSAI in the current PLMN until switching off the UE or the UICC containing the USIM is removed.

"S-NSSAI not available in the current registration area"

The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current registration area as specified in subclause 4.6.2.2 and not attempt to use this S-NSSAI in the current registration area until switching off the UE, the UE moving out of the current registration area or the UICC containing the USIM is removed.

9.2.4.1.3 Test description

9.2.4.1.3.1 Pre-test conditions

System Simulator:

- WLAN Cell 27

UE:

- None.

Preamble:

- The UE is in state 3W-A on WLAN Cell 27 according to TS 38.508-1 [4].

9.2.4.1.3.2 Test procedure sequence

Table 9.2.4.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS transmits a CONFIGURATION UPDATE COMMAND message including a new 5G-GUTI. | <-- | CONFIGURATION UPDATE COMMAND | - | - |
| 2 | Check: Does UE transmit a CONFIGURATION UPDATE COMPLETE message? | --> | CONFIGURATION UPDATE COMPLETE | 1 | P |
| 3 | The SS transmits an IDENTITY REQUEST requesting 5G-GUTI in the IE identity type | <-- | IDENTITY REQUEST | - | - |
| 4 | Check: Does the UE respond with an IDENTITY RESPONSE message with including the new 5G-GUTI assigned in step 1 in the 5GS mobile identity IE? | --> | IDENTITY RESPONSE | 1 | P |
| 5 | The SS transmits a CONFIGURATION UPDATE COMMAND message including NITZ information. | <-- | CONFIGURATION UPDATE COMMAND | - | - |
| 6 | Check: Does the UE transmit a CONFIGURATION UPDATE COMPLETE message within the expiry of T3555? | --> | CONFIGURATION UPDATE COMPLETE | 2 | F |
| 7 | Check: Using MMI/AT command verify the NITZ update on the UE. | - | - | 2 | P |
| 8 | Switch off procedure in Ipsec\_SA\_Established specified in TS 38.508-1 [4] subclause 4.9.6.5 is performed. | - | - | - | - |
| 9 | The UE is switched On. | - | - | - | - |
| 10-16 | Steps 1 to 7 of the generic procedure for WLAN Ipsec\_SA\_Released specified in TS 38.508-1 [4] subclause 4.5.2 are performed. | - | - | - | - |
| 17 | The SS transmits a REGISTRATION ACCEPT message including Configured NSSAI. | <-- | REGISTRATION ACCEPT | - | - |
| 17A-17B | Steps 9 to 10 of the generic procedure for WLAN Ipsec\_SA\_Released specified in TS 38.508-1 [4] subclause 4.5.2 are performed. | - | - | - | - |
| 18 | The SS transmits a CONFIGURATION UPDATE COMMAND message including registration requested IE. | <-- | CONFIGURATION UPDATE COMMAND | - | - |
| 19 | The UE transmits a CONFIGURATION UPDATE COMPLETE message. | --> | CONFIGURATION UPDATE COMPLETE | - | - |
| 19A | The generic procedure for SS-requested IPsec Secure tunnel disconnection, specified in subclause 4.5A.3 of TS 38.508-1 [4], takes place performing disconnection of security association. | - | - | - | - |
| 20 | Check: Does UE transmit a REGISTRATION REQUEST message with registration type value set to “Mobility” and including the Requested NSSAI? | --> | REGISTRATION REQUEST | 3 | P |
| 21-25 | Void | - | - | - | - |
| 26 | The SS transmits a REGISTRATION ACCEPT message including Allowed NSSAI. | <-- | REGISTRATION ACCEPT | - | - |
| 27 | The UE transmits a REGISTRATION COMPLETE message. | - | REGISTRATION COMPLETE | - | - |
| 27A | The generic procedure for SS-requested IPsec Secure tunnel disconnection, specified in subclause 4.5A.3 of TS 38.508-1 [4], takes place performing disconnection of security association. | - | - | - | - |
| 28 | Check: Using MMI/AT command (+C5GNSSAIRDP) verify the update of allowed NSSAI. | - | - | 3 | P |
| 28A-28B | Steps 1 to 2 of the generic procedure for WLAN IPsec\_SA\_Established specified in TS 38.508-1 [4] subclause 4.5.4.2-4 are performed. | - | - | - | - |
| 29 | The SS transmits a CONFIGURATION UPDATE COMMAND message including a new allowed NSSAI list. | <-- | CONFIGURATION UPDATE COMMAND | - | - |
| 30 | The UE transmits a CONFIGURATION UPDATE COMPLETE message. | --> | CONFIGURATION UPDATE COMPLETE | - | - |
| 31 | Check: Using MMI/AT command (+C5GNSSAIRDP) verify the update of allowed NSSAI. | - | - | 4 | P |
| 32 | The SS transmits NSSAI DELETE REQUEST message to delete the Default Configured NSSAI list. | <-- | NSSAI DELETE REQUEST | - | - |
| 33 | UE transmits NSSAI DELETE RESPONSE message. | --> | NSSAI DELETE RESPONSE | - | - |
| 34 | SS releases the RRC connection. | - | - | - | - |

9.2.4.1.3.3 Specific message contents

Table 9.2.4.1.3.3-1: CONFIGURATION UPDATE COMMAND (step 1, Table 9.2.4.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-19 | | | |
| Information Element | Value/remark | Comment | Condition |
| Configuration update indication | 0001 | Acknowledgement (ACK) requested |  |
| 5G-GUTI | Other than the default value |  |  |

Table 9.2.4.1.3.3-2: IDENTITY REQUEST (step 3, Table 9.2.4.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-21 | | | |
| Information Element | Value/remark | Comment | Condition |
| Identity type | ‘010’B | 5G-GUTI |  |

Table 9.2.4.1.3.3-3: IDENTITY RESPONSE (step 4, Table 9.2.4.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-22 | | | |
| Information Element | Value/remark | Comment | Condition |
| mobile identity IE | 5G-GUTI assigned in step 1 | 5G-GUTI |  |

Table 9.2.4.1.3.3-4: CONFIGURATION UPDATE COMMAND (step 5, Table 9.2.4.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-19 | | | |
| Information Element | Value/remark | Comment | Condition |
| Full name for network | Present |  |  |
| Universal time and local time zone | "xx211331832540" O | "<Current Year> 31 December 13:38 52 GMT+1", Note 1, Note 2, Note 3 |  |
| Note 1: Hard coded values have been chosen to allow for consistent/comparable SS behaviour.  Note 2: Daylight Saving Time is included in the Local Time Zone.  Note 3: Current Year is derived by the SS. | | | |

Table 9.2.4.1.3.3-5: REGISTRATION ACCEPT (step 17, Table 9.2.4.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result value | ‘010’B | Non-3GPP access |  |
| Configured NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 3 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | 3 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.2.4.1.3.3-6: CONFIGURATION UPDATE COMMAND (step 18, Table 9.2.4.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-19 | | | |
| Information Element | Value/remark | Comment | Condition |
| Configuration update indication | 0010 | Registration requested |  |

Table 9.2.4.1.3.3-7: REGISTRATION REQUEST (step 20, Table 9.2.4.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘010’B |  | MOBILITY |
| Requested NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 3 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000011’B | 3 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.2.4.1.3.3-8: REGISTRATION ACCEPT (step 26, Table 9.2.4.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result value | ‘010’B | Non-3GPP access |  |
| Allowed NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 3 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000011’B | 3 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.2.4.1.3.3-9: CONFIGURATION UPDATE COMMAND (step 30, Table 9.2.4.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-19 | | | |
| Information Element | Value/remark | Comment | Condition |
| Configuration update indication | 0001 | Acknowledgement (ACK) requested |  |
| Allowed NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.2.4.1.3.3-10: NSSAI DELETE REQUEST (step 32, Table 9.2.4.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.509 Table 6.7.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol discriminator | 1111 |  |  |
| Skip indicator | 0000 |  |  |
| Message type | ‘10100110’B |  |  |
| Delete NSSAI type | ‘00000001’B | Delete Configured NSSAI |  |
| Configured NSSAI | 00000000 |  |  |

Table 9.2.4.1.3.3-11: NSSAI DELETE RESPONSE (step 33, Table 9.2.4.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.509 Table 6.7.2 | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol discriminator | 1111 |  |  |
| Skip indicator | 0000 |  |  |
| Message type | ‘10100111’B |  |  |

### 9.2.5 Registration

#### 9.2.5.1 Initial Registration

##### 9.2.5.1.1 Initial registration / Success / 5G-GUTI reallocation, Last visited TAI

9.2.5.1.1.1 Test Purpose (TP)

(1)

**with** { the UE has no valid 5G-GUTI but available SUCI and switched off }

**ensure that** {

**when** { the UE is switched on }

**then** { the UE sends a REGISTRATION REQUEST message including the SUCI in the 5GS mobile identity IE }

}

(2)

**with** { the UE is 5GMM-REGISTERED state with assigned 5G-GUTI and last visited registered TAI and switched off }

**ensure that** {

**when** { the UE is switched on }

**then** { the UE sends a REGISTRATION REQUEST message including the 5G-GUTI assigned previously in the 5GS mobile identity IE and the last visited registered TAI }

}

9.2.5.1.1.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501 clauses 5.5.1.2.2 and 5.5.1.2.4. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.5.1.2.2]

The UE initiates the registration procedure for initial registration by sending a REGISTRATION REQUEST message to the AMF, starting timer T3510. If timer T3502 is currently running, the UE shall stop timer T3502. If timer T3511 is currently running, the UE shall stop timer T3511.

During initial registration the UE handles the 5GS mobile identity IE in the following order:

…

b) if the UE holds a valid 5G-GUTI that was previously assigned, over 3GPP access or non-3GPP access, by the same PLMN with which the UE is performing the registration, the UE shall indicate the 5G-GUTI in the 5GS mobile identity IE;

c) if the UE holds a valid 5G-GUTI that was previously assigned, over 3GPP access or non-3GPP access, by an equivalent PLMN, the UE shall indicate the 5G-GUTI in the 5GS mobile identity IE;

d) if the UE holds a valid 5G-GUTI that was previously assigned, over 3GPP access or non-3GPP, by any other PLMN, the UE shall indicate the 5G-GUTI in the 5GS mobile identity IE;

e) if a SUCI is available the UE shall include the SUCI in the 5GS mobile identity IE; and

If the SUCI is included in the 5GS mobile identity IE and the timer T3519 is not running, the UE shall start timer T3519 and store the value of the SUCI sent in the REGISTRATION REQUEST message. The UE shall include the stored SUCI in the REGISTRATION REQUEST message while timer T3519 is running.

…

If the last visited registered TAI is available, the UE shall include the last visited registered TAI in the REGISTRATION REQUEST message.

[TS 24.501, clause 5.5.1.2.4]

The 5G-GUTI reallocation shall be part of the initial registration procedure. During the initial registration procedure, if the AMF has not allocated a new 5G-GUTI by the generic UE configuration update procedure, the AMF shall include in the REGISTRATION ACCEPT message the new assigned 5G-GUTI together with the assigned TAI list.

9.2.5.1.1.3 Test description

9.2.5.1.1.3.1 Pre-test conditions

System Simulator:

- WLAN Cell 27

UE:

- None.

Preamble:

- The UE is in state Switched OFF (state 0W-B) according to TS 38.508-1 [4].

9.2.5.1.1.3.2 Test procedure sequence

Table 9.2.5.1.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U – S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2-8 | UE establishes an IPSEC SA and trigger 5GMM Registration procedure by executing steps 1 to 7 of Table 4.5.2.2-3 in TS 38.508-1 [4]. | - | - | - | - |
| 9 | SS transmits an REGISTRATION REJECT message with the 5GMM cause IE setting as “Illegal ME”.  NOTE 1: 5G-GUTI-1 should be deleted, then UE has no valid 5G-GUTI but available SUCI now. | <-- | REGISTRATION REJECT | - | - |
| 10 | The generic procedure for SS-requested IPsec Secure tunnel disconnection, specified in subclause 4.5A.3 of TS 38.508-1 [4], takes place performing disconnection of security association. | - | - | - | - |
| 11 | If possible (see ICS) switch off is performed or the USIM is removed.  Otherwise the power is removed. | - | - | - | - |
| 12 | The UE is brought back to operation or the USIM is inserted. | - | - | - | - |
| 13-23 | Steps 1-11 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | 1 | P |
| 24 | If possible (see ICS) switch off is performed or the USIM is removed.  Otherwise the power is removed. | - | - | - | - |
| 25 | The UE is brought back to operation or the USIM is inserted. | - | - | - | - |
| 26-35 | Steps 1-11 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | 2 | P |

9.2.5.1.1.3.3 Specific message contents

Table 9.2.5.1.1.3.3-1: Message REGISTRATION REJECT (step 9, Table 9.2.5.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-9 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GMM cause | '0000 0011'B | Illegal UE |  |

Table 9.2.5.1.1.3.3-2: Message REGISTRATION REQUEST (step 15, Table 9.2.5.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type | '001'B | Initial registration |  |
| 5GS mobile identity | SUCI | The SUCI of UE |  |

Table 9.2.5.1.1.3.3-3: Message REGISTRATION ACCEPT (step 21, Table 9.2.5.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-7 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5G-GUTI | 5G-GUTI-2 |  |  |

Table 9.2.5.1.1.3.3-4: Message REGISTRATION REQUEST (step 34, Table9.2.5.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GS registration type | '001'B | Initial registration |  |
| 5GS mobile identity | 5G-GUTI-2 |  |  |
| Last visited registered TAI | TAI-1 | N3GPP TAI |  |

##### 9.2.5.1.2 Initial registration / 5GS services / NSSAI handling

9.2.5.1.2.1 Test Purpose (TP)

(1)

**with** { UE has sent a REGISTRATION REQUEST message including requested NSSAI}

**ensure that** {

**when** { UE receives REGISTRATION ACCEPT message with allowed NSSAI }

**then** { UE shall replace any stored allowed NSSAI for the current PLMN with new allowed NSSAI for the current PLMN }

}

(2)

**with** { UE has sent a REGISTRATION REQUEST message including Requested NSSAI}

**ensure that** {

**when** { UE receives REGISTRATION ACCEPT message with Rejected NSSAI with reject cause “S-NSSAI not available in the current PLMN” }

**then** { UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current PLMN and not attempt to use the Rejected NSSAI in the current PLMN until switching off the UE or the UICC containing the USIM is removed }

}

(3)

**with** { UE receives REGISTRATION ACCEPT message with Rejected NSSAI with reject cause “S-NSSAI not available in the current PLMN” }

**ensure that** {

**when** { UE has been switched off, then switched on }

**then** { UE shall delete the stored Rejected NSAAI and shall send the NSSAI in Requested NSSAI IE of the REGISTRATION REQUEST message as per the configured and Allowed NSSAI for current PLMN }

}

(4)

**with** { UE has sent a REGISTRATION REQUEST message including Requested NSSAI}

**ensure that** {

**when** { UE receives REGISTRATION ACCEPT message with Rejected NSSAI with reject cause “S-NSSAI not available in the current registration area” }

**then** { UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current PLMN and registration area combination and not attempt to use the Rejected NSSAI in the current registration area until switching off the UE, the UE moving out of the current registration area or the UICC containing the USIM is removed }

}

9.2.5.1.2.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clause 5.5.1.2.2 and 5.5.1.2.4. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501 clause 5.5.1.2.2]

5.5.1.2.1 General

This procedure can be used by a UE for initial registration for 5GS services.

…

The UE shall include the requested NSSAI containing the S-NSSAI(s) corresponding to the slice(s) to which the UE wants to register and shall include the mapping of the requested NSSAI which is the mapping of each S-NSSAI of the requested NSSAI to the S-NSSAI(s) of the HPLMN, if available, in the REGISTRATION REQUEST message. If the UE has allowed NSSAI or configured NSSAI for the current PLMN, the requested NSSAI shall be either:

a) the configured NSSAI for the current PLMN, or a subset thereof as described below, if the UE has no allowed NSSAI for the current PLMN;

b) the allowed NSSAI for the current PLMN, or a subset thereof as described below, if the UE has an allowed NSSAI for the current PLMN; or

c) the allowed NSSAI for the current PLMN, or a subset thereof as described below, plus one or more S-NSSAIs from the configured NSSAI for which no corresponding S-NSSAI is present in the allowed NSSAI and those are neither in the rejected NSSAI for the current PLMN nor in the rejected NSSAI for the current PLMN and registration area combination.

If the UE has neither allowed NSSAI for the current PLMN nor configured NSSAI for the current PLMN and has a default configured NSSAI, the UE shall:

a) include the S-NSSAI(s) in the Requested NSSAI IE of the REGISTRATION REQUEST message using the default configured NSSAI; and

b) include the Network slicing indication IE with the Default configured NSSAI indication bit set to "Requested NSSAI created from default configured NSSAI" in the REGISTRATION REQUEST message.

If the UE has no allowed NSSAI for the current PLMN, no configured NSSAI for the current PLMN, and no default configured NSSAI, the UE shall not include a requested NSSAI in the REGISTRATION message.

The subset of configured NSSAI provided in the requested NSSAI consists of one or more S-NSSAIs in the configured NSSAI applicable to the current PLMN, if the S-NSSAI is neither in the rejected NSSAI for the current PLMN nor in the rejected NSSAI for the current PLMN and registration area combination.

The subset of allowed NSSAI provided in the requested NSSAI consists of one or more S-NSSAIs in the allowed NSSAI for the current PLMN.

NOTE 3: How the UE selects the subset of configured NSSAI or allowed NSSAI to be provided in the requested NSSAI is implementation.

NOTE 4: The number of S-NSSAI(s) included in the requested NSSAI cannot exceed eight.

[TS 24.501 clause 5.5.1.2.4]

The AMF shall include the allowed NSSAI for the current PLMN and shall include the mapping of each S-NSSAI of the allowed NSSAI to the S-NSSAI(s) of the HPLMN contained in the requested NSSAI from the UE if available, in the REGISTRATION ACCEPT message if the UE included the requested NSSAI in the REGISTRATION REQUEST message and the AMF allows one or more S-NSSAIs in the requested NSSAI. The AMF may also include rejected NSSAI in the REGISTRATION ACCEPT message. Rejected NSSAI contains S-NSSAI(s) which was included in the requested NSSAI but rejected by the network associated with rejection cause(s).

The AMF may include a new configured NSSAI for the current PLMN in the REGISTRATION ACCEPT message if:

a) the REGISTRATION REQUEST message did not include the requested NSSAI;

b) the REGISTRATION REQUEST message included the requested NSSAI containing an S-NSSAI that is not valid in the serving PLMN; or

c) the REGISTRATION REQUEST message included the Network slicing indication IE with the Default configured NSSAI indication bit set to "Requested NSSAI created from default configured NSSAI".

If a new configured NSSAI for the current PLMN is included in the REGISTRATION ACCEPT message, the AMF shall also include the mapping of the configured NSSAI for the current PLMN the S-NSSAI(s) of the HPLMN if available in the REGISTRATION ACCEPT message. In this case the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3.

The AMF shall include the Network slicing indication IE with the Network slicing subscription change indication set to "Network slicing subscription changed" in the REGISTRATION ACCEPT message if the UDM has indicated that the subscription data for network slicing has changed. In this case the AMF shall start timer T3550 and enter state 5GMM-COMMON-PROCEDURE-INITIATED as described in subclause 5.1.3.2.3.3.

The UE receiving the rejected NSSAI in the REGISTRATION ACCEPT message takes the following actions based on the rejection cause in the rejected NSSAI:

"S-NSSAI not available in the current PLMN"

The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current PLMN as specified in subclause 4.6.2.2 and not attempt to use this S-NSSAI in the current PLMN until switching off the UE or the UICC containing the USIM is removed.

"S-NSSAI not available in the current registration area"

The UE shall add the rejected S-NSSAI(s) in the rejected NSSAI for the current PLMN and registration area combination as specified in subclause 4.6.2.2 and not attempt to use this S-NSSAI in the current registration area until switching off the UE, the UE moving out of the current registration area or the UICC containing the USIM is removed.

If the UE did not include the requested NSSAI in the REGISTRATION REQUEST message or none of the requested NSSAI are present in the subscribed S-NSSAIs, and one or more subscribed S-NSSAIs (containing one or more S-NSSAIs each of which may be associated with a new S-NSSAI) marked as default are available, the AMF shall put the subscribed S-NSSAIs marked as default in the allowed NSSAI of the REGISTRATION ACCEPT message. The AMF shall determine a registration area such that all S-NSSAIs of the allowed NSSAI are available in the registration area.

9.2.5.1.2.3 Test description

9.2.5.1.2.3.1 Pre-test conditions

System Simulator:

- WLAN Cell 27

UE:

- UE is previously registered on WLAN Cell 27 using default message contents according to TS 38.508-1 [4];

- Empty URSP Configuration.

Preamble:

- The UE is in state Switched OFF (state 0W-B) according to TS 38.508-1 [4].

9.2.5.1.2.3.2 Test procedure sequence

Table 9.2.5.1.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| - | Exception: The UE establishes an IPsec tunnel in parallel to 5GC registration steps 2 to 6 as per the IKEv2 protocol as defined in 3GPP TS 23.502 [33] clause 4.12.2.2 figure 4.12.2.2-1. | - | - | - | - |
| 2 | Check: Does UE transmit a REGISTRATION REQUEST message? | --> | REGISTRATION REQUEST | - | - |
| 3-6 | Steps 4 to 7 of the generic procedure for WLAN Ipsec\_SA\_Released specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 7 | The SS transmits a REGISTRATION ACCEPT message including Allowed NSSAI and Configured NSSAI. | <-- | REGISTRATION ACCEPT | - | - |
| 8 | Step 10 of the generic procedure for WLAN Ipsec\_SA\_Released specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 9 | Switch off procedure in WLAN Ipsec\_SA\_Established specified in TS 38.508-1 subclause 4.9.6.5 is performed. | - | - | - | - |
| 10 | The UE is brought back to operation or the USIM is inserted. | - | - | - | - |
| - | Exception: The UE establishes an IPsec tunnel in parallel to 5GC registration steps 11 to 15 as per the IKEv2 protocol as defined in 3GPP TS 23.502 [33] clause 4.12.2.2 figure 4.12.2.2-1. | - | - | - | - |
| 11 | Check: Does UE transmit a REGISTRATION REQUEST message including Requested NSSAI? | --> | REGISTRATION REQUEST | 1 | P |
| 12-15 | Steps 4 to 7 of the generic procedure for WLAN Ipsec\_SA\_Released specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 16 | The SS transmits a REGISTRATION ACCEPT message including Allowed NSSAI and Rejected NSSAI. | <-- | REGISTRATION ACCEPT | - | - |
| 17 | Step 10 of the generic procedure for WLAN Ipsec\_SA\_Released specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 18 | Switch off procedure in WLAN Ipsec\_SA\_Established specified in TS 38.508-1 subclause 4.9.6.5 is performed. | - | - | - | - |
| - | Exception: The UE establishes an IPsec tunnel in parallel to 5GC registration steps 19 to 23 as per the IKEv2 protocol as defined in 3GPP TS 23.502 [33] clause 4.12.2.2 figure 4.12.2.2-1. | - | - | - | - |
| 19 | Check: Does UE transmit a REGISTRATION REQUEST message including Requested NSSAI? | --> | REGISTRATION REQUEST | 2 | P |
| 20-23 | Steps 4 to 7 of the generic procedure for WLAN Ipsec\_SA\_Released specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 24 | The SS transmits a REGISTRATION ACCEPT message including Allowed NSSAI. | <-- | REGISTRATION ACCEPT | - | - |
| 25 | The UE transmits a REGISTRATION COMPLETE message. | --> | REGISTRATION COMPLETE | - | - |
| 26 | Step 10 of the generic procedure for WLAN Ipsec\_SA\_Released specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 27 | Check: Is S-NSSAI=2 in the Rejected NSSAI list with cause “S-NSSAI not available in the current PLMN” associated with current PLMN using AT/MMI? | - | - | 2 | P |
| 28 | Switch off procedure in WLAN Ipsec\_SA\_Established specified in TS 38.508-1 subclause 4.9.6.5 is performed. | - | - | - | - |
| 29 | The UE is brought back to operation or the USIM is inserted | - | - | - | - |
| - | Exception: The UE establishes an IPsec tunnel in parallel to 5GC registration steps 30 to 34 as per the IKEv2 protocol as defined in 3GPP TS 23.502 [33] clause 4.12.2.2 figure 4.12.2.2-1. | - | - | - | - |
| 30 | Check: Does UE transmit a REGISTRATION REQUEST message including Requested NSSAI? | --> | REGISTRATION REQUEST | 3 | P |
| 31-34 | Steps 4 to 7 of the generic procedure for WLAN Ipsec\_SA\_Released specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 35 | The SS transmits a REGISTRATION ACCEPT message including Allowed NSSAI and Rejected NSSAI. | <-- | REGISTRATION ACCEPT | - | - |
| 36 | Step 10 of the generic procedure for WLAN Ipsec\_SA\_Released specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 37 | Check: Is S-NSSAI=2 removed from the Rejected NSSAI list associated with current PLMN? | - | - | 3 | P |
| 37A | Check: Is S-NSSAI=1 in the Rejected NSSAI list with cause “S-NSSAI not available in the current registration area” associated with current PLMN and registration area combination using AT/MMI? | - | - | 4 | P |
| 38 | Switch off procedure in WLAN Ipsec\_SA\_Established specified in TS 38.508-1 subclause 4.9.6.5 is performed. | - | - | - | - |
| 39 | The UE is brought back to operation or the USIM is inserted | - | - | - | - |
| - | Exception: The UE establishes an IPsec tunnel in parallel to 5GC registration steps 40 to 44 as per the IKEv2 protocol as defined in 3GPP TS 23.502 [33] clause 4.12.2.2 figure 4.12.2.2-1. | - | - | - | - |
| 40 | Check: Does UE transmit a REGISTRATION REQUEST message including Requested NSSAI? | --> | REGISTRATION REQUEST | 4 | P |
| 41-44 | Steps 4 to 7 of the generic procedure for WLAN Ipsec\_SA\_Released specified in TS 38.508-1 subclause 4.5.2 are performed. | - | - | - | - |
| 45 | The SS transmits a REGISTRATION ACCEPT message including Allowed NSSAI. | <-- | REGISTRATION ACCEPT | - | - |
| 46 | The UE transmits a REGISTRATION COMPLETE message. | --> | REGISTRATION COMPLETE | - | - |
| 47 | Check: Is S-NSSAI=1 in the Rejected NSSAI list with cause “S-NSSAI not available in the current registration area” associated with current PLMN and registration area combination using AT/MMI? | - | - | 4 | P |

9.2.5.1.2.3.3 Specific message contents

Table 9.2.5.1.2.3.3-1: REGISTRATION REQUEST (step 2, Table 9.2.5.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘001’B | Initial registration |  |
| Requested NSSAI |  | Note |  |
| S-NSSAI IEI |  | S-NSSAI value 1 | Note |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Note: S-NSSAI =1 will be always included from the allowed NSSAI list associated with PLMN of WLAN Cell 27 by the UE but may include other S-NSSAI from Configured NSSAI list associated with PLMN of NCG WLAN Cell 27 if configured in the UE. See TS 24.501 sub-clause 5.5.1.2.1 | | | |

Table 9.2.5.1.2.3.3-2: REGISTRATION ACCEPT (step 7, Table 9.2.5.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result value | ‘010’B | Non 3GPP access |  |
| Allowed NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Configured NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.2.5.1.2.3.3-3: PDU SESSION ESTABLISHMENT ACCEPT (step 10, Table 9.2.5.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 clause 4.7.2-2 | | | |
| Information Element | Value/remark | Comment | Condition |
| S-NSSAI |  |  |  |
| Length of S-NSSAI contents | ‘0000 0001’B | SST |  |
| SST | ‘0000 0010’B | SST value 2 |  |

Table 9.2.5.1.2.3.3-4: REGISTRATION REQUEST (step 11, Table 9.2.5.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘001’B | Initial registration |  |
| Requested NSSAI |  | Note |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 | Note |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Note: S-NSSAI =2 will be always included by the UE from the allowed NSSAI list associated with PLMN of NCG WLAN Cell 27 but may include S-NSSAI =1 from Configured NSSAI list associated with PLMN of NCG WLAN Cell 27. See TS 24.501 sub-clause 5.5.1.2.1 | | | |

Table 9.2.5.1.2.3.3-5: REGISTRATION ACCEPT (step 16, Table 9.2.5.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result value | ‘010’B | Non 3GPP access |  |
| Allowed NSSAI |  | Note |  |
| S-NSSAI IEI |  | S-NSSAI value 1 | Note |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Rejected NSSAI |  |  |  |
| Rejected S-NSSAI-1 |  | Rejected S-NSSAI value 1 |  |
| Cause value | ‘0000’B | S-NSSAI not available in the current PLMN |  |
| SST | ‘00000010’B | 2 |  |
| SD | Not Present |  |  |
| Note: If UE has requested only S-NSSAI =2 in step 22 and S-NSSAI =2 is added in the Rejected NSSAI list by the SS then AMF/SS can include default subscribed S-NSSAIs in the allowed NSSAI of REGISTRATION ACCEPT message, see TS 24.501 sub-clause 5.5.1.2.4. | | | |

Table 9.2.5.1.2.3.3-6: REGISTRATION REQUEST (step 19, Table 9.2.5.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘001’B | Initial registration |  |
| Requested NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.2.5.1.2.3.3-7: REGISTRATION ACCEPT (step 24, Table 9.2.5.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result value | ‘010’B | Non 3GPP access |  |
| Allowed NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.2.5.1.2.3.3-8: REGISTRATION REQUEST (step 30, Table 9.2.5.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘001’B | Initial registration |  |
| Requested NSSAI |  | Note |  |
| S-NSSAI IEI |  | S-NSSAI value 1 | Note |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Note: S-NSSAI =1 will be always included by the UE from the allowed NSSAI list associated with PLMN of NCG Cell C but may include S-NSSAI =2 from Configured NSSAI list associated with PLMN of NCG Cell C. See TS 24.501 sub-clause 5.5.1.2.1 | | | |

Table 9.2.5.1.2.3.3-9: REGISTRATION ACCEPT (step 35, Table 9.2.5.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result value | ‘010’B | Non 3GPP access |  |
| TAI list |  |  |  |
| Type of list | ‘01’B | list of TACs belonging to one PLMN, with consecutive TAC values |  |
| Number of elements | ‘00001’B | 2 Elements |  |
| TAC | PLMN =MCC/MNC  stored in EFIMSI  TAC 1 = 2 | TAI2, TAI 3 |  |
| Allowed NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Rejected NSSAI |  |  |  |
| Rejected S-NSSAI-1 |  | Rejected S-NSSAI value 1 |  |
| Cause value | ‘0001’B | S-NSSAI not available in the current registration area |  |
| SST | ‘00000001’B | 1 |  |
| SD | Not Present |  |  |
| Note: If UE has requested only S-NSSAI =1 in step 57 and S-NSSAI =1 is added in the Rejected NSSAI list by the SS then AMF/SS can include default subscribed S-NSSAIs in the allowed NSSAI of REGISTRATION ACCEPT message, see TS 24.501 sub-clause 5.5.1.2.4. | | | |

Table 9.2.5.1.2.3.3-10: PDU SESSION ESTABLISHMENT ACCEPT (step 36, Table 9.2.5.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 clause 4.7.2-2 | | | |
| Information Element | Value/remark | Comment | Condition |
| S-NSSAI |  |  |  |
| Length of S-NSSAI contents | ‘0000 0001’B | SST |  |
| SST | ‘0000 0010’B | SST value 2 |  |

Table 9.2.5.1.2.3.3-11: REGISTRATION REQUEST (step 40, Table 9.2.5.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘001’B | initial registration |  |
| Requested NSSAI |  | Note |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

Table 9.2.5.1.2.3.3-12: REGISTRATION ACCEPT (step 45, Table 9.2.5.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result value | ‘010’B | Non 3GPP access |  |
| Allowed NSSAI |  |  |  |
| S-NSSAI IEI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000010’B | SST |  |
| SST | ‘00000001’B | 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |

##### 9.2.5.1.3 Void

##### 9.2.5.1.4 Initial registration / Rejected / Congestion / Abnormal cases / T3346

9.2.5.1.4.1 Test Purpose (TP)

(1)

**with** { The UE has sent initial REGISTRAION REQUEST message }

**ensure that** {

**when** { UE receives a REGISTRATION REJECT with cause #22 (Congestion) with T3346 included and the UE is NOT configured for High Priority Access }

**then** { UE does not start the Initial registration until T3346 expires }

}

(2)

**with** { The UE has received initial REGISTRATION REJECT with T3346 included }

**ensure that** {

**when** { upon expiry of T3346 }

**then** { UE starts the Initial registration procedure }

}

(3)

**with** { The UE has received initial REGISTRATION REJECT with T3346 included }

**ensure that** {

**when** { the timer T3346 is running and the UE needs to perform initial registration for emergency services }

**then** { UE starts the Initial registration procedure }

}

9.2.5.1.4.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clauses 5.5.1.2.5 and 5.5.1.2.7 and TS 24.301, clause 5.5.1.2.5. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.5.1.2.5]

If the initial registration request cannot be accepted by the network, the AMF shall send a REGISTRATION REJECT message to the UE including an appropriate 5GMM cause value.

If the initial registration request is rejected due to general NAS level mobility management congestion control, the network shall set the 5GMM cause value to #22 "congestion" and assign a back-off timer T3346.

The UE shall take the following actions depending on the 5GMM cause value received in the REGISTRATION REJECT message.

#3 (Illegal UE); or

#6 (Illegal ME).

…

#22 (Congestion).

If the T3346 value IE is present in the REGISTRATION REJECT message and the value indicates that this timer is neither zero nor deactivated, the UE shall proceed as described below; otherwise it shall be considered as an abnormal case and the behaviour of the UE for this case is specified in subclause 5.5.1.2.7.

The UE shall abort the initial registration procedure, set the 5GS update status to 5U2 NOT UPDATED and enter state 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION.

The UE shall stop timer T3346 if it is running.

If the REGISTRATION REJECT message is integrity protected, the UE shall start timer T3346 with the value provided in the T3346 value IE.

If the REGISTRATION REJECT message is not integrity protected, the UE shall start timer T3346 with a random value from the default range specified in 3GPP TS 24.008 [12].

The UE stays in the current serving cell and applies the normal cell reselection process. The initial registration procedure is started if still needed when timer T3346 expires or is stopped.

If the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status, and attach attempt counter as specified in 3GPP TS 24.301 [15] for the case when the EPS attach request procedure is rejected with the EMM cause with the same value.

…

Other values are considered as abnormal cases. The behaviour of the UE in those cases is specified in subclause 5.5.1.2.7.

[TS 24.501, clause 5.5.1.2.7]

The following abnormal cases can be identified:

a) Timer T3346 is running.

The UE shall not start the registration procedure for initial registration unless:

1) the UE is a UE configured for high priority access in selected PLMN;

2) the UE needs to perform the registration procedure for initial registration for emergency services; or

3) the UE receives a DEREGISTRATION REQUEST message with the "re-registration required" indication.

The UE stays in the current serving cell and applies the normal cell reselection process.

NOTE 1: It is considered an abnormal case if the UE needs to initiate a registration procedure for initial registration while timer T3346 is running independent on whether timer T3346 was started due to an abnormal case or a non-successful case.

[TS 24.301, clause 5.5.1.2.5]

…

#22 (Congestion);

If the T3346 value IE is present in the ATTACH REJECT message and the value indicates that this timer is neither zero nor deactivated, the UE shall proceed as described below; otherwise it shall be considered as an abnormal case and the behaviour of the UE for this case is specified in subclause 5.5.1.2.6.

The UE shall abort the attach procedure, reset the attach attempt counter, set the EPS update status to EU2 NOT UPDATED and enter state EMM-DEREGISTERED.ATTEMPTING-TO-ATTACH.

The UE shall stop timer T3346 if it is running.

If the ATTACH REJECT message is integrity protected, the UE shall start timer T3346 with the value provided in the T3346 value IE.

If the ATTACH REJECT message is not integrity protected, the UE shall start timer T3346 with a random value from the default range specified in 3GPP TS 24.008 [13].

The UE stays in the current serving cell and applies the normal cell reselection process. The attach procedure is started if still needed when timer T3346 expires or is stopped.

If A/Gb mode or Iu mode is supported by the UE, the UE shall in addition handle the GMM parameters GMM state, GPRS update status and GPRS attach attempt counter as specified in 3GPP TS 24.008 [13] for the case when the normal attach procedure is rejected with the GMM cause with the same value.

If the UE is operating in single-registration mode, the UE shall in addition handle the 5GMM parameters as specified in 3GPP TS 24.501 [54] for the case when the initial registration procedure is rejected with the 5GMM cause with the same value.

…

9.2.5.1.4.3 Test description

9.2.5.1.4.3.1 Pre-test conditions

System Simulator:

- WLAN Cell 27

UE:

None.

Preamble:

- The UE is in state Switched OFF (State 0W-A as per TS 38.508-1 [4] Table 4.4A.2-0).

9.2.5.1.4.3.2 Test procedure sequence

Table 9.2.5.1.4.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | UE is switched on. | - | - | - |  |
| 2-8 | Steps 1-7 of Table 4.5.2.2-3 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 9 | SS transmits a REGISTRATION REJECT message with cause #22 (Congestion) and T3346 set to 3 minutes.  (Note 1) | <-- | REGISTRATION REJECT | - | - |
| 10 | The generic procedure for SS-requested IPsec Secure tunnel disconnection, specified in subclause 4.5A.3 of TS 38.508-1 [4], takes place performing disconnection of security association. | - | - | - | - |
| 11 | Check: Does the UE initiate IPSec secure tunnel as per 3GPP TS 24.502 [33] clause 7.3.2 within T3346 minutes of Step 9?  (Note 1) | - | - | 1 | F |
| 12-18 | Steps 1-7 of Table 4.5.2.2-3 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | 2 | P |
| 19 | SS transmits a REGISTRATION REJECT message with cause #22 (Congestion) and T3346 set to 3 minutes.  (Note 1) | <-- | REGISTRATION REJECT | - | - |
| 20 | The generic procedure for SS-requested IPsec Secure tunnel disconnection, specified in subclause 4.5A.3 of TS 38.508-1 [4], takes place performing disconnection of security association. | - | - | - | - |
| 21 | The UE is made to establish an Emergency PDU session.  (Note 2) | - | - | - | - |
| 22-32 | Steps 1-11a1 of Table 4.5.2.2-3 of the generic procedure in TS 38.508-1 [4] are performed, REGISTRATION REQUEST message with IE 5GS registration type set to "Emergency registration" or “Initial registration”.  (Note 3) | - | - | 3 | P |
| Note 1: T3346 is set to 3 minutes. This is checked for 3 minutes less tolerance.  Note 2: This can be done by an AT/MMI command.  Note 3: 5GS registration type can set to either "Initial registration" according to TS 24.501 clause 5.2.2.3.3 or "Emergency registration" according to TS 24.501 clause 5.5.1.2. | | | | | |

9.2.5.1.4.3.3 Specific message contents

Table 9.2.5.1.4.3.3-1: REGISTRATION REJECT (steps 9, 19 Table 9.2.5.1.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | ’0001 0110’B | Cause #22 (Congestion) |  |
| T3346 Value | ‘00100011’B | 3 minutes |  |

Table 9.2.5.1.4.3.3-2: REGISTRATION REQUEST (step 25 Table 9.2.5.1.4.3.2-1)

|  |
| --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-6, Condition EMERGENCY or INITIAL. |

#### 9.2.5.2 Mobility Registration

##### 9.2.5.2.1 Void

##### 9.2.5.2.2 Mobility registration update/Change of SMS over NAS capability

9.2.5.2.2.1 Test Purpose (TP)

(1)

**with** { UE in state 5GMM-REGISTERED, and 5GMM-IDLE mode over non 3GPP access }

**ensure that** {

**when** { UE needs to change the SMS over NAS capability }

**then** { UE initiates **and** successfully completes the registration procedure for mobility registration update }

}

9.2.5.2.2.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501 [22], subclause 5.5.1.3.2. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.5.1.3.2]

The UE in state 5GMM-REGISTERED shall initiate the registration procedure for mobility and periodic registration update by sending a REGISTRATION REQUEST message to the AMF,

...

l) when the UE needs to register for SMS over NAS, indicate a change in the requirements to use SMS over NAS, or de-register from SMS over NAS;

...

For a REGISTRATION REQUEST message with a 5GS registration type IE indicating "mobility registration updating", UE shall include the requested NSSAI containing the S-NSSAI(s) corresponding to the slices to which the UE intends to register with and shall include the mapped S-NSSAI(s) for the requested NSSAI, if available, in the REGISTRATION REQUEST message. If the UE has allowed NSSAI or configured NSSAI for the current PLMN, the requested NSSAI shall be either:

a) the configured NSSAI for the current PLMN, or a subset thereof as described below, if the UE has no allowed NSSAI for the current PLMN;

b) the allowed NSSAI for the current PLMN, or a subset thereof as described below, if the UE has an allowed NSSAI for the current PLMN; or

c) the allowed NSSAI for the current PLMN, or a subset thereof as described below, plus one or more S-NSSAIs from the configured NSSAI for which no corresponding S-NSSAI is present in the allowed NSSAI and those are neither in the rejected NSSAI for the current PLMN nor in the rejected NSSAI for the current registration area.

If the UE has neither allowed NSSAI for the current PLMN nor configured NSSAI for the current PLMN and has a default configured NSSAI, the UE shall:

a) include the S-NSSAI(s) in the Requested NSSAI IE of the REGISTRATION REQUEST message using the default configured NSSAI; and

b) include the Network slicing indication IE with the Default configured NSSAI indication bit set to "Requested NSSAI created from default configured NSSAI" in the REGISTRATION REQUEST message.

If the UE has no allowed NSSAI for the current PLMN, no configured NSSAI for the current PLMN, and no default configured NSSAI, the UE shall not include a requested NSSAI in the REGISTRATION REQUEST message.

The subset of configured NSSAI provided in the requested NSSAI consists of one or more S-NSSAIs in the configured NSSAI applicable to this PLMN, if the S-NSSAI is neither in the rejected NSSAIs for the current PLMN nor in the rejected NSSAI for the current registration area.

The subset of allowed NSSAI provided in the requested NSSAI consists of one or more S-NSSAIs in the allowed NSSAI for this PLMN.

NOTE 3: How the UE selects the subset of configured NSSAI or allowed NSSAI to be provided in the requested NSSAI is implementation specific. The UE can take preferences indicated by the upper layers (e.g. policies, applications) into account.

9.2.5.2.2.3 Test description

9.2.5.2.2.3.1 Pre-test conditions

System Simulator:

WLAN Cell 27

UE:

UE is enabled for SMS over NAS

Preamble:

The UE is in state 3W-A with PDU session Active state according to TS 38.508-1 [4]SMS over NAS allowed.

9.2.5.2.1.3.2 Test procedure sequence

Table 9.2.5.2.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Make the UE deregister the SMS over NAS NOTE 1) | - | - | - | - |
| 2 | The UE transmits an REGISTRATION REQUEST message indicating "mobility registration updating". | --> | 5GMM: REGISTRATION REQUEST | 1 | P |
| 3 | SS sends a REGISTRATION ACCEPTmessage | <-- | 5GMM: REGISTRATION ACCEPT | - | - |
| 4 | Check: Does the UE send a REGISTRATION COMPLETE? | --> | 5GMM: REGISTRATION COMPLETE | - | - |
| Note 1: This can be done by MMI or AT command +C5GUSMS | | | | | |

9.2.5.2.1.3.3 Specific message contents

Table 9.2.5.2.1.3.3-1: REGISTRATION REQUEST (preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type |  |  |  |
| 5GS registration type value | ‘001’B |  | INITIAL |
| 5GS update type |  |  |  |
| SMS requested | SMS over NAS supported |  |  |

Table 9.2.5.2.1.3.3-2: REGISTRATION ACCEPT (preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result |  |  |  |
| SMS allowed | SMS over NAS allowed |  |  |
| T3512 value |  |  |  |
| Timer value | ‘00011’B |  |  |
| Unit | ‘101’B |  |  |

Table 9.2.5.2.1.3.3-3: REGISTRATION REQUEST (Table 9.2.5.2.1.3.2-1, step 2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type |  |  |  |
| 5GS registration type value | ‘010’B |  | MOBILITY |
| 5GS update type |  |  |  |
| SMS requested | SMS over NAS not supported |  |  |

### 9.2.6 De-registration

#### 9.2.6.1 UE-initiated de-registration

##### 9.2.6.1.1 UE-initiated de-registration / switch off

9.2.6.1.1.1 Test Purpose (TP)

(1)

**with** { the UE in 5GMM-REGISTERED state }

**ensure that** {

**when** { the UE is switched off }

**then** { the UE shall send DEREGISTRATION REQUEST message with De-registration type IE indicated to "Switch off" }

}

(2)

**with** { the UE supports remove USIM without power down and in 5GMM-REGISTERED state }

**ensure that** {

**when** { the USIM is removed from the UE }

**then** { the UE shall send DEREGISTRATION REQUEST message with De-registration type IE indicated to "Switch off" }

}

(3)

**with** { the UE in 5GMM-DEREGISTERED-INTIATED state }

**ensure that** {

**when** { the first four expiries of the timer T3521 }

**then** { the UE shall retransmit the DEREGISTRATION REQUEST message and shall reset and restart timer T3521 }

}

(4)

**with** { the UE in 5GMM-DEREGISTERED-INTIATED state }

**ensure that** {

**when** { On the fifth expiry of timer T3521 }

**then** { the deregistration procedure shall be aborted and the UE perform local detach }

}

9.2.6.1.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clauses 5.5.2.1, 5.5.2.2.1 and 5.5.2.2.6. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.5.2.1]

The de-registration procedure is used:

a) by the UE to de-register for 5GS services over 3GPP access when the UE is registered over 3GPP access;;

b) by the UE to de-register for 5GS services over 3GPP access, non-3GPP access, or both when the UE is registered in the same PLMN over both accesses;

c) by the network to inform the UE that it is deregistered for 5GS services over 3GPP access when the UE is registered over 3GPP access;

d) by the network to inform the UE that it is deregistered for 5GS services over 3GPP access, non-3GPP access, or both when the UE is registered in the same PLMN over both accesses; and

e) by the network to inform the UE to re-register to the network.

The de-registration procedure with appropriate de-registration type shall be invoked by the UE:

a) if the UE is switched off; and

b) as part of the eCall inactivity procedure defined in subclause 5.5.3.

The de-registration procedure with appropriate de-registration type shall be invoked by the network:

a) if the network informs whether the UE should re-register to the network.

The de-registration procedure with appropriate access type shall be invoked by the UE:

a) if the UE wants to de-register for 5GS services over 3GPP access when the UE is registered over 3GPP access; or

b) the UE wants to de-register for 5GS services over 3GPP access, non-3GPP access, or both when the UE is registered in the same PLMN over both accesses.

If the de-registration procedure is triggered due to USIM removal, the UE shall indicate "switch off" in the de-registration type IE.

If the de-registration procedure is requested by the UDM for a UE that has an emergency PDU session, the AMF shall not send a DEREGISTRATION REQUEST message to the UE.

If the de-registration procedure for 5GS services is performed, the PDU sessions, if any, for this particular UE are released locally without peer-to-peer signalling between the UE and the network.

The UE is allowed to initiate the de-registration procedure even if the timer T3346 is running.

NOTE: When the UE has no PDU sessions over non-3GPP access, or the UE moves all the PDU sessions over a non-3GPP access to a 3GPP access, the UE and the AMF need not initiate de-registration over the non-3GPP access.

The AMF shall provide the UE with a non-3GPP de-registration timer.

[TS 24.501, clause 5.5.2.2.1]

The de-registration procedure is initiated by the UE by sending a DEREGISTRATION REQUEST message (see example in figure 5.5.2.2.1). The De-registration type IE included in the message indicates whether the de-registration procedure is due to a "switch off" or not. The access type included in the message indicates whether the de-registration procedure is:

a) for 5GS services over 3GPP access when the UE is registered over 3GPP access only;

b) for 5GS services over non-3GPP access when the UE is registered over non-3GPP access only; or

c) for 5GS services over 3GPP access, non-3GPP access or both 3GPP access and non-3GPP access when the UE is registered in the same PLMN over both accesses.

If the UE has a valid 5G-GUTI, the UE shall populate the 5GS mobile identity IE with the valid 5G-GUTI. If the UE does not have a valid 5G-GUTI, the UE shall populate the 5GS mobile identity IE with its SUCI.

If the UE does not have a valid 5G-GUTI and it does not have a valid SUCI, then the UE shall populate the5GSmobile identity IE with its PEI.

If the de-registration request is not due to switch off and the UE is in the state 5GMM-REGISTERED or 5GMM-REGISTERED-INITIATED, timer T3521 shall be started in the UE after the DEREGISTRATION REQUEST message has been sent. The UE shall enter the state 5GMM-DEREGISTERED-INITIATED.

If the UE is to be switched off, the UE shall try for a period of 5 seconds to send the DEREGISTRATION REQUEST message. During this period, the UE may be switched off as soon as the DEREGISTRATION REQUEST message has been sent.

[TS 24.501, clause 5.5.2.2.6]

...

c) T3521 timeout.

On the first four expiries of the timer, the UE shall retransmit the DEREGISTRATION REQUEST message and shall reset and restart timer T3521. On the fifth expiry of timer T3521, the de-registration procedure shall be aborted and the UE proceeds as follows:

9.2.6.1.1.3 Test description

9.2.6.1.1.3.1 Pre-test conditions

System Simulator:

- WLAN Cell 27.

UE:

- None.

Preamble:

- The UE is in state 3W-A on WLAN Cell 27 according to 38.508-1 [4].

9.2.6.1.1.3.2 Test procedure sequence

Table 9.2.6.1.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Cause switch off | - | - | - | - |
| 2 | Check: Does the UE transmit a DEREGISTRATION REQUEST with the De-registration type IE indicating "switch off"? | --> | DEREGISTRATION REQUEST | 1 | P |
| 3 | SS Transmits DEREGISTRATION ACCEPT | <-- | DEREGISTRATION ACCEPT | - | - |
| 4 | The generic procedure for SS-requested IPsec Secure tunnel disconnection, specified in subclause 4.5A.3 of TS 38.508-1 [4], takes place performing disconnection of security association. | - | - | - | - |
| 5 | The UE is switched on. | - | - | - | - |
| 6-15 | The registration procedure is completed by executing steps 1-10 of the UE registration procedure in TS 38.508-1 [4] table 4.5.2.2-3. | - | - | - | - |
| 16 | Cause UE to initiate deregistration. | - | - | - | - |
| 17 | The UE transmits a DEREGISTRATION REQUEST message. The UE starts timer T3521. | --> | DEREGISTRATION REQUEST | - | - |
| 18 | The SS does not respond to the DEREGISTRATION REQUEST message. | - | - | - | - |
| 19 | Check: When the timer T3521 expires does the UE re-transmit DETACH REQUEST message. Timer T3421 is re-started (1st expiry). | --> | DEREGISTRATION REQUEST | 3 | P |
| 20 | The SS does not respond to the DEREGISTRATION REQUEST message. | - | - | - | - |
| 21 | Check: When the timer T3521 expires does the UE re-transmit DEREGISTRATION REQUEST message. Timer T3521 is re-started (2nd expiry). | --> | DEREGISTRATION REQUEST | 3 | P |
| 22 | The SS does not respond to the DEREGISTRATION REQUEST message. | - | - | - | - |
| 23 | Check: When the timer T3521 expires does the UE re-transmit DEREGISTRATION REQUEST message. Timer T3521 is re-started (3rd expiry). | --> | DEREGISTRATION REQUEST | 3 | P |
| 24 | The SS does not respond to the DEREGISTRATION REQUEST message. | - | - | - | - |
| 25 | Check: When the timer T3521 expires does the UE re-transmit DEREGISTRATION REQUEST message. Timer T3521 is re-started (4th expiry). | --> | DEREGISTRATION REQUEST | 3 | P |
| 26 | The SS does not respond to the DETACH REQUEST message. | - | - | - | - |
| 27 | When the timer T3521 expires the UE aborts the detach procedure and performs a local detach (5th expiry). | - | - | 4 | P |
| 28 | SS Transmits PDU SESSION MODIFICATION COMMAND | <-- | PDU SESSION MODIFICATION COMMAND | - | - |
| 29 | Check: Does the UE transmit a PDU SESSION MODIFICATION COMPLETE? | --> | PDU SESSION MODIFICATION COMPLETE | 4 | F |
| 30 | The generic procedure for SS-requested IPsec Secure tunnel disconnection, specified in subclause 4.5A.3 of TS 38.508-1 [4], takes place performing disconnection of security association. | - | - | - | - |
| - | EXCEPTION: Steps 31 to 46 shall be implemented if the UE supports remove USIM without power down: pc\_USIM\_Removal = TRUE [29] | - | - | - | - |
| 31 | The UE is switched off. | - | - | - | - |
| 32 | The UE is switched on. | - | - | - | - |
| 33-42 | The registration procedure is completed by executing steps 1-10 of the UE registration procedure in TS 38.508-1 [4] table 4.5.2.2-3. | - | - | - | - |
| 43 | Cause removal of USIM from the UE without powering down. | - | - | - | - |
| 44 | Check: Does the UE transmit a DEREGISTRATION REQUEST with the De-registration type IE indicating "switch off"? | --> | DEREGISTRATION REQUEST | 2 | P |
| 45 | SS Transmits DEREGISTRATION ACCEPT | <-- | DEREGISTRATION ACCEPT | - | - |
| 46 | The generic procedure for SS-requested IPsec Secure tunnel disconnection, specified in subclause 4.5A.3 of TS 38.508-1 [4], takes place performing disconnection of security association. | - | - | - | - |

9.2.6.1.1.3.3 Specific message contents

Table 9.2.6.1.1.3.3-1: DEREGISTRATION REQUEST (Step 1 and step 44, Table 9.2.6.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-12 | | | |
| Information Element | Value/Remark | Comment | Condition |
| De-registration type |  |  |  |
| Switch off | ‘1’B |  |  |

#### 9.2.6.2 Network-initiated de-registration

##### 9.2.6.2.1 Network-initiated de-registration / De-registration for Non-3GPP access / Re-registration required

9.2.6.2.1.1 Test Purpose (TP)

(1)

**with** { the UE in 5GMM-REGISTERED state }

**ensure that** {

**when** { the SS sends a DEREGISTRATION REQUEST message indicates "re-registration required" and the de-registration request is for non 3GPP access }

**then** { the UE sends a DEREGISTRATION ACCEPT message to the network and releases the existing NAS signalling connection, then initiates an initial registration and also re-establishes any previously established PDU sessions }

}

9.2.6.2.1.2 Conformance requirements

References: The conformance requirement covered in the present TC is specified in: 3GPP TS 24.501 clauses 5.5.2.3.2. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501 clause 5.5.2.3.2]

NOTE 1: When the de-registration type indicates "re-registration required", user interaction is necessary in some cases when the UE cannot re-establish the PDU session (s), if any, automatically.

…

Upon sending a DEREGISTRATION ACCEPT message, the UE shall delete the rejected NSSAI as specified in subclause 4.6.2.2.

If the de-registration type indicates "re-registration required", then the UE shall ignore the 5GMM cause IE if received.

If the de-registration type indicates "re-registration not required", the UE shall take the actions depending on the received 5GMM cause value:

#3 (Illegal UE);

#6 (Illegal ME); or

#7 (5GS services not allowed).

The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. The UE shall consider the USIM as invalid for 5GS services until switching off or the UICC containing the USIM is removed. The UE shall delete the list of equivalent PLMNs and shall enter the state 5GMM-DEREGISTERED.

If the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status, 4G-GUTI, last visited registered TAI, TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when a DETACH REQUEST is received with the EMM cause with the same value and with detach type set to "re-attach not required".

NOTE 2: The possibility to configure a UE so that the radio transceiver for a specific radio access technology is not active, although it is implemented in the UE, is out of scope of the present specification.

If the UE also supports the registration procedure over the other access, the UE shall in addition handle 5GMM parameters and 5GMM state for this access, as described for this 5GMM cause value.

...

#72 (Non-3GPP access to 5GCN not allowed).

The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete 5G-GUTI, last visited registered TAI, TAI list and ngKSI. Additionally, the UE shall reset the registration attempt counter and enter the state 5GMM-DEREGISTERED.

NOTE 3: The 5GMM sublayer states, the 5GMM parameters and the registration status are managed per access type independently, i.e. 3GPP access or non-3GPP access (see subclauses 4.7.2 and 5.1.3).

The UE shall disable the N1 mode capability for non-3GPP access (see subclause 4.9.3).

As an implementation option, the UE may enter the state 5GMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection according to 3GPP TS 23.122 [5].

9.2.6.2.1.3 Test description

9.2.6.2.1.3.1 Pre-test conditions

System Simulator:

- WLAN Cell 27.

UE:

- None.

Preamble:

- the UE is in state 3W-A on WLAN Cell 27 according to TS 38.508-1 [4].

9.2.6.2.1.3.2 Test procedure sequence

Table 9.2.6.2.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message/PDU/SDU |  |  |
| 1 | The SS transmits a DEREGISTRATION REQUEST with indicates "re-registration required". | <-- | DEREGISTRATION REQUEST | - | - |
| 2 | Check: Does the UE transmit a DEREGISTRATION ACCEPT message? | --> | DEREGISTRATION ACCEPT | 1 | P |
| 3 | The generic procedure for SS-requested IPsec Secure tunnel disconnection, specified in subclause 4.5A.3 of TS 38.508-1 [4], takes place performing disconnection of security association. | - | - | - | - |
| - | EXCEPTION: step 4 describes a behaviour which depends on the UE capability | - | - | - | - |
| 4 | IF NOT pc\_Automatic\_Re\_registration, the user initiates a registration by MMI. | - | - | - | - |
| 6-15 | The registration procedure is completed by executing steps 1-10 of the UE registration procedure in TS 38.508-1 [4] table 4.5.2.2-3. | - | - | 1 | P |

9.2.6.2.1.3.3 Specific message contents

Table 9.2.6.2.1.3.3-1: DEREGISTRATION REQUEST (step 1, Table 9.2.6.2.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-14 | | | |
| Information Element | Value/Remark | Comment | Condition |
| DEREGISTRATION type |  |  |  |
| Switch off | '0’B | Normal de-registration |  |
| Re-registration required | ‘1’B | re-registration required |  |
| Access type | ‘10’B | Non 3GPP access |  |
| 5GMM cause | '0000 0011’B | Cause #3 (Illegal UE) |  |

Table 9.2.6.2.1.3.3-2: REGISTRATION REQUEST (step 8, Table 9.2.6.2.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS mobile identity | The valid 5G-GUTI that UE holds |  |  |

##### 9.2.6.2.2 Network-initiated de-registration / De-registration for Non 3GPP access / Re-registration not required

9.2.6.2.2.1 Test Purpose (TP)

(1)

**with** { the UE in 5GMM-REGISTERED state }

**ensure that** {

**when** { the SS sends a DEREGISTRATION REQUEST message indicates no 5GMM cause IE, ""re-registration not required"" and the de-registration request is for npn-3GPP access and 5GMM cause value is not included }

**then** { the UE deletes 5G-GUTI, TAI list, last visited registered TAI, list of equivalent PLMNs, ngKSI, sends a DEREGISTRATION ACCEPT message enter the state 5GMM-DEREGISTERED for non 3GPP access }

}

(2)

**with** { the UE in 5GMM-REGISTERED state }

**ensure that** {

**when** { the SS sends a DEREGISTRATION REQUEST message indicates no 5GMM cause IE, "re-registration not required" and the de-registration request is for non-3GPP access and 5GMM cause value set to #7 5GS services not allowed }

**then** { the UE deletes 5G-GUTI, TAI list, last visited registered TAI, list of equivalent PLMNs, ngKSI, consider the USIM as invalid for 5GS services until switching off or the UICC containing the USIM is removed, sends a DEREGISTRATION ACCEPT message enter the state 5GMM-DEREGISTERED for Non 3GPP access }

}

(3)

**with** { the UE in 5GMM-REGISTERED state }

**ensure that** {

**when** { the SS sends a DEREGISTRATION REQUEST message indicates no 5GMM cause IE, "re-registration not required" and the de-registration request is for non-3GPP access and 5GMM cause value set to #72 Non-3GPP access to 5GCN not allowed }

**then** { the UE deletes 5G-GUTI, TAI list, last visited registered TAI, ngKSI, disable the N1 mode capability for non-3GPP access, sends a DEREGISTRATION ACCEPT message enter the state 5GMM-DEREGISTERED for Non 3GPP access }

}

9.2.6.2.2.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501 clauses 5.5.2.3.2 and 5.5.2.3.4. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 5.5.2.3.2]

Upon receiving the DEREGISTRATION REQUEST message, if the DEREGISTRATION REQUEST message indicates "re-registration not required" and the de-registration request is for 3GPP access, the UE shall release locally the PDU sessions over 3GPP access, if any. The UE shall send a DEREGISTRATION ACCEPT message to the network and enter the state 5GMM-DEREGISTERED for 3GPP access.

...

If the de-registration type indicates "re-registration not required", the UE shall take the actions depending on the received 5GMM cause value:

...

#7 (5GS services not allowed).

The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete any 5G-GUTI, last visited registered TAI, TAI list and ngKSI. The UE shall consider the USIM as invalid for 5GS services until switching off or the UICC containing the USIM is removed. The UE shall delete the list of equivalent PLMNs and shall enter the state 5GMM-DEREGISTERED.

If the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status, 4G-GUTI, last visited registered TAI, TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when a DETACH REQUEST is received with the EMM cause with the same value and with detach type set to "re-attach not required".

NOTE 2: The possibility to configure a UE so that the radio transceiver for a specific radio access technology is not active, although it is implemented in the UE, is out of scope of the present specification.

If the UE also supports the registration procedure over the other access, the UE shall in addition handle 5GMM parameters and 5GMM state for this access, as described for this 5GMM cause value.

...

#72 (Non-3GPP access to 5GCN not allowed).

The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete 5G-GUTI, last visited registered TAI, TAI list and ngKSI. Additionally, the UE shall reset the registration attempt counter and enter the state 5GMM-DEREGISTERED.

NOTE 3: The 5GMM sublayer states, the 5GMM parameters and the registration status are managed per access type independently, i.e. 3GPP access or non-3GPP access (see subclauses 4.7.2 and 5.1.3).

The UE shall disable the N1 mode capability for non-3GPP access (see subclause 4.9.3).

As an implementation option, the UE may enter the state 5GMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection according to 3GPP TS 23.122 [5].

[TS 24.501, clause 5.5.2.3.4]

b) DEREGISTRATION REQUEST, other 5GMM cause values than those treated in subclause 5.5.2.3.2 or no 5GMM cause IE is included, and the De-registration type IE indicates "re-registration not required".

The UE shall delete 5G-GUTI, TAI list, last visited registered TAI, list of equivalent PLMNs, ngKSI, shall set the 5GS update status to 5U2 NOT UPDATED and shall start timer T3502.

A UE not supporting S1 mode may enter the state 5GMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection according to 3GPP TS 23.122 [5]; otherwise the UE shall enter the state 5GMM-DEREGISTERED.ATTEMPTING-REGISTRATION.

A UE operating in single-registration mode shall:

- enter the state 5GMM-DEREGISTERED and attempt to select E-UTRAN radio access technology and proceed with the appropriate EMM specific procedures. In this case, the UE may disable N1 mode capability (see subclause 4.9); or

- enter the state 5GMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection according to 3GPP TS 23.122 [5].

A UE operating in single-registration mode shall set the EPS update status to EU2 NOT UPDATED and shall delete the EMM parameters 4G-GUTI, last visited registered TAI, TAI list and eKSI and shall enter the state EMM-DEREGISTERED.

9.2.6.2.2.3 Test description

9.2.6.2.2.3.1 Pre-test conditions

System Simulator:

- WLAN Cell 27.

UE:

- None

Preamble:

- The UE is in state 3W-A on WLAN Cell 27 according to TS 38.508-1 [4].

9.2.6.2.2.3.2 Test procedure sequence

Table 9.2.6.2.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U – S | Message |  |  |
| 1 | SS sends a DEREGISTRATION REQUEST message indicates no 5GMM cause IE, "re-registration not required" and the de-registration request is for non 3GPP access | <-- | NR 5GMM: DEREGISTRATION REQUEST | - | - |
| 2 | Check: Does the UE transmit an DEREGISTRATION ACCEPT message? | --> | NR 5GMM: DEREGISTRATION ACCEPT | 1 | P |
| 3 | The generic procedure for SS-requested IPsec Secure tunnel disconnection, specified in subclause 4.5A.3 of TS 38.508-1 [4], takes place performing disconnection of security association. | - | - | - | - |
| 4 | Cause UE to initiate registration. | - | - | - | - |
| 5-15 | The registration procedure is completed by executing steps 1-10 of the UE registration procedure in TS 38.508-1 [4] table 4.5.2.2-3. | - | - | 1 | P |
| 16 | SS sends a DEREGISTRATION REQUEST message indicates no 5GMM cause IE, "re-registration not required", 5GMM Cause set to #7 (5GS services not allowed) and the de-registration request is for non 3GPP access | <-- | NR 5GMM: DEREGISTRATION REQUEST | - | - |
| 17 | Check: Does the UE transmit an DEREGISTRATION ACCEPT message? | --> | NR 5GMM: DEREGISTRATION ACCEPT | 2 | P |
| 18 | The generic procedure for SS-requested IPsec Secure tunnel disconnection, specified in subclause 4.5A.3 of TS 38.508-1 [4], takes place performing disconnection of security association. | - | - | - | - |
| 19 | Check for 60 seconds if UE initiates Registration procedure | - | NR 5GMM: REGISTRATION REQUEST | 2 | F |
| 20 | The UE is switched off. | - | - | - | - |
| 21 | The UE is switched on. | - | - | - | - |
| 22-31 | The registration procedure is completed by executing steps 1-10 of the UE registration procedure in TS 38.508-1 [4] table 4.5.2.2-3. | - | - | - | - |
| 32 | SS sends a DEREGISTRATION REQUEST message indicates no 5GMM cause IE, "re-registration not required", 5GMM Cause set to #72 (Non-3GPP access to 5GCN not allowed) and the de-registration request is for non 3GPP access | <-- | NR 5GMM: DEREGISTRATION REQUEST | - | - |
| 33 | Check: Does the UE transmit a DEREGISTRATION ACCEPT message? | --> | NR 5GMM: DEREGISTRATION ACCEPT | 3 | P |
| 34 | The generic procedure for SS-requested IPsec Secure tunnel disconnection, specified in subclause 4.5A.3 of TS 38.508-1 [4], takes place performing disconnection of security association. | - | - | - | - |
| 35 | Check for 60 seconds if UE initiates Registration procedure | - | NR 5GMM: REGISTRATION REQUEST | 3 | F |
| 36 | The UE is switched off. | - | - | - | - |

9.2.6.2.2.3.3 Specific message contents

Table 9.2.6.2.2.3.3-1: Message DEREGISTRATION REQUEST (step 1, Table 9.2.6.2.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-12 | | | |
| Information Element | Value/remark | Comment | Condition |
| De-registration type |  |  |  |
| Switch off | ‘0’B | Normal de-registration |  |
| Re-registration required | ‘0’B | re-registration not required |  |
| Access type | ‘01’B | 3GPP access |  |
| 5GMM cause | Not Present |  |  |

Table 9.2.6.2.2.3.3-2: Message REGISTRATION REQUEST (step 8, Table 9.2.6.2.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| ngKSI |  |  |  |
| NAS key set identifier | '111'B | no key is available (UE to network) |  |
| TSC | Any allowed value | TSC does not apply for NAS key set identifier value "111" |  |
| 5GS mobile identity | The valid SUCI |  |  |
| Last visited registered TAI | Not present |  |  |

Table 9.2.6.2.2.3.3-2: Message ATTACH REQUEST (step 28, Table 9.2.6.2.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7.2-4 | | | |
| Information Element | Value/remark | Comment | Condition |
| NAS key set identifier |  |  |  |
| NAS key set identifier | '111'B | no key is available |  |
| TSC | Any allowed value | TSC does not apply for NAS key set identifier value "111". |  |
| Old GUTI or IMSI | IMSI1 |  |  |
| Last visited registered TAI | Not present |  |  |

### 9.2.7 Service request

#### 9.2.7.1 Service request / IDLE mode uplink user data transport / Rejected / Restricted service area, Abnormal / T3517

9.2.7.1.1 Test Purpose (TP)

Same test purposes as clause 9.1.7.1.1

9.2.7.1.2 Conformance requirements

Same conformance requirements as in clause 9.1.7.1.2

9.2.7.1.3 Test description

9.2.7.1.3.1 Pre-test conditions

System Simulator:

- WLAN Cell 27

UE:

- None.

Preamble:

- The UE is in state 3W-A with PDU session Active state according to TS 38.508-1 [4]

9.2.7.1.3.2 Test procedure sequence

Table 9.2.7.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The generic procedure for SS-requested IPsec Secure tunnel disconnection, specified in subclause 4.5A.3 of TS 38.508-1 [4], takes place performing disconnection of security association. | - | - | - | - |
| 2 | Trigger UE to initiate IPSec SA  (Note 1) | - | - | - | - |
| - | Exception: In parallel to steps 3, the UE initiates an IPsec security association and one child security association as defined in TS 24.502 [35] clause 7.3.2 | - | - | - | - |
| 3 | Check: Does UE transmit a SERVICE REQUEST message with Service type IE set to ‘data’? | --> | SERVICE REQUEST | 1 | P |
| 4 | The SS transmits a SERVICE REJECT message with 5GMM cause = "Restricted service area". | <-- | SERVICE REJECT | - | - |
| 5-6 | Void. | - | - | - | - |
| 6A | The SS starts timer 5 sec.  Note: An arbitraty chosen timer to avoid message crossing. | - | - | - | - |
| - | EXCEPTION: Steps 6Ba1 to 6Bb3 describe behaviour that depends on the UE implementation; the "lower case letter" identifies a step sequence that take place if the UE is implemented in a certain way. | - | - | - | - |
| - | Exception: In parallel to steps 6Ba1 to 8B, the UE initiates an IPsec security association as defined in TS 24.502 [35] clause 7.3.2 | - | - | - | - |
| 6Ba1 | Check: Does the UE transmit REGISTRATION REQUEST for mobility registration?  NOTE: Allowed for Rel-15 UEs. | --> | REGISTRATION REQUEST | 2 | P |
| 6Ba2 | Stop timer 5 sec. | - | - | - | - |
| 6Bb1 | Timer 5 sec expires. | - | - | - | - |
| 6Bb2 | The generic procedure for SS-requested IPsec Secure tunnel disconnection, specified in subclause 4.5A.3 of TS 38.508-1 [4], takes place performing disconnection of security association. | - | - | - | - |
| 6Bb3 | Check: Does the UE transmit REGISTRATION REQUEST for mobility registration over a new signalling connection? | --> | REGISTRATION REQUEST | 2 | P |
| 7-8 | Void. | - | - | - | - |
| 8A | SS stops transmitting UL grant. | - | - | - | - |
| 8B | SS sends a REGISTRATION ACCEPTmessage containing a 5G-GUTI. | <-- | REGISTRATION ACCEPT | - | - |
| 8C | SS transmits one UL grant, for the UE to transmit the REGISTRATION COMPLETE message at step 8D. | - | - | - | - |
| 8D | The UE send a REGISTRATION COMPLETE. | --> | REGISTRATION COMPLETE | - | - |
| 8E | The generic procedure for SS-requested IPsec Secure tunnel disconnection, specified in subclause 4.5A.3 of TS 38.508-1 [4], takes place performing disconnection of security association. | - | - | - | - |
| 8F | The SS resumes UL grant transmission. | - | - | - | - |
| 8G | The UE transmits a SERVICE REQUEST message over a new signalling connection. | --> | SERVICE REQUEST | - | - |
| 8H | The SS does not respond to SERVICE REQUEST message.  Note: The UE locally releases the signalling connection after T3517 expiry. | - | - | - | - |
| - | EXCEPTION: Steps 9 to 10 are repeated for 4 times. | - | - | - | - |
| 9 | Check: does the UE transmit a SERVICE REQUEST message after T3517 expiry but before 60s over a new signalling connection? | --> | SERVICE REQUEST | 3 | P |
| 10 | The SS does not respond to SERVICE REQUEST message.  Note: The UE locally releases the signalling connection after T3517 expiry. | --> | SERVICE REQUEST | - | - |
| 11 | Check: Does the UE transmit a SERVICE REQUEST message within 60 seconds (minimum value of T3525) over a new signalling connection? | --> | SERVICE REQUEST | 3,4 | F |
| 12 | The SS starts timer 10 sec after Step 11 to see if UE performs the optional Steps listed below. | - | - | - | - |
| - | EXCEPTION: Steps 12a1 to 12a7a2 describe behaviour that depends on the UE implementation; the "lower case letter" identifies a step sequence that take place if the UE is implemented in a certain way. | - | - | - | - |
| 12a1 | Trigger UE to initiate IPSec SA  (Note 1) | - | - | - | - |
|  | Exception: In parallel to steps 12a2 to 12a5, the UE initiates an IPsec security association and one child security association as defined in TS 24.502 [35] clause 7.3.2 | - | - | - | - |
| 12a2 | The UE transmits a SERVICE REQUEST message after T3525 expiry over a new signalling connection. | --> | SERVICE REQUEST | - | - |
| 12a3-12a7a2 | Steps 5 to 9a2 of the NR RRC\_CONNECTED procedure in TS 38.508-1 [4] Table 4.5.4.2-3 are executed. | - | - | - | - |
| Note 1: This could be done by e.g. MMI or by AT command +CGACT. | | | | | |

9.2.7.1.3.3 Specific message contents

Table 9.2.7.1.3.3-3: SERVICE REQUEST (steps 3, 8G and 9, Table 9.2.7.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.1-16 | | | |
| Information Element | Value/remark | Comment | Condition |
| Service type |  |  |  |
| Service type value | ‘0001’B | data |  |

Table 9.2.7.1.3.3-4: SERVICE REJECT (step 4, Table 9.2.7.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.1-18 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | '0001 1100'B | Restricted service area |  |

#### 9.2.7.2 Service request / CMM CONNECTED mode/uplink user data transport / Abnormal / T3517

9.2.7.2.1 Test Purpose (TP)

(1)

**with** { the UE is in 5GMM-REGISTERED state and 5GMM-CONNECTED mode over 3GPP access }

**ensure that** {

**when** { the UE has user data pending due to no user-plane resources established for PDU session(s) used for user data transport }

**then** { the UE sends a SERVICE REQUEST message }

}

(2)

**with** { the UE sends a SERVICE REQUEST message in 5GMM-CONNECTED mode }

**ensure that** {

**when** { T3517 expired }

**then** { the UE stays in 5GMM-CONNECTED mode }

}

9.2.7.2.2 Conformance requirements

Same conformance requirements as in clause 9.1.7.2.2

9.2.7.2.3 Test description

9.2.7.2.3.1 Pre-test conditions

System Simulator:

- WLAN Cell 27

UE:

- None.

Preamble:

- The UE is in state 3W-A with PDU session (with PDU session ID X where 1 <= X <= 15) Active state according to TS 38.508-1 [4]

9.2.7.2.3.2 Test procedure sequence

Table 9.2.7.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U – S | Message |  |  |
| 1 | The SS initiated child SA deletion procedure sec tunnel as defined in TS 24.502 [33] clause 7.7.2 | - | - | - | - |
| 2 | Trigger UE to send a ICMP ECHO REQUEST (pc\_IPv4 = TRUE)\_or ICMPv6 ECHO REQUEST (pc\_IPv6 = TRUE)  (Note 2) | - | - | - | - |
| 3 | The UE transmits a SERVICE REQUEST message. | --> | NR 5GMM: SERVICE REQUEST | 1 | P |
| 4 | The SS does not respond to the *SERVICE REQUEST* message. | - | - | - | - |
| 5 | Wait for T3517 seconds  (Note 1). | - | - | - | - |
| 6 | The UE transmit a *SERVICE REQUEST* message. | --> | NR 5GMM: SERVICE REQUEST | - | - |
| 7 | The SS sends an IDENTITY REQUEST message. | <-- | NR 5GMM: IDENTITY REQUEST | - | - |
| 8 | Check: Does the UE transmit an IDENTITY RESPONSE message? | --> | NR 5GMM: IDENTITY RESPONSE | 2 | P |
| - | Exception: In parallel to steps 9, the SS initiates one child security association as defined in TS 24.502 [33] clause 7.5 | - | - | - | - |
| 9 | The SS transmits SERVICE ACCEPT message to setup User-plane resources for the PDU session X. | <-- | NR 5GMM: SERVICE ACCEPT |  |  |
| - | EXCEPTION: Steps 10a1 to 10b2 describe behaviour that depends on the UE implementation; the "lower case letter" identifies a step sequence that take place depending on the UE implementation. | - | - | - | - |
| 10a1 | IF (pc\_IPv4 = TRUE) THEN, check that the UE sends an ICMP Echo request to the SS? | --> | ICMP ECHO REQUEST | 1 | P |
| 10a2 | The SS sends an ICMP Echo reply | <-- | ICMP ECHO REPLY | - |  |
| 10b1 | ELSE IF (pc\_IPv4 = FALSE AND pc\_IPv6 = TRUE) THEN, check the UE sends an ICMPv6 Echo request to the SS? | --> | ICMPv6 ECHO REQUEST | 1 | P |
| 10b2 | The SS sends an ICMPv6 Echo reply | <-- | ICMPv6 ECHO REPLY | - | - |
| Note 1: T3517 expires after 15 seconds.  Note 2: This could be done by a MMI command | | | | | |

9.2.7.2.3.3 Specific message contents

Table 9.2.7.2.3.3-1: SERVICE REQUEST (step 3, 6, Table 9.2.7.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-16 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Service type | '0001'B | data |  |
| Uplink data status |  |  |  |
| PSI(X) | '1'B | PSI(X) is set to 1 indicates that uplink data are pending for the PDU session X activated in preamble. |  |

Table 9.2.7.2.3.3-2: IDENTITY REQUEST (step 7, Table 9.2.7.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] table 4.7.1-21 | | | |
| Information Element | Value/remark | Comment | Condition |
| Identity type | ‘0010’B | 5G-GUTI |  |

Table 9.2.7.2.3.3-3: IDENTITY RESPONSE (step 8, Table 9.2.7.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] table 4.7.1-22 | | | |
| Information Element | Value/remark | Comment | Condition |
| Mobile identity | 5G-GUTI |  |  |

Table 9.2.7.2.3.3-4: SERVICE ACCEPT (step 9, Table 9.2.7.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-17 | | | |
| Information Element | Value/Remark | Comment | Condition |
| PDU session reactivation result |  |  |  |
| PSI(X) | '0'B | PSI(X) is set to 0 indicates that establishment of user-plane resource of the PDU session X activated in preamble is successful. |  |

### 9.2.8 SMS over NAS

#### 9.2.8.1 SMS over NAS / MO SMS over NAS - 5GMM-Idle mode

9.2.8.1.1 Test Purpose (TP)

(1)

**with** { the UE in switched off state with valid USIM inserted }

**ensure that** {

**when** { the UE requests initial registration for SMS over NAS }

**then** { the UE shall send REGISTRATION REQUEST message with SMS requested bit of the 5GS registration type IE "SMS over NAS supported" }

}

(2)

**with** { the UE in 5GMM\_Connected state with 5GMM-Idle mode and the UE has sent a SERVICE REQUEST message triggered by initiating MO SMS}

**ensure that** {

**when** { UE receives a SERVICE ACCEPT message from SS }

**then** { UE sends CP-DATA containing RP-DATA RPDU (SMS SUBMIT TPDU) encapsulated in an Uplink NAS transport message }

}

(3)

**with** { UE has sent CP-DATA containing an RP-DATA RPDU (SMS SUBMIT TPDU) encapsulated in an Uplink NAS transport message }

**ensure that** {

**when** { UE receives a CP-DATA containing an RP-ACK RPDU encapsulated in a Downlink NAS transport message }

**then** { UE sends a CP-ACK encapsulated in an Uplink NAS Transport message }

9.2.8.1.2 Conformance requirements

Same conformance requirements as in clause 9.2.8.1.2

9.2.8.1.3 Test description

9.2.8.1.3.1 Pre-test conditions

System Simulator:

WLAN Cell 27;

UE:

The UE does not have any stored SMS message.

Preamble:

The UE is in state Switched OFF (state-0W-B) according to TS 38.508-1 [4].

9.2.8.1.3.2 Test procedure sequence

Table 9.2.8.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched ON | - | - | - | - |
| 2-3 | Steps 1-2 of the generic procedure for UE registration specified in TS 38.508-1 [4] table 4.5.2.2-3 are performed. | - | - | - | - |
| - | Exception: The UE establishes an IPsec tunnel in parallel to 5GC registration steps 4 to 8 as per the IKEv2 protocol as defined in 3GPP TS 23.502 [31] clause 4.12.2.2 figure 4.12.2.2-1. | - | - | - | - |
| 4 | Check: Does UE transmit a REGISTRATION REQUEST message including 5GS update type IE with SMS requested bit set to "SMS over NAS supported"? | --> | REGISTRATION REQUEST | 1 | P |
| 5 - 8 | Steps 4-5 of the generic procedure for UE registration specified in TS 38.508-1 [4] table 4.5.2.2-3 are performed. | - | - | - | - |
| 9 | SS transmits REGISTRATION ACCEPT message including 5GS registration result with SMS allowed bit set to “SMS over NAS allowed”. | <-- | REGISTRATION ACCEPT | - | - |
| 10 -12 | Steps 9-11 of the generic procedure for UE registration specified in TS 38.508-1 [4] table 4.5.2.2-3 are performed. | - | - | - | - |
| 13 | Sending of a 160 character MO SMS is initiated at the UE via MMI or AT command | - | - | - | - |
| 14 | UE transmits establishes a IPSEC SA and NAS signalling connection as per generic procedure in table 4.5A.4.2.2-1 of 38.508-1 [4]”. | - | - | - | - |
| 15 | Check: Does the UE transmit a CP-DATA containing an RP-DATA RPDU (SMS SUBMIT TPDU) encapsulated in an Uplink NAS transport message? | --> | UPLINK NAS TRANSPORT | 2 | P |
| 16 | The SS transmits a CP-ACK encapsulated in a Downlink NAS Transport message. | <-- | DOWNLINK NAS TRANSPORT | - | - |
| 17 | The SS transmits a CP-DATA containing an RP-ACK RPDU encapsulated in a Downlink NAS transport message | <-- | DOWNLINK NAS TRANSPORT | - | - |
| 18 | Check: Does the UE transmit a CP-ACK encapsulated in an Uplink NAS Transport message? | --> | UPLINK NAS TRANSPORT | 3 | P |

9.2.8.1.3.3 Specific message contents

Table 9.2.8.1.3.3-1: REGISTRATION REQUEST (step 4, Table 9.2.8.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type |  |  |  |
| 5GS registration type value | ‘001’B |  | INITIAL |
| 5GS update type |  |  |  |
| SMS requested | SMS over NAS supported |  |  |

Table 9.2.8.1.3.3-2: REGISTRATION ACCEPT (step 9, Table 9.2.8.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result |  |  |  |
| SMS allowed | SMS over NAS allowed |  |  |
| T3512 value |  |  |  |
| Timer value | ‘00011’B |  |  |
| Unit | ‘101’B |  |  |

Table 9.2.8.1.3.3-3: UL NAS TRANSPORT (step 15, Table 9.2.8.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-10 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0010’B | SMS |  |
| Payload container | CP-DATA | RP-DATA RPDU |  |

Table 9.2.8.1.3.3-3a:Message CP-DATA (step 15, Table 9.2.8.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Information Element | Value/remark | Comment | Condition |
| CP-User data | RP-DATA |  |  |

Table 9.2.8.1.3.3-4: DL NAS TRANSPORT (step 16, Table 9.2.8.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-11 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0010’B | SMS |  |
| Payload container | CP-ACK |  |  |

Table 9.2.8.1.3.3-5: DL NAS TRANSPORT (step 17, Table 9.2.8.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-11 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0010’B | SMS |  |
| Payload container | CP-DATA | RP-ACK RPDU |  |

Table 9.2.8.1.3.3-5a:Message CP-DATA (step 17, Table 9.2.8.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Information Element | Value/remark | Comment | Condition |
| CP-User data | RP-DATA |  |  |

Table 9.2.8.1.3.3-6: UL NAS TRANSPORT (step 18, Table 9.2.8.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-10 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0010’B | SMS |  |
| Payload container | CP-ACK |  |  |

## 9.3 Inter-system mobility

### 9.3.1 5GS-EPC Inter-system mobility

#### 9.3.1.1 Inter-system mobility registration update / Single-registration mode with N26 / 5GMM-IDLE / 5GC to EPC

9.3.1.1.1 Test Purpose (TP)

(1)

**with** { UE in state 5GMM-REGISTERED and 5GMM-IDLE on a 5GC NR cell and has been previously registered on EPC as well, UE supporting S1 and N1 and operating in single-registration mode, NWK supporting Single-registration mode with N26 interface }

**ensure that** {

**when** { UE detects a suitable EPC E-UTRA cell after the serving NGC cell becomes not suitable }

**then** { UE performs a Inter-system change from N1 mode to S1 mode by initiating and successfully completing a TAU procedure, mapped EPC context used }

}

9.3.1.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501 [22], subclause 5.1.4.2; TS 24.301 [21], subclause 4.4.2.3. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, subclause 5.1.4.2]

At Inter-system change from N1 mode to S1 mode when there is at least one active PDU session for which interworking with EPS is supported as specified in subclause 6.1.4.1, the UE shall enter sub states EMM-REGISTERED.NORMAL-SERVICE and 5GMM-REGISTERED.NO-CELL-AVAILABLE and initiate a tracking area updating procedure (see 3GPP TS 24.301 [15]).

[TS 24.301, subclause 4.4.2.3]

During Inter-system change from N1 mode to S1 mode in 5GMM-IDLE mode, if the UE is operating in the single-registration mode and:

1) if the tracking area updating procedure is initiated as specified in 3GPP TS 24.501 [54], the UE shall transmit a TRACKING AREA UPDATE REQUEST message integrity protected with the current 5G NAS security context and the UE shall derive a mapped EPS security context (see subclause 8.6.1 of 3GPP TS 33.501 [56]). The UE shall include the eKSI indicating the 5G NAS security context value in the TRACKING AREA UPDATE REQUEST message.

After receiving the TRACKING AREA UPDATE REQUEST message including the eKSI, the MME forwards the TRACKING AREA UPDATE REQUEST message to the source AMF, if possible, to obtain the mapped EPS security context from the AMF as specified in 3GPP TS 33.501 [56]. The MME re-establishes the secure exchange of NAS messages by either:

- replying with a TRACKING AREA UPDATE ACCEPT message that is integrity protected and ciphered using the mapped EPS NAS security context. From this time onward, all NAS messages exchanged between the UE and the MME are sent integrity protected and except for the messages specified in subclause 4.4.5, all NAS messages exchanged between the UE and the MME are sent ciphered; or

9.3.1.1.3 Test description

9.3.1.1.3.1 Pre test conditions

System Simulator:

- 2 cells

- NGC Cell A as defined in TS 38.508-1 [4] Table 6.3.2.2-1. System information combination NR-6 as defined in TS 38.508-1 [4], subclause 4.4.3.1.2.

- E-UTRA Cell A as defined in TS 36.508 [7] Table 6.3.2.2-1. System information combination 31 as defined in TS 36.508 [7], subclause 4.4.3.1.1.

UE:

- None.

Preamble:

- With E-UTRA Cell A "Serving cell" and NGC Cell A "Non-suitable "Off" cell", the UE is brought to state RRC\_IDLE using generic procedure parameters Connectivity (*E**-UTRA/EPC*) and Unrestricted nr PDN (*On*) in accordance with the procedure described in TS 38.508-1 [4], clause 4.5.2. 4G GUTI and eKSI are assigned and security context established

- the UE is switched-off

- With NGC Cell A "Serving cell" and E-UTRA Cell A "Non-suitable "Off" cell", the UE is brought to state 1N-A, RRC\_IDLE Connectivity (NR), in accordance with the procedure described in TS 38.508-1 [4], Table 4.5.2.2-2. 5G-GUTI and ngKSI are assigned and security context established.

9.3.1.1.2 Test procedure sequence

Table 9.3.1.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS configures:  - E-UTRA Cell A as "Serving cell"  - NGC Cell A as "Non-suitable "off" cell". | - | - | - | - |
| 2 | Check: Does the UE perform on the E-UTRA Cell A the TAU procedure for Inter-system change from N1 mode to S1 mode in 5GMM/EMM-IDLE mode as described in TS 38.508-1 [4], Table 4.9.7.2.2-1, 'connected without release'? | - | - | 1 | - |
| 3 | At the end of this test procedure sequence, the UE is in end state E-UTRA connected  (E2\_T3440) according to TS 36.508 [7]. | - | - | - | - |

9.3.1.1.3.3 Specific message contents

None.

#### 9.3.1.2 Inter-system mobility registration update / Single-registration mode with N26 / 5GMM-IDLE / EPC to 5GC

9.3.1.2.1 Test Purpose (TP)

(1)

**with** { UE in state EMM-REGISTERED and EMM-IDLE on an E-UTRA cell and has been previously registered on 5GC, UE supporting S1 and N1 and operating in single-registration mode, NWK supporting Single-registration mode with N26 interface }

**ensure that** {

**when** { UE detects a suitable NGC cell after the serving E-UTRA cell becomes not suitable }

**then** { UE performs a Inter-system change from S1 mode to N1 mode by initiating and successfully completing a mobility and periodic registration update procedure, mapped 5GC context used }

}

9.3.1.2.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501 [22], subclauses 4.4.2.1, 4.4.2.5, 5.1.4.2, 5.5.1.3.2; TS 24.301 [21], subclause 5.5.5. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, subclause 4.4.2.1]

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

...

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

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

[TS 24.501, subclause 4.4.2.5]

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

...

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

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

After receiving the REGISTRATION REQUEST message without integrity protection and encryption:

1) if N26 interface is supported:

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

...

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

[TS 24.501, subclause 5.1.4.2]

At inter-system change from S1 mode to N1 mode, the UE shall enter sub states 5GMM-REGISTERED.NORMAL-SERVICE and EMM-REGISTERED.NO-CELL-AVAILABLE and initiate a registration procedure for mobility and periodic registration update indicating "mobility registration updating" in the 5GS registration type IE of the REGISTRATION REQUEST message (see subclause 5.5.1.3).

[TS 24.501, subclause 5.5.1.3.2]

The UE in state 5GMM-REGISTERED shall initiate the registration procedure for mobility and periodic registration update by sending a REGISTRATION REQUEST message to the AMF,

...

e) upon Inter-system change from S1 mode to N1 mode;

...

If case b) is the only reason for initiating the registration procedure for mobility and periodic registration update, the UE shall indicate "periodic registration updating" in the 5GS registration type IE; otherwise the UE shall indicate "mobility registration updating".

If the UE indicates "mobility registration updating" in the 5GS registration type IE and the UE supports S1 mode, the UE shall:

- set the S1 mode bit to "S1 mode supported" in the 5GMM capability IE of the REGISTRATION REQUEST message;

- include the S1 UE network capability IE in the REGISTRATION REQUEST message; and

- if the UE supports sending an ATTACH REQUEST message containing a PDN CONNECTIVITY REQUEST message with request type set to "handover" to transfer a PDU session from N1 mode to S1 mode, set the HO attach bit to "attach request message containing PDN connectivity request with request type set to handover to transfer PDU session from N1 mode to S1 mode supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

...

If the last visited registered TAI is available, the UE shall include the last visited registered TAI in the REGISTRATION REQUEST message.

The UE shall handle the 5GS mobility identity IE in the REGISTRATION REQUEST message as follows:

a) if the UE is operating in the single-registration mode, performs Inter-system change from S1 mode to N1 mode, and the UE holds a valid 4G-GUTI, the UE shall include the 5G-GUTI mapped from the 4G-GUTI as specified in 3GPP TS 23.003 [4] in the 5GS mobility identity IE. Additionally, if the UE holds a valid 5G‑GUTI, the UE shall include the 5G-GUTI in the Additional GUTI IE in the REGISTRATION REQUEST message in the following order:

1) a valid 5G-GUTI that was previously assigned by the same PLMN with which the UE is performing the registration, if available;

2) a valid 5G-GUTI that was previously assigned by an equivalent PLMN, if available; and

3) a valid 5G-GUTI that was previously assigned by any other PLMN, if available; and

...

If the UE operating in the single-registration mode performs Inter-system change from S1 mode to N1 mode, the UE:

a) shall include the UE status IE with the EMM registration status set to "UE is in EMM-REGISTERED state" in the REGISTRATION REQUEST message;

NOTE 1: Inclusion of the UE status IE with this setting corresponds to the indication that the UE is "moving from EPC" as specified in 3GPP TS 23.502 [9], subclause 4.11.1.3.3 and 4.11.2.3.

b) may include the PDU session status IE in the REGISTRATION REQUEST message indicating the status of the PDU session(s) mapped during the Inter-system change from S1 mode to N1 mode from the PDN connection(s) for which the EPS indicated that interworking to 5GS is supported, if any (see subclause 6.1.4.1); and

c) shall include a TRACKING AREA UPDATE REQUEST message as specified in 3GPP TS 24.301 [15] in the IE in the REGISTRATION REQUEST message.

...

The UE shall send the REGISTRATION REQUEST message including the NAS message container IE as described in subclause 4.4.6:

...

b) when the UE is sending the message after an Inter-system change from S1 mode to N1 mode in 5GMM-IDLE mode and the UE has a valid 5G NAS security context and needs to send non-cleartext IEs.

[TS 24.301, subclause 5.5.5]

The tracking area updating procedure is used to construct a TRACKING AREA UPDATE REQUEST message for the inter-system change from S1 mode to N1 mode for further security verification by the MME.

The TRACKING AREA UPDATE REQUEST message is created by EMM by request of 5GMM which further includes the message in the REGISTRATION REQUEST message as described in 3GPP TS 24.501 [54].

The TRACKING AREA UPDATE REQUEST message shall contain only mandatory information elements.

The UE shall set the EPS update type IE in the TRACKING AREA UPDATE REQUEST message to "TA updating".

If the UE has a current EPS security context, the UE shall include the eKSI (either KSIASME or KSISGSN) in the NAS Key Set Identifier IE in the TRACKING AREA UPDATE REQUEST message. Otherwise, the UE shall set the NAS Key Set Identifier IE to the value "no key is available". If the UE has a current EPS security context, the UE shall integrity protect the TRACKING AREA UPDATE REQUEST message with the current EPS security context and increase the uplink NAS COUNT by one. Otherwise the UE shall not integrity protect the TRACKING AREA UPDATE REQUEST message. The UE shall set associated GUTI in the Old GUTI IE.

When the UE is in EMM-REGISTERED.NO-CELL-AVAILABLE substate and needs to construct the TRACKING AREA UPDATE REQUEST message for inter-system change from S1 mode to N1 mode, the UE shall consider that the tracking area updating procedure is not initiated and the UE shall remain in EMM-REGISTERED.NO-CELL-AVAILABLE state.

9.3.1.2.3 Test description

9.3.1.2.3.1 Pre test conditions

System Simulator:

- 2 cells

- NGC Cell A as defined in TS 38.508-1 [4] Table 6.3.2.2-1. System information combination NR-6 as defined in TS 38.508-1 [4], subclause 4.4.3.1.2.

- E-UTRA Cell A as defined in TS 36.508 [7] Table 6.3.2.2-1. System information combination 31 as defined in TS 36.508 [7], subclause 4.4.3.1.1.

UE:

None.

Preamble:

- With NGC Cell A "Serving cell" and E-UTRA Cell A "Non-suitable "Off" cell", the UE is switched on and when it initiates the initial registration procedure then it is rejected as specified in subclause 4.9.8 Procedure for Registration Reject. This is made to ensure that the UE does not have a valid native 5G NAS security context for the rest of the test case.

- the UE is switched-off.

- With E-UTRA Cell A "Serving cell" and NGC Cell A "Non-suitable "Off" cell", the UE is brought to state RRC\_IDLE using generic procedure parameters Connectivity (*E-UTRA/EPC*) and Unrestricted nr PDN (*On*)in accordance with the procedure described in TS 38.508-1 [4], clause 4.5.2. 4G GUTI and eKSI are assigned and security context established.

9.3.1.2.3.2 Test procedure sequence

Table 9.3.1.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS configures:  - NGC Cell A as "Serving cell"  - E-UTRA Cell A as "Non-suitable "off" cell". | - | - | - | - |
| 2 | Check: Does the UE perform on the NGC Cell A the Test procedure for UE Tracking area updating for Inter-system change from S1 mode to N1 mode in 5GMM/EMM-IDLE mode as described in TS 38.508-1 [4], Table 4.9.9.2.2-1 with the exception that the SS does not initiate the primary authentication and key agreement procedure described in steps 4-5 (NOTE 1), '*connected without release*'? | - | - | 1 | - |
| NOTE 1: This is required to allow for the verification of the UE using mapped 5GC context as per TP1. | | | | | |

9.3.1.2.3.3 Specific message contents

Table 9.3.1.2.3.3-1: REGISTRATION REQUEST (Preamble; TS 38.508-1 [4], Table 4.5.2.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM capability |  |  |  |
| S1 mode (octet 3, bit 1) | '1'B | S1 mode supported |  |
| S1 UE network capability |  |  |  |
| All octets with the exception of octet 9, bit 6 | Not checked |  |  |
| N1 mode supported (N1mode) (octet 9, bit 6) | '1'B | N1 mode supported |  |

Table 9.3.1.2.3.3-2: REGISTRATION REJECT (Preamble; step 8, TS 38.508-1 [4], Table 4.9.8.2.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.9.8.2.3-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | '0000 0011'B | Illegal UE |  |

Table 9.3.1.2.3.3-3: Message ATTACH REQUEST (Preamble; step 4, TS 38.508-1 [4], Table 4.5.2.2-5)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7.2-4 with condition NR | | | |
| Information Element | Value/remark | Comment | Condition |
| NAS key set identifier |  |  |  |
| NAS key set identifier | '111'B | no key is available |  |
| TSC | Any allowed value | TSC does not apply for NAS key set identifier value "111". |  |
| Old GUTI or IMSI | IMSI1 |  |  |
| Last visited registered TAI | Not present |  |  |

Table 9.3.1.2.3.3-4: REGISTRATION REQUEST (step 2, Table 9.3.1.2.3.2-1; step 1, TS 38.508-1 [4] Table 4.9.9.2.2-1)

|  |
| --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-6 with condition NOT NON\_CLEARTEXT\_IE |

Table 9.3.1.2.3.3-5: TRACKING AREA UPDATE REQUEST (9.3.1.2.3.3-4)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.9.9.2.3-2 | | | |
| Information Element | Value/remark | Comment | Condition |
| NAS key set identifier |  |  |  |
| NAS key set identifier | the eKSI for the current EPS security context |  |  |
| TSC | '0'B | native (current) EPS security context |  |

Table 9.3.1.2.3.3-6: SECURITY MODE COMMAND (step 2, Table 9.3.1.2.3.2-1; step 6, TS 38.508-1 [4] Table 4.9.9.2.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-25. | | | |
| Information Element | Value/remark | Comment | Condition |
| ngKSI |  |  |  |
| NAS key set identifier | KSIASME that was created when the UE last registered to EPS |  |  |
| TSC | '1'B | mapped security context (for KSIASME) |  |

#### 9.3.1.3 Inter-system mobility and periodic registration update / Rejected / Single-registration mode with N26 / Handling of EPC relevant parameters

9.3.1.3.1 Test Purpose (TP)

(1)

**with** { UE in state 5GMM-REGISTERED on an NGC cell, UE supporting S1 and N1 and operating in single-registration mode, NWK supporting Single-registration mode with N26 interface }

**ensure that** {

**when** { UE initiates a Mobility and periodic registration procedure on an NGC cell and receives a REGISTRATION REJECT message including 5GMM cause value #9 (UE identity cannot be derived by the network) }

**then** { UE deletes the EPS relevant parameters 4G-GUTI, last visited registered TAI and eKSI and enters the state EMM-DEREGISTERED, and, subsequently, when it finds a suitable E-UTRA cell it moves to it and automatically initiates an attach procedure }

}

9.3.1.3.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501 [22], subclause 5.5.1.3.5, TS 24.301 [21], clause 5.5.3.2.5. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, subclause 5.5.1.3.5]

If the mobility and periodic registration update request cannot be accepted by the network, the AMF shall send a REGISTRATION REJECT message to the UE including an appropriate 5GMM cause value.

The UE shall take the following actions depending on the 5GMM cause value received in the REGISTRATION REJECT message.

...

#9 (UE identity cannot be derived by the network).

...

If the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status, 4G-GUTI, last visited registered TAI, TAI list and eKSI as specified in 3GPP TS 24.301 [15] for the case when the normal tracking area updating procedure is rejected with the EMM cause with the same value.

[TS 24.301, subclause 5.5.3.2.5]

If the tracking area updating cannot be accepted by the network, the MME sends a TRACKING AREA UPDATE REJECT message to the UE including an appropriate EMM cause value.

...

#9 (UE identity cannot be derived by the network);

The UE shall set the EPS update status to EU2 NOT UPDATED (and shall store it according to subclause 5.1.3.3) and shall delete any GUTI, last visited registered TAI, TAI list and eKSI. The UE shall enter the state EMM-DEREGISTERED.

If the rejected request was not for initiating a PDN connection for emergency bearer services, the UE shall subsequently, automatically initiate the attach procedure.

9.3.1.3.3 Test description

9.3.1.3.3.1 Pre test conditions

System Simulator:

- 2 cells

- NGC Cell A as defined in TS 38.508-1 [4] Table 6.3.2.2-1. System information combination NR-6 as defined in TS 38.508-1 [4], subclause 4.4.3.1.2.

- E-UTRA Cell A as defined in TS 36.508 [7] Table 6.3.2.2-1. System information combination 31 as defined in TS 36.508 [7], subclause 4.4.3.1.1.

UE:

None.

Preamble:

- With E-UTRA Cell A "Serving cell" and NGC Cell A "Non-suitable "Off" cell", the UE is brought to state RRC\_IDLE using generic procedure parameters Connectivity (*E-UTRA/EPC*) and Unrestricted nr PDN (*On*) in accordance with the procedure described in TS 38.508-1 [4], clause 4.5.2. 4G GUTI and eKSI are assigned and security context established.

- the UE is switched-off

- With NGC Cell A "Serving cell" and E-UTRA Cell A "Non-suitable "Off" cell", the UE is brought to state 1N-A, RRC\_IDLE Connectivity (NR), in accordance with the procedure described in TS 38.508-1 [4], Table 4.5.2.2-2. 5G-GUTI and ngKSI are assigned and security context established.

9.3.1.3.3.2 Test procedure sequence

Table 9.3.1.3.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Wait for 25 seconds (expiry of T3512 periodic registration update timer, the value of 30 sec is provided during the initial registration in the Preamble). | - | - | - | - |
| 2 | The UE transmits a REGISTRATION REQUEST message with the 5GS registration type IE indicating "periodic registration updating". | --> | REGISTRATION REQUEST | - | - |
| 3 | The SS configures:  - E-UTRA Cell A "Suitable neighbour inter-frequency cell". | - | - | - | - |
| 4 | The SS transmits a REGISTRATION REJECT message including 5GMM cause value #9 (UE identity cannot be derived by the network). | <-- | REGISTRATION REJECT | - | - |
| 4A | The SS configures:  - NGC Cell A as "Non-Suitable "Off" cell". | - | - | - | - |
| 5 | Check: Does the UE perform on the E-UTRA Cell A an attach procedure as described in TS 38.508-1 [4], Table 4.5.2.2-1? The UE does not provide 4G-GUTI or 4G eKSI; nor last visited registered TAI. | - | - | 1 | - |

9.3.1.3.3.3 Specific message contents

Table 9.3.1.3.3.3-1: REGISTRATION ACCEPT (Preamble; TS 38.508-1 [4] Table 4.5.2.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7. | | | |
| Information Element | Value/remark | Comment | Condition |
| T3512 value |  |  |  |
| Unit | '100'B | value is incremented in multiples of 30 seconds |  |
| Timer value | '0 0001'B | 30 seconds |  |

Table 9.3.1.3.3.3-2: REGISTRATION REQUEST (step 2, Table 9.3.1.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-6. | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type | '011'B | periodic registration updating |  |
| ngKSI | Active ngKSI assigned in the Preamble |  |  |
| 5GS mobile identity | Active 5G-GUTI assigned in the Preamble |  |  |
| Last visited registered TAI | The TAI of the NGC Cell A, see TS 38.508-1 [4] Table 6.3.2.2-1 |  |  |

Table 9.3.1.3.3.3-3: REGISTRATION REJECT (step 4, Table 9.3.1.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-9. | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | '0000 1001'B | #9 - UE identity cannot be derived by the network |  |

Table 9.3.1.3.3.3-4: ATTACH REQUEST (step 5, Table 9.3.1.3.3.2-1; step 5, TS 38.508-1 [4] Table 4.5.2.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7.2-4. | | | |
| Information Element | Value/remark | Comment | Condition |
| NAS key set identifier | '111'B | no key is available |  |
| EPS mobile identity | IMSI |  |  |
| Old P-TMSI signature | Not present |  |  |
| Last visited registered TAI | Not present |  |  |
| Old location area identification | Not checked |  |  |
| Old GUTI type | Not present |  |  |

#### 9.3.1.4 NSAC / interworking with EPC

9.3.1.4.1 Test Purpose (TP)

(1)

**with** { UE stores one or more rejected S-NSSAIs for the maximum number of UEs reached and T3526 is running }

**ensure that** {

**when** { UE selects an E-UTRA cell connected to EPC }

**then** { UE shall not remove the rejected S-NSSAIs for the maximum number of UEs reached }

}

(2)

**with** { UE stores one rejected S-NSSAI for the current PLMN }

**ensure that** {

**when** { UE receives ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message provided with S-NSSAI and the PLMN ID in E-UTRA cell connected to EPC }

**then** { UE removes the S-NSSAI from the rejected NSSAI list and sends an ACTIVATE DEFAULT EPS BEARER CONTEXT ACCEPT message }

}

9.3.1.4.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501 [22], subclauses 4.6.1 and 4.6.2.2. Unless otherwise stated these are Rel-17 requirements.

[TS 24.501, subclause 4.6.1]

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

a) configured NSSAI;

b) requested NSSAI;

c) allowed NSSAI;

d) subscribed S-NSSAIs; and

e) pending NSSAI.

The following NSSAIs are defined in the present document:

a) rejected NSSAI for the current PLMN or SNPN;

b) rejected NSSAI for the current registration area;

c) rejected NSSAI for the failed or revoked NSSAA; and

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

…

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

[TS 24.501, subclause 4.6.2.2]

If available, the configured NSSAI(s) shall be stored in a non-volatile memory in the ME as specified in annex C. For a configured NSSAI, if there is associated NSSRG information, the NSSRG information shall also be stored in a non-volatile memory in the ME as specified in annex C. The support for NSSRG information by a UE or an AMF is optional.

The allowed NSSAI(s) should be stored in a non-volatile memory in the ME as specified in annex C.

Each of the configured NSSAI stored in the UE is a set composed of at most 16 S-NSSAIs. Each of the allowed NSSAI stored in the UE is a set composed of at most 8 S-NSSAIs and is associated with a PLMN identity or SNPN identity, an access type and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription. Each of the configured NSSAI except the default configured NSSAI, and the rejected NSSAI is associated with a PLMN identity or SNPN identity and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription. Each of the pending NSSAI stored in the UE is a set composed of at most 16 S-NSSAIs and is associated with a PLMN identity or SNPN identity and, if the UE supports access to an SNPN using credentials from a credentials holder, the selected entry of the "list of subscriber data" or the selected PLMN subscription. The S-NSSAI(s) in the rejected NSSAI for the current registration area are further associated with one or more tracking areas where the rejected S-NSSAI(s) is not available. The S-NSSAI(s) in the rejected NSSAI for the current PLMN or SNPN shall be considered rejected for the current PLMN or SNPN regardless of the access type. The S-NSSAI(s) in the rejected NSSAI for the failed or revoked NSSAA shall be considered rejected for the current PLMN regardless of the access type. The S-NSSAI(s) in the rejected NSSAI for the maximum number of UEs reached are further associated with the access type over which the rejected NSSAI was received. There shall be no duplicated PLMN identities or SNPN identities associated with each of the list of configured NSSAI(s), pending NSSAI(s), rejected NSSAI(s) for the current PLMN or SNPN, rejected NSSAI(s) for the current registration area, rejected NSSAI(s) for the failed or revoked NSSAA, and rejected NSSAI for the maximum number of UEs reached.

The UE stores NSSAIs as follows:

…

c) When the UE receives the S-NSSAI(s) included in the rejected NSSAI in the REGISTRATION ACCEPT message, the REGISTRATION REJECT message, the DEREGISTRATION REQUEST message or in the CONFIGURATION UPDATE COMMAND message, the UE shall:

1) store the S-NSSAI(s) into the rejected NSSAI and the mapped S-NSSAI(s) for the rejected NSSAI based on the associated rejection cause(s);

...

When the UE receive ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message provided with S-NSSAI and the PLMN ID in the protocol configuration options IE or extended protocol configuration options IE (see subclause 6.2.2 of 3GPP TS 24.301 [15]), the UE shall remove the S-NSSAI from the rejected NSSAI for the current PLMN. When the UE receive ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message provided with S-NSSAI and the PLMN ID in the protocol configuration options IE or extended protocol configuration options IE (see subclause 6.2.2 of 3GPP TS 24.301 [15]), the UE may remove the S-NSSAI from the rejected NSSAI for the maximum number of UEs reached for each and every access type, if any, and stop the timer T3526 associated with the S-NSSAI if running.

When the UE:

1) deregisters over an access type;

2) successfully registers in a new registration area over an access type;

3) enters state 5GMM-DEREGISTERED or 5GMM-REGISTERED following an unsuccessful registration in a new registration area over an access type; or

4) performs inter-system change from N1 mode to S1 mode and the UE successfully completes tracking area update procedure;

the rejected NSSAI for the current registration area corresponding to the access type shall be deleted;

…

9.3.1.4.3 Test description

9.3.1.4.3.1 Pre test conditions

System Simulator:

- 2 cells

- NGC Cell A as defined in TS 38.508-1 [4] Table 6.3.2.2-1. System information combination NR-6 as defined in TS 38.508-1 [4], subclause 4.4.3.1.2.

- E-UTRA Cell A as defined in TS 36.508 [7] Table 6.3.2.2-1. System information combination 31 as defined in TS 36.508 [7], subclause 4.4.3.1.1.

- The SS configures the NGC Cell A as the "Serving cell" and E-UTRA Cell A as "Non-suitable "Off" cell".

UE:

- UE is previously registered on NGC Cell A using default message contents according to TS 38.508-1 [4];

Preamble:

- The UE is in state Switched OFF (state 0N-B) according to TS 38.508-1 [4].

9.3.1.4.3.2 Test procedure sequence

Table 9.3.1.4.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2 | The UE transmits a REGISTRATION REQUEST message including ER-NSSAI bit | --> | REGISTRATION REQUEST | - | - |
| 3-11 | Steps 5 to 13 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 [4] subclause 4.5.2.2-2 are performed. | - | - | - | - |
| 12 | The SS transmits a REGISTRATION ACCEPT message including S-NSSAI=1 with cause value “S-NSSAI not available due to maximum number of UEs reached” and S-NSSAI=2 with cause value “S-NSSAI not available in the current PLMN or SNPN” in extended rejected NSSAI without back-off timer.  Note: Now UE should start timer T3526 associated with S-NSSAI=1. | <-- | REGISTRATION ACCEPT | - | - |
| 13 | The UE transmits an *ULInformationTransfer* message and a REGISTRATION COMPLETE message. | --> | REGISTRATION COMPLETE | - | - |
| 14a1-15 | Steps 19a1 to 20a1 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 [4] subclause 4.5.2.2-2 are performed. | - | - | - | - |
| 16 | The SS configures:  - NGC Cell A as "Non-Suitable "Off" cell".  - E-UTRA Cell A as "Serving cell". | - | - | - | - |
| 17 | Generic test procedure in TS 38.508-1 [4] Table 4.9.7.2.2-1 take place and UE is camped on E-UTRA Cell A. | - | - | - | - |
| 18 | Void | - | - | - | - |
| 19 | Void | - | - | - | - |
| 20 | Check: Are S-NSSAI=1 and S-NSSAI=2 in the Rejected NSSAI list PLMN using AT/MMI command (+C5GNSSAIRDP)? | - | - | 1 | P |
| 21-24 | Void | - | - | - | - |
| 25 | Cause the UE to request establishment of additional PDN connectivity. | - | - | - | - |
| 25A-25E | Steps 3 to 7 of the generic procedure specified in TS 36.508 [7], table 4.5.3.3-1 take place. | - | - | - | - |
| 26 | The UE transmits a PDN CONNECTIVITY REQUEST message to request an additional PDN. | --> | RRC: *ULInformationTransfer*  NAS: PDN CONNECTIVITY REQUEST | - | - |
| 27 | The SS transmits an *RRCConnectionReconfiguration* message including the ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message to establish the default EPS bearer context. | <-- | RRC: *RRCConnectionReconfiguration*  NAS: ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST | - | - |
| 28 | The UE transmits an *RRCConnectionReconfigurationComplete* message. | --> | RRC: *RRCConnectionReconfigurationComplete* | - | - |
| 29 | Check: Does the UE transmit an *ULInformationTransfer* message including the ACTIVATE DEFAULT EPS BEARER CONTEXT ACCEPT message? | --> | RRC: *ULInformationTransfer*  NAS: ACTIVATE DEFAULT EPS BEARER CONTEXT ACCEPT | 2 | P |
| 30 | The SS transmits an *RRCConnectionRelease* message. | <-- | RRC: *RRCConnectionRelease* | - | - |
| 31-32 | Void | - | - | - | - |
| 33 | Check: Are S-NSSAI=2 in the Rejected NSSAI list using AT/MMI command (+C5GNSSAIRDP)? | - | - | 2 | F |

9.3.1.4.3.3 Specific message contents

Table 9.3.1.4.3.3-1: REGISTRATION REQUEST (step 2, Table 9.3.1.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-6 with CIPHERED\_MESSAGE | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘001’B | Initial registration |  |
| 5GMM capability |  |  |  |
| ER-NSSAI | ‘1’B | Extended rejected NSSAI supported |  |

Table 9.3.1.4.3.3-2: REGISTRATION ACCEPT (step 12, Table 9.3.1.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result |  |  |  |
| 5GS registration result value | '0001'B | 3GPP access |  |
| Allowed NSSAI |  |  |  |
| Length of NSSAI contents | '0000 0010'B | 1 entry |  |
| S-NSSAI |  | S-NSSAI value 3 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000011’B | SST value 3 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Configured NSSAI |  |  |  |
| Length of NSSAI contents | '0000 0010'B | 2 entries |  |
| S-NSSAI |  | S-NSSAI value 1 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| S-NSSAI IEI |  | S-NSSAI value 2 |  |
| Length of S-NSSAI contents | ‘00000001’B | SST |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped configured SST | Not Present |  |  |
| Mapped configured SD | Not Present |  |  |
| Extended rejected NSSAI |  |  |  |
| Length of Extended rejected NSSAI contents | ‘00000101’B | 1 entry |  |
| Partial extended rejected NSSAI list |  | entry 1 |  |
| Type of list | ‘000’B | S-NSSAIs without back-off timer |  |
| Number of elements | ‘0001’B | 2 elements |  |
| Rejected S-NSSAI 1 |  | S-NSSAI value 1 |  |
| Length of rejected S-NSSAI | ‘0001’B | SST |  |
| Cause value | ‘0011’B | S-NSSAI not available due to maximum number of UEs reached |  |
| SST | ‘00000001’B | SST value 1 |  |
| SD | Not Present |  |  |
| Mapped HPLMN SST | Not present |  |  |
| Mapped HPLMN SD | Not present |  |  |
| Rejected S-NSSAI 2 |  | S-NSSAI value 2 |  |
| Length of rejected S-NSSAI | ‘0001’B | SST |  |
| Cause value | ‘0000’B | S-NSSAI not available in the current PLMN or SNPN |  |
| SST | ‘00000010’B | SST value 2 |  |
| SD | Not Present |  |  |
| Mapped HPLMN SST | Not present |  |  |
| Mapped HPLMN SD | Not present |  |  |

Table 9.3.1.4.3.3-3: ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST (step 27, Table 9.3.1.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7.3-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol discriminator | ESM |  |  |
| Protocol configuration options |  |  |  |
| Container ID n | 001BH | S-NSSAI |  |
| Length of container ID n contents | Any allowed value |  |  |
| Container ID n contents | SNSSAI=2 and PLMN ID of NGC Cell A |  |  |

#### 9.3.1.5

#### 9.3.1.6 Inter-system mobility registration update / Single registration mode with N26 interface / No E-UTRA Disabling In 5GS / tracking area updating attempt counter is equal to 5 / Success

9.3.1.6.1 Test Purpose (TP)

(1)

**with** { UE supporting both S1 mode and N1 mode and is switched on without NG-RAN coverage but with good E-UTRA coverage }

**ensure that** {

**when** { UE moves to a poor LTE coverage and performs TAU, E-UTRA capability was disabled due to the tracking area updating attempt counter is equal to 5 and then UE moves back to a good coverage with NR network }

**then** { UE enables the E-UTRA capability }

}

9.3.1.6.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.301, clauses 4.5 and 5.5.1.3.6, TS 23.502, clause 4.13.6.1 and TS 38.331, clause 5.3.8.3. Unless otherwise stated these are Rel-17 requirements.

[TS 24.301, clause 4.5]

The UE shall only disable the E-UTRA capability when in EMM-IDLE mode.

When the UE supports both N1 mode and S1 mode then the UE's capability to access the 5GCN via E-UTRA shall not be affected, if the UE's E-UTRA capability is disabled or enabled.

When the UE is disabling the E-UTRA capability not due to redirection to 5GCN required, it should proceed as follows:

a) select another RAT (GERAN, UTRAN, or NG-RAN if the UE has not disabled its N1 mode capability for 3GPP access as specified in 3GPP TS 24.501 [54]) of the registered PLMN or a PLMN from the list of equivalent PLMNs;

b) if another RAT of the registered PLMN or a PLMN from the list of equivalent PLMNs cannot be found, or the UE does not have a registered PLMN, then perform PLMN selection as specified in 3GPP TS 23.122 [6]. As an implementation option, instead of performing PLMN selection, the UE may select another RAT of the chosen PLMN. If disabling of E-UTRA capability was not due to UE initiated detach procedure for EPS services only, the UE may re-enable the E-UTRA capability for this PLMN selection; or

c) if no other allowed PLMN and RAT combinations are available, then the UE may re-enable the E-UTRA capability and remain registered for EPS services in E-UTRAN of the registered PLMN. If the UE chooses this option, then it may periodically attempt to select another PLMN and RAT combination that can provide non-EPS services. How this periodic scanning is done, is UE implementation dependent.

…

As an implementation option, the UE may start a timer for enabling E-UTRA when the UE's attach attempt counter or tracking area updating attempt counter reaches 5 and the UE disables E-UTRA capability for cases described in clauses 5.5.1.2.6, 5.5.1.3.4.3, 5.5.1.3.6, 5.5.3.2.6, 5.5.3.3.4.3 and 5.5.3.3.6. The UE should memorize the identity of the PLMNs where E-UTRA capability were disabled. On expiry of this timer:

- if the UE is in Iu mode or A/Gb mode and is in idle mode as specified in 3GPP TS 24.008 [13] on expiry of the timer, the UE should enable the E-UTRA capability;

- if the UE is in Iu mode or A/Gb mode and an RR connection exists, the UE shall delay enabling E-UTRA capability until the RR connection is released;

- if the UE is in Iu mode and a PS signalling connection exists but no RR connection exists, the UE may abort the PS signalling connection before enabling E-UTRA capability;

- if the UE is in N1 mode and is in 5GMM-IDLE mode as specified in 3GPP TS 24.501 [54], on expiry of the timer, the UE should enable the E-UTRA capability; and

- if the UE is in N1 mode and is in 5GMM-CONNECTED mode as specified in 3GPP TS 24.501 [54], on expiry of the timer, the UE shall delay enabling the E-UTRA capability until the N1 NAS signalling connection is released.

If the UE attempts to establish an emergency bearer service or to access RLOS in a PLMN where the E-UTRA capability was disabled due to the UE's attach attempt counter or tracking area updating attempt counter have reached 5, the UE may enable the E-UTRA capability for that PLMN memorized by the UE.

The UE may support being configured for No E-UTRA Disabling In 5GS (see 3GPP TS 24.368 [50] or 3GPP TS 31.102 [17]). If the UE supports being configured for No E-UTRA Disabling in 5GS, No E-UTRA Disabling In 5GS is enabled if the corresponding configuration parameter is present and set to enabled. Otherwise, No E-UTRA Disabling In 5GS is disabled. If No E-UTRA Disabling In 5GS is enabled at the UE and the UE selects an NG-RAN cell in a PLMN where the E-UTRA capability was disabled due to the UE's attach attempt counter or tracking area updating attempt counter having reached 5, the UE shall enable the E-UTRA capability for that PLMN.

For other cases, it is up to the UE implementation when to enable the E-UTRA capability.

NOTE: If the UE is not operating in CS/PS mode 1 operation, the value of the timer for enabling E-UTRA capability is recommended to be not larger than the default value of T3402.

[TS 24.301, clause 5.5.1.3.6]

The UE shall proceed as follows:

…

2) if the combined attach was successful for EPS services only and the ATTACH ACCEPT message contained an EMM cause value not treated in clause 5.5.1.3.4.3 or the EMM cause IE is not included in the message, the UE shall proceed as follows:

a) The UE shall stop timer T3410 if still running, and shall enter state MM IDLE. The tracking area updating attempt counter shall be incremented, unless it was already set to 5;

b) If the tracking area updating attempt counter is less than 5:

- the UE shall start timer T3411, shall set the EPS update status to EU1 UPDATED and shall enter state EMM-REGISTERED.ATTEMPTING-TO-UPDATE-MM. When timer T3411 expires the combined tracking area updating procedure indicating "combined TA/LA updating with IMSI attach" is triggered;

c) If the tracking area updating attempt counter is equal to 5:

- a UE operating in CS/PS mode 2 of operation and a UE operating in CS/PS mode 1 of operation with "IMS voice available" shall start timer T3402 if the value of the timer as indicated by the network is not zero, shall set the EPS update status to EU1 UPDATED and shall enter state EMM-REGISTERED.ATTEMPTING-TO-UPDATE-MM.

- If the value of T3402 as indicated by the network is zero, the UE shall perform the actions defined for the expiry of the timer T3402.

- When timer T3402 expires the combined tracking area updating procedure indicating "combined TA/LA updating with IMSI attach" is triggered; and

- a UE operating in CS/PS mode 1 of operation with "IMS voice not available" shall attempt to select GERAN, UTRAN or NG-RAN radio access technology and proceed with appropriate MM, GMM or 5GMM specific procedures. If the UE selects GERAN or UTRAN radio access technology, the UE may disable the E-UTRA capability (see clause 4.5). If No E-UTRA Disabling In 5GS is enabled at the UE (see 3GPP TS 24.368 [50] or 3GPP TS 31.102 [17]) and the UE selects NG-RAN radio access technology, it shall not disable the E-UTRA capability; otherwise, the UE may disable the E-UTRA capability as specified in clause 4.5; and

NOTE 2: Whether the UE requests RRC to treat the active E-UTRA cell as barred (see 3GPP TS 36.304 [21]) is left to the UE implementation.

d) If there is a CS fallback emergency call pending or CS fallback call pending, the UE shall attempt to select GERAN or UTRAN radio access technology. If the UE finds a suitable GERAN or UTRAN cell, it then proceeds with the appropriate MM and CC specific procedures; otherwise the EMM sublayer shall indicate the abort of the EMM procedure to the MM sublayer; and

3) otherwise, the abnormal cases specified in clause 5.5.1.2.6 apply with the following modification.

If the attach attempt counter is incremented according to clause 5.5.1.2.6 the next actions depend on the value of the attach attempt counter:

- if the attach attempt counter is less than 5, the UE shall set the update status to U2 NOT UPDATED but shall not delete any LAI, TMSI, ciphering key sequence number and list of equivalent PLMNs; or

- if the attach attempt counter is equal to 5, then the UE shall delete any LAI, TMSI, ciphering key sequence number and list of equivalent PLMNs and set the update status to U2 NOT UPDATED.

- The UE shall attempt to select GERAN, UTRAN or NG-RAN radio access technology and proceed with appropriate MM, GMM or 5GMM specific procedures. Additionally, if the UE selects GERAN or UTRAN radio access technology, the UE may disable the E-UTRA capability as specified in clause 4.5. If No E-UTRA Disabling In 5GS is enabled at the UE (see 3GPP TS 24.368 [50] or 3GPP TS 31.102 [17]) and the UE selects NG-RAN radio access technology, it shall not disable the E-UTRA capability; otherwise, the UE may disable the E-UTRA capability as specified in clause 4.5.

NOTE 3: Whether the UE requests RRC to treat the active E-UTRA cell as barred (see 3GPP TS 36.304 [21]) is left to the UE implementation.

If there is a CS fallback emergency call pending or CS fallback call pending, the UE shall attempt to select GERAN or UTRAN radio access technology. If the UE finds a suitable GERAN or UTRAN cell, it then proceeds with the appropriate MM and CC specific procedures; otherwise the EMM sublayer shall indicate the abort of the EMM procedure to the MM sublayer.

9.3.1.6.3 Test description

9.3.1.6.3.1 Pre-test conditions

System Simulator:

- NR Cell 1 is configured according to TS 38.508-1 [4] Table 4.4.2-3 and is connected to 5GC.

- E-UTRA Cell 1 (belongs to TAI-1) is configured to TS 36.508 [7] Table 4.4.2-2 and is connected to EPC.

- E-UTRA Cell 11 (belongs to TAI-2) is configured to TS 36.508 [7] Table 4.4.2-2 and is connected to EPC.

- System information for the NR Cell 1 in accordance with combination NR-6 in TS 38.508-1 [4] sub-clause 4.4.3.1.2, and, for the E-UTRA Cell 1 and E-UTRA Cell 11 in accordance with system information combination 31 as defined in TS 36.508 [7], subclause 4.4.3.1.1.

- N26 interface is configured.

- Power levels are constant and as defined in Tables 9.3.1.6.3.1-1/2.

Table 9.3.1.6.3.1-1: Time instances of cell power level and parameter changes for conducted test environment

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Parameter name | Unit | NR Cell 1 | E-UTRA Cell 1 | E-UTRA Cell 11 | Remark |
| T0 | SS/PBCH SSS EPRE | dBm/SCS | “Off” |  |  |  |
| RS EPRE | dBm/15kHz |  | “Off” | -100 |
| T1 | SS/PBCH SSS EPRE | dBm/SCS | -88 |  |  |
| RS EPRE | dBm/15kHz |  | “Off” | “Off” |

Table 9.3.1.6.3.1-2: Time instances of cell power level and parameter changes for OTA test environment

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Parameter name | Unit | NR Cell 1 | E-UTRA Cell 1 | E-UTRA Cell 11 | Remark |
| T0 | SS/PBCH SSS EPRE | dBm/SCS | “Off” |  |  |  |
| RS EPRE | dBm/15kHz |  | “Off” | -100 |
| T1 | SS/PBCH SSS EPRE | dBm/SCS | -82 |  |  |
| RS EPRE | dBm/15kHz |  | “Off” | “Off” |

UE:

- The UE is configured to use preconditions.

- The UE is configured with a value of No E-UTRA Disabling In 5GS set to 1.

Preamble:

- With E-UTRA Cell 1 "Non-suitable "Off" cell" and NR Cell 1 "Serving cell" in accordance with TS 38.508-1 [4], Table 6.2.2.1-3, the UE is brought to state 1N-A, RRC\_IDLE Connectivity (NR), in accordance with the procedure described in TS 38.508-1 [4], Table 4.5.2.2-2. 5G-GUTI and ngKSI are assigned and security context established.

- The UE is switched-off

- The UE is switched-on

- With E-UTRA Cell 1 "Serving cell" and NR Cell 1 "Non-suitable "Off" cell" in accordance with TS 38.508-1 [4], Table 6.2.2.1-3, the UE is brought to state RRC\_IDLE using generic procedure parameters Connectivity (E-UTRA/EPC) and Unrestricted nr PDN (On) in accordance with the procedure described in TS 38.508-1 [4], clause 4.5.2.2-1, 4G GUTI and eKSI are assigned and security context established.

9.3.1.6.3.2 Test procedure sequence

Table 9.3.1.6.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **St** | **Procedure** | **Message Sequence** | | **TP** | **Verdict** |
|  |  | **U - S** | **Message** |  |  |
| 1 | Set the power levels according to “T0” as per Table 9.3.1.6.3.1-1/2. | - | - | - | - |
| - | The following messages are to be observed on E-UTRA Cell 11 unless explicitly stated otherwise. | - | - | - | - |
| - | EXCEPTION: The steps 3 and 4 below are repeated for 4 times. | - | - | - | - |
| 3 | The UE transmits a TRACKING AREA UPDATE REQUEST message | --> | TRACKING AREA UPDATE REQUEST | - | - |
| 4 | The SS waits 25 seconds (15 seconds T3430 and 10 seconds T3411). | - | - | - | - |
| 5 | The UE transmits a TRACKING AREA UPDATE REQUEST. (tracking area updating attempt counter = 5) | --> | TRACKING AREA UPDATE REQUEST | - | - |
| 6 | The SS releases the RRC connection. | - | - | - | - |
| 7 | Set the power levels according to “T1” as per Table 9.3.1.6.3.1-1/2. | - | - | - | - |
| - | The following messages are to be observed on NR Cell 1 unless explicitly stated otherwise. | - | - | - | - |
| 8-9 | Steps 2-3 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 10 | Check: Does the UE transmit a REGISTRATION REQUEST message with E-UTRA Capability enabled? | --> | REGISTRATION  REQUEST | 1 | P |
| 11-25a1 | Steps 5 to 19a1 of the generic procedure for NR RRC\_IDLE specified in TS 38.508-1 [4] subclause 4.5.2.2-2 are performed. | - | - | - | - |

9.3.1.6.3.3 Specific message contents

Table 9.3.1.6.3.3-1: REGISTRATION REQUEST (step 10, Table 9.3.1.6.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘001’B | Initial registration |  |
| 5GMM capability |  |  |  |
| S1 mode | ‘1’B | S1 mode  supported |  |

## 9.4 Non-Terrestrial Network

### 9.4.1 5GS mobility management for Non-Terrestrial Network

#### 9.4.1.1 NTN / GNSS position reporting / reject cause #78 "PLMN not allowed to operate at the present UE location"

9.4.1.1.1 Test Purpose (TP)

(1)

**with** { UE has sent an REGISTRATION REQUEST message }

**ensure that** {

**when** { UE receives an REGISTRATION REJECT message with the reject cause #78 set to "PLMN not allowed to operate at the present UE location" }

**then** { UE sets the 5GS update status to 5U3 ROAMING NOT ALLOWED, UE deletes the 5G-GUTI, last visited registered TAI, TAI list and ngKSI, UE resets the registration attempt counter, UE enters the state 5GMM-DEREGISTERED.PLMN-SEARCH and perform a PLMN selection }

}

9.4.1.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 23.122 clause 3.1, TS 24.501 clauses 4.23.2 and TS5.5.1.2.5. Unless otherwise stated these are Rel-17 requirements.

[TS 23.122 clause 3.1]

…

To prevent repeated attempts to obtain service on a PLMN through satellite NG-RAN or satellite E-UTRAN access technology, when the MS receives an integrity protected reject message with cause value #78 "PLMNs not allowed to operate at the present UE location" from a satellite NG-RAN cell or a satellite E-UTRAN cell, the MS maintains a list of "PLMNs not allowed to operate at the present UE location" in which it stores the PLMN ID of the rejecting PLMN, the current geographical location, if known by the MS. A timer is started when the PLMN ID of the rejecting PLMN is added to the list of "PLMNs not allowed to operate at the present UE location". If the geographical location exists, a MS implementation specific distance value needs to be stored. An entry in the list is deleted if the timer associated to the entry expires or the MS successfully registers to the PLMN stored in the entry. An entry in the list may be deleted if the current UE location is known, a geographical location is stored for the entry of this PLMN, and the distance to the current UE location is larger than a UE implementation specific value. For details see 3GPP TS 24.501 [64] and 3GPP TS 24.301 [23A].

NOTE 1: The list of "PLMNs not allowed to operate at the present UE location" is provided to the AS, see 3GPP TS 38.304 [61].

In automatic PLMN selection mode, if the MS detects a PLMN in satellite NG-RAN access technology which is part of the list of "PLMNs not allowed to operate at the present UE location" the MS shall consider the PLMN as PLMN selection candidate for satellite NG-RAN access technology only if the current MS location is known, a geographical location is stored for the entry of this PLMN, and the distance to the current MS location is larger than a MS implementation specific value.

…

[TS 24.501, clause 4.23.2]

For 3GPP satellite NG-RAN the UE shall store a list of "PLMNs not allowed to operate at the present UE location". Each entry consists of:

a) the PLMN identity of the PLMN which sent a message including 5GMM cause value #78 "PLMN not allowed to operate at the present UE location" via satellite NG-RAN access technology; and

b) the geographical location, if known by the UE, where 5GMM cause value #78 was received on satellite NG-RAN access technology; and

c) if the geographical location exists, a UE implementation specific distance value.

Before storing a new entry in the list, the UE shall delete any existing entry with the same PLMN identity. Upon storing a new entry, the UE starts a timer instance associated with the entry with an implementation specific value that shall not be set to a value smaller than the timer value indicated by the network in the Lower bound timer value IE, if any. If the Lower bound timer value IE was not provided by the network, the value of the timer shall be set based on the UE implementation.

The UE is allowed to attempt to access a PLMN via satellite NG-RAN access technology which is part of the list of "PLMNs not allowed to operate at the present UE location" only if:

a) the current UE location is known, a geographical location is stored for the entry of this PLMN, and the distance to the current UE location is larger than a UE implementation specific value.

b) the timer associated with the entry of this PLMN has expired; or

c) the access is for emergency services (see 3GPP TS 23.122 [5] for further details).

NOTE: When the UE is accessing network for emergency services, it is up to operator and regulatory policies whether the network needs to determine if the UE is in a location where network is not allowed to operate.

The list shall accommodate three or more entries. The maximum number of entries is an implementation decision. When the list is full and a new entry has to be inserted, the oldest entry shall be deleted.

Each entry shall be removed if for the entry:

a) the UE successfully registers via satellite NG-RAN access technology to the PLMN stored in the entry except when the UE registers for emergency services; or

b) the timer instance associated with the entry expires.

The UE may delete the entry in the list, if the current UE location is known, a geographical location is stored for the entry of this PLMN, and the distance to the current UE location is larger than a UE implementation specific value.

If the UE is in 5GMM-DEREGISTERED.LIMITED-SERVICE state and an entry from the list of "PLMNs not allowed to operate at the present UE location" is removed, the UE shall perform PLMN selection according to 3GPP TS 23.122 [5].

When the UE is switched off, the UE shall keep the list of "PLMNs not allowed to operate at the present UE location" in its non-volatile memory. The UE shall delete the list of "PLMNs not allowed to operate at the present UE location" if the USIM is removed.

If the UE is switched off when the timer instance associated with the entry in the list is running, the UE shall behave as follows when the UE is switched on and the USIM in the UE remains the same:

let t1 be the time remaining for timer instance associated with the entry in the list to timeout at switch off and let t be the time elapsed between switch off and switch on. If t1 is greater than t, then the timer shall be restarted with the value t1 – t. If t1 is equal to or less than t, then the timer need not be restarted and considered expired. If the UE is not capable of determining t, then the UE shall restart the timer with the value t1.

[TS 24.501, clause 5.5.1.2.5]

If the initial registration request cannot be accepted by the network, the AMF shall send a REGISTRATION REJECT message to the UE including an appropriate 5GMM cause value.

…

If the REGISTRATION REJECT message with 5GMM cause #76 or #78 was received without integrity protection, then the UE shall discard the message. If the REGISTRATION REJECT message with 5GMM cause #62 was received without integrity protected, the behaviour of the UE is specified in subclause 5.3.20.2.

Based on operator policy, if the initial registration request is rejected due to core network redirection for CIoT optimizations, the network shall set the 5GMM cause value to #31 "Redirection to EPC required".

NOTE 1: The network can take into account the UE's S1 mode capability, the EPS CIoT network behaviour supported by the UE or the EPS CIoT network behaviour supported by the EPC to determine the rejection with the 5GMM cause value #31 "Redirection to EPC required".

…

If the UE's initial registration request is via a satellite NG-RAN cell and the network using the User Location Information provided by the NG-RAN, see 3GPP TS 38.413 [31], is able to determine that the UE is in a location where the network is not allowed to operate, the network shall set the 5GMM cause value in the REGISTRATION REJECT message to #78 "PLMN not allowed to operate at the present UE location".

NOTE 5: When the UE is accessing network for emergency services, it is up to operator and regulatory policies whether the network needs to determine if the UE is in a location where network is not allowed to operate.

…

If the AMF received multiple TAIs from the satellite NG-RAN as described in 3GPP TS 23.501 [8], and determines that, by UE subscription and operator's preferences, all of the received TAIs are forbidden for roaming or for regional provision of service, the AMF shall include the TAI(s) in:

a) the Forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" IE; or

b) the Forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service" IE; or

c) both;

in the REGISTRATION REJECT message.

Regardless of the 5GMM cause value received in the REGISTRATION REJECT message via satellite NG-RAN,

- if the UE receives the Forbidden TAI(s) for the list of "5GS forbidden tracking areas for roaming" IE in the REGISTRATION REJECT message and if the TAI(s) included in the IE is not part of the list of "5GS forbidden tracking areas for roaming", the UE shall store the TAI(s) included in the IE, if not already stored, into the list of "5GS forbidden tracking areas for roaming"; and

- if the UE receives the Forbidden TAI(s) for the list of "5GS forbidden tracking areas for regional provision of service" IE in the REGISTRATION REJECT message and if the TAI(s) included in the IE is not part of the list of "5GS forbidden tracking areas for regional provision of service", the UE shall store the TAI(s) included in the IE, if not already stored, into the list of "5GS forbidden tracking areas for regional provision of service".

Furthermore, the UE shall take the following actions depending on the 5GMM cause value received in the REGISTRATION REJECT message.

. . .

#78 (PLMN not allowed to operate at the present UE location).

This cause value received from a non-satellite NG-RAN cell is considered as an abnormal case and the behaviour of the UE is specified in subclause 5.5.1.2.7.

The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2) and shall delete 5G-GUTI, last visited registered TAI, TAI list and ngKSI. Additionally, the UE shall reset the registration attempt counter. The UE shall store the PLMN identity and, if it is known, the current geographical location in the list of "PLMNs not allowed to operate at the present UE location" and shall start a corresponding timer instance (see subclause 4.23.2). The UE shall enter state 5GMM-DEREGISTERED.PLMN-SEARCH and perform a PLMN selection according to 3GPP TS 23.122 [5].

If the message was received via 3GPP access and the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status, 4G-GUTI, TAI list, eKSI and attach attempt counter as specified in 3GPP TS 24.301 [15] for the case when the EPS attach procedure is rejected with the EMM cause with the same value.

. . .

Other values are considered as abnormal cases. The behaviour of the UE in those cases is specified in subclause 5.5.1.2.7.

[TS 24.501, clause 5.4.5.3.2]

In 5GMM-CONNECTED mode, the AMF initiates the NAS transport procedure by sending the DL NAS TRANSPORT message, as shown in figure 5.4.5.3.2.1.

In case a) in subclause 5.4.5.3.1, i.e. upon reception from an SMF of a 5GSM message without an N1 SM delivery skip allowed indication for a UE or a 5GSM message with an N1 SM delivery skip allowed indication for a UE in the 5GMM-CONNECTED mode, the AMF shall:

a) include the PDU session information (PDU session ID) in the PDU session ID IE;

b) set the Payload container type IE to "N1 SM information"; and

c) set the Payload container IE to the 5GSM message.

…

In case i1) in subclause 5.4.5.3.1, i.e. upon sending a single uplink 5GSM message which was not forwarded because the UE is registered to a PLMN via a satellite NG-RAN cell that is not allowed to operate at the present UE location, the AMF shall:

a) include the PDU session ID in the PDU session ID IE;

b) set the Payload container type IE to "N1 SM information";

c) set the Payload container IE to the 5GSM message which was not forwarded; and

d) set the 5GMM cause IE to the 5GMM cause #78 "PLMN not allowed to operate at the present UE location".

[TS 24.501, clause 5.4.5.3.3]

Upon reception of a DL NAS TRANSPORT message, the UE shall stop the timer T3346 if running.

Upon reception of a DL NAS TRANSPORT message, if the Payload container type IE is set to:

a) "N1 SM information" and the 5GMM cause IE is not included in the DL NAS TRANSPORT message, the 5GSM message in the Payload container IE and the PDU session ID are handled in the 5GSM procedures specified in clause 6;

…

g) "N1 SM information" and:

…

5a) the 5GMM cause IE is set to the 5GMM cause #78 "PLMN not allowed to operate at the present UE location", the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded because the UE is registered to a PLMN via a satellite NG-RAN cell that is not allowed to operate at the present UE location along with the 5GSM message from the Payload container IE of the DL NAS TRANSPORT message;

[TS 24.501, clause 5.1.3.2.2]

In order to describe the detailed UE behaviour, the 5GS update (5U) status pertaining to a specific subscriber is defined.

If the UE is not operating in SNPN access operation mode (see 3GPP TS 23.501 [8]), the 5GS update status is stored in a non-volatile memory in the USIM if the corresponding file is present in the USIM, else in the non-volatile memory in the ME, as described in annex C.

If the UE is operating in SNPN access operation mode, the 5GS update status for each SNPN whose SNPN identity is included in the "list of subscriber data" configured in the ME (see 3GPP TS 23.122 [5]) is stored in the non-volatile memory in the ME as described in annex C.

The 5GS update status value is changed only after the execution of a registration, network-initiated de-registration, 5GS based primary authentication and key agreement, service request, paging procedure or due to change in the current TAI which does not belong to the current registration area while T3346 is running.

…

5U3: ROAMING NOT ALLOWED

The last registration, service request, or registration for mobility or periodic registration update attempt was correctly performed, but the answer from the AMF was negative (because of roaming or subscription restrictions).

9.4.1.1.3 Test description

9.4.1.1.3.1 Pre-test conditions

System Simulator:

NGC Cell A and NGC Cell G as specified in TS 38.508-1 [4] Table 6.3.2.2-1.

System information combination NR-29 as defined in TS 38.508-1 [4] clause 4.4.3.1.2 is used in NGC cells.

UE:

The UE is in Automatic PLMN selection mode.

- The pre-configured UE location is defined in TS 38.508-1 [4] Clause 4.5C.

Preamble:

- The UE is registered to NGC Cell A and then Switched OFF (State 0N-B) as defined in TS 38.508-1 [4] Table

4.4A.2-0.

9.4.1.1.3.2 Test procedure sequence

Table 9.4.1.1.3.2-1: Void

Table 9.4.1.1.3.2-2: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| - | The following messages are to be observed on NGC Cell G unless explicitly stated otherwise. | - | - | - | - |
| 1 | The SS configures  - NGC Cell G as “Serving Cell”  - NGC Cell A as “Non-suitable "Off" cell” |  |  |  |  |
| 2 | The UE is switched on. | - | - | - | - |
| 3-14 | Steps 2-13 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed | - | - | - | - |
| 15 | The SS transmits a REGISTRATION REJECT message, 5GMM cause value = #78 "PLMN not allowed to operate at the present UE  location" | <-- | REGISTRATION REJECT | - | - |
| 16 | The SS releases the RRC connection. | - | - | - | - |
| 17 | Check: Does the UE transmit the REGISTRATION REQUEST message on NGC Cell G in the next 30 seconds? | --> | REGISTRATION REQUEST | 1 | F |
| - | The following messages are to be observed on NGC Cell A unless explicitly stated otherwise. | - | - | - | - |
| 18 | The SS configures  - NGC Cell A as “Serving Cell”  - NGC Cell G as “Non-suitable "Off" cell” |  |  |  |  |
| 19 | Check: Does the UE transmit the REGISTRATION REQUEST message on NGC Cell A in the next 30 seconds? | --> | REGISTRATION REQUEST | 1 | P |
| 20-30 | Steps 5-15 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed on NGC Cell A | - | - | - | - |
| 31 | SS transmits an RRCRelease  Message to move NR RRC\_IDLE state | <-- | NR RRC: RRCRelease | - | - |
| 32 | Make the UE delete the list of PLMNs not allowed to operate at the present UE location. (Note 1) | - | - | - | - |
| Note 1: This could be done by an MMI/AT command. | | | | | |

9.4.1.1.3.3 Specific message contents

Table 9.4.1.1.3.3-1: Message REGISTRATION REJECT (step 15, Table 9.4.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-9 | | | |
| **Information Element** | **Value/Remark** | **Comment** | **Condition** |
| 5GMM cause | 01001110 | #78 "PLMN not allowed to operate at the present UE location" |  |
| Lower bound timer value | 01100001 | 30 seconds |  |

Table 9.4.1.1.3.3-2: Message REGISTRATION REQUEST (step 17, Table 9.4.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-6 | | | |
| **Information Element** | **Value/Remark** | **Comment** | **Condition** |
| 5GS mobile identity | ‘001’B | 5GS mobile identity is SUCI, 5G-GUTI has been deleted after receiving registration reject at step 19 |  |
| Last visited registered TAI | Not present | TAI has been deleted after receiving registration reject at step 19 |  |
| ngKSI | Not present | ngKSI has been deleted after receiving registration reject at step 19 |  |

Table 9.4.1.1.3.3-3: *SIB19 for* on NGC Cells A and G (Preamble and all steps)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.2-18C | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB19-r17 ::= SEQUENCE { |  |  |  |
| ntn-Config-r17 SEQUENCE { |  |  |  |
| ephemerisInfo-r17 | Refer to the first and second in TS 38.508-1 [4] Table 6.3.4.1-1 |  | GSO |
| ephemerisInfo-r17 | FFS |  | NGSO |
| } |  |  |  |
| } |  |  |  |

|  |  |
| --- | --- |
| Condition | Explanation |
| GSO | Geosynchronous Orbit scenario |
| NGSO | Non-geosynchronous Orbit scenario |

#### 9.4.1.2 NTN / Mobility registration update / supported TACs not part of UE registration area

9.4.1.2.1 Test Purpose (TP)

(1)

**with** { UE in 5GMM-REGISTERED/5GMM-IDLE and UE finds a suitable cell provided by NR NTN RAT }

**ensure that** {

**when** { UE detects entering a cell where none of the supported TAC in the list of tracking areas that the UE previously registered in the AMF }

**then** { UE initiates and successfully completes the registration procedure for mobility registration update }

}

(2)

**with** { UE in 5GMM-REGISTERED/5GMM-IDLE and UE finds a suitable cell provided by NR NTN RAT }

**ensure that** {

**when** { UE detects entering a cell with TA from the list of tracking areas that the UE previously registered in the AMF }

**then** { UE does not initiate the registration procedure for mobility registration update }

}

9.4.1.2.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS23.501 clauses 5.4.11.6

Unless otherwise stated these are Rel-17 requirements.

[23.501, clause 5.4.11.6]

A moving radio cell for NR satellite access may indicate support for one or more TACs for each PLMN. A UE that is registered with a PLMN may access a radio cell and does not need to perform a Mobility Registration Update procedure as long as at least one supported TAC for the RPLMN or equivalent to the RPLMN is part of the UE Registration Area. A UE shall perform a Mobility Registration Update procedure when accessing a radio cell where none of the supported TACs for the RPLMN or equivalent to the RPLMN are part of the UE Registration Area.

When indicating a last visited TAI in a Registration Update, a UE may indicate any TAI supported in a radio cell for the RPLMN or equivalent to the RPLMN for the last UE access prior to the Registration Update that is part of the UE Registration Area.

[24.501, clause 5.3.4]

…

c)   The UE considers itself registered to a list of tracking areas and does not need to trigger the registration procedure for mobility and periodic registration update used for mobility (i.e. the 5GS registration type IE set to "mobility registration updating" in the REGISTRATION REQUEST message) as long as the UE stays in one of the tracking areas of the list of tracking areas received from the AMF.

…

[TS 38.331, clause 5.2.2.4.1]

Upon receiving the *MIB* the UE shall:

1> store the acquired *MIB*;

1> if the UE is in RRC\_IDLE or in RRC\_INACTIVE, or if the UE is in RRC\_CONNECTED while *T311* is running:

2> if the access is not for NTN or the UE is not capable of NTN; and

2> if the *cellBarred* in the acquired *MIB* is set to *barred*:

…

3> consider the cell as barred in accordance with TS 38.304 [20];

3> perform cell re-selection to other cells on the same frequency as the barred cell as specified in TS 38.304 [20];

2> else:

3> apply the received *systemFrameNumber*, *pdcch-ConfigSIB1*, *subCarrierSpacingCommon*, *ssb-SubcarrierOffset* and *dmrs-TypeA-Position*.

NOTE: A UE capable of NTN access should acquire SIB1 to determine whether the cell is an NTN cell.

[TS 38.331, clause 5.2.2.4.2]

Upon receiving the SIB1 the UE shall:

1> store the acquired *SIB1*;

1> if the access is for NTN, and the *cellBarredNTN* in the acquired *SIB1* is set to *barred* or the *cellBarredNTN* is not included in the acquired *SIB1*:

2> consider the cell as barred in accordance with TS 38.304 [20];

2> perform cell re-selection to other cells on the same frequency as the barred cell as specified in TS 38.304 [20];

….

1> if the *cellAccessRelatedInfo* contains an entry of a selected SNPN or PLMN and in case of PLMN the UE is either allowed or instructed to access the PLMN via a cell for which at least one CAG ID is broadcast:

2> in the remainder of the procedures use *npn-IdentityList, trackingAreaCode,* and *cellIdentity* for the cell as received in the corresponding entry of *npn-IdentityInfoList* containing the selected PLMN or SNPN;

1> else if the *cellAccessRelatedInfo* contains an entry with the *PLMN-Identity* of the selected PLMN:

2> in the remainder of the procedures use *plmn-IdentityList*, *trackingAreaCode*, *trackingAreaList,* and *cellIdentity* for the cell as received in the corresponding *PLMN-IdentityInfo* containing the selected PLMN;

…

1> else:

…

…

3> else:

…

4> forward the *cellIdentity* to upper layers;

4> forward the *trackingAreaCode* to upper layers;

4> forward the *trackingAreaList* to upper layers, if included;

9.4.1.2.3 Test description

9.4.1.2.3.1 Pre-test conditions

System Simulator:

3 cells, NGC Cell A, and NGC Cell B and NGC Cell D belonging to the same PLMN and different TA in accordance with TS 38.508-1 [4] Table 6.3.2.2-1

System information combination NR-29 as defined in TS 38.508-1 [4] clause 4.4.3.1.2 is used in NGC cells.

UE:

The UE is in Automatic PLMN selection mode.

- The pre-configured UE location is defined in TS 38.508-1 [4] Clause 4.5C.

Preamble:

- NGC Cell A is set to “Serving Cell”.

- The UE is in test state 1N-A as defined in TS 38.508-1 [4], subclause 4.4A on NGC Cell A.

- During the initial registration:

- In the list of tracking areas provided by the AMF (IE 'TAI list') contains only the TAI of NGC Cell A.

9.4.1.2.3.2 Test procedure sequence

Table 9.4.1.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS configures  - NGC Cell B as “Serving Cell”  - NGC Cell A and Cell D as “Non-suitable "Off" cell” | - | - | - | - |
| 2 | Check: Does the UE perform on NGC Cell B the Registration procedure for mobility registration update by executing the Test procedure to check that UE is camped on a new cell belonging to a new TA as specified in TS 38.508-1 [4] subclause 4.9.5?  NOTE: During the procedure the SS assigns a TAI list containing the TAI of NGC Cell B and NGC Cell D. | - | - | 1 | P |
| 3 | The SS configures  - NGC Cell D as “Serving Cell”  - NGC Cell A and Cell B as “Non-suitable "Off" cell” | - | - | - | - |
| 4 | Check: Does the UE send in the next 30 sec a request for RRC connection establishment. | --> | NR RRC: RRCSetupRequest | 2 | F |
| 5 | Check: Does the result of generic test procedure in TS 38.508-1 [4] subclause 4.9.4 indicate that the UE is in 5GC RRC\_IDLE state on the NGC Cell D? | - | - | 2 | P |

9.4.1.2.3 Specific message contents

Table 9.4.1.2.3.3-1: *SIB1* for NGC Cell A(preamble and all steps)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-28 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| cellAccessRelatedInfo SEQUENCE { |  |  |  |
| plmn-IdentityList SEQUENCE (SIZE (1..maxPLMN)) OF PLMN-Identity { | 1 entry |  |  |
| plmn-Identity[1] |  |  |  |
| trackingAreaList-r17SEQUENCE { |  |  |  |
| trackingAreaCode[1] | 1 | Entry 1, TAC of NGC Cell A |  |
| trackingAreaCode[2] | 2 | Entry 2, , TAC of NGC Cell B |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.4.1.2.3.3-2: *SIB1* for NGC Cell B (preamble and all steps)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-28 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| cellAccessRelatedInfo SEQUENCE { |  |  |  |
| plmn-IdentityList SEQUENCE (SIZE (1..maxPLMN)) OF PLMN-Identity { | 1 entry |  |  |
| plmn-Identity[1] |  |  |  |
| trackingAreaList-r17SEQUENCE { |  |  |  |
| trackingAreaCode[1] | 2 | Entry 1, TAC of NGC Cell B |  |
| trackingAreaCode[2] | 3 | Entry 2, Unregistered TAC |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.4.1.2.3.3-3: *SIB19* for NGC Cells A, B and D(preamble and all steps)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.2-18C | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB19-r17 ::= SEQUENCE { |  |  |  |
| ntn-Config-r17 SEQUENCE { |  |  |  |
| ephemerisInfo-r17 | Refer to the first, second and third cell in TS 38.508-1 [4] Table 6.3.4.1-1 respectively for NGC Cell A, B and D |  | GSO |
| ephemerisInfo-r17 | FFS |  | NGSO |
| } |  |  |  |
| } |  |  |  |

|  |  |
| --- | --- |
| Condition | Explanation |
| GSO | Geosynchronous Orbit scenario |
| NGSO | Non-geosynchronous Orbit scenario |

Table 9.4.1.2.3.3-4: REGISTRATION REQUEST (Step 2, Table 9.4.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6. | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type | '010'B | mobility registration updating |  |
| 5GS mobile identity | Active 5G-GUTI assigned in the preamble |  |  |
| 5GMM capability | Any value |  |  |
| Last visited registered TAI | The TAI of the NGC Cell A, see TS 38.508-1 [4] Table 6.3.2.2-1 |  |  |
| S1 UE network capability | If included then Any value | Shall be included if S1 mode indicated as supported in the IE '5GMM capability' |  |

Table 9.4.1.2.3.3-5: REGISTRATION ACCEPT (Step 2, Table 9.4.1.2.3.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7. | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration result |  |  |  |
| 5GS registration result value | '001'B | 3GPP access |  |
| SMS allowed | '0'B | SMS over NAS not allowed |  |
| 5G-GUTI | A 5G-GUTI different to the one provided by the UE in the REGISTRATION REQUEST |  |  |
| TAI list |  |  |  |
| Type of list | "00"B | list of TACs belonging to one PLMN, with non-consecutive TAC values |  |
| MCC | The MCC of the PLMN to which the NGC Cell A, NGC Cell B and NGC Cell D belong to, see TS 38.508-1 [4] Table 6.3.2.2-1 |  |  |
| MNC | The MNC of the PLMN to which the NGC Cell A, NGC Cell B and NGC Cell D belong to, see TS 38.508-1 [4] Table 6.3.2.2-1 |  |  |
| TAC 1 | The TAI of the NGC Cell B, see TS 38.508-1 [4] Table 6.3.2.2-1 |  |  |
| TAC 4 | The TAI of the NGC Cell D, see TS 38.508-1 [4] Table 6.3.2.2-1 |  |  |
| PDU session status | If PDU session status was included in the REGISTRATION REQUEST, the indicated as active PDN sessions shall be confirmed as active |  |  |

# 10 Session management

## 10.1 5GS session management

### 10.1.1 PDU session authentication and authorization

#### 10.1.1.1 PDU session authentication and authorization / During the UE-requested PDU session procedure

10.1.1.1.1 Test Purpose (TP)

(1)

**with** { UE is establishing UE-requested PDU session by sending PDU Session establishment Request message }

**ensure that** {

**when** { UE receives a PDU SESSION AUTHENTICATION COMMAND message }

**then** { UE transmits a PDU SESSION AUTHENTICATION COMPLETE message }

}

(2)

**with** { PDU session authentication and authorization procedure is performed during the UE-requested PDU session establishment procedure }

**ensure that** {

**when** { UE receives EAP-failure message in the PDU SESSION ESTABLISHMENT REJECT message }

**then** { UE consider that the PDU session is not established }

}

(3)

**with** { PDU session authentication and authorization procedure is performed during the UE-requested PDU session establishment procedure }

**ensure that** {

**when** { UE receives EAP-success message in the PDU SESSION ESTABLISHMENT ACCEPT message }

**then** { UE consider that the PDU session is established }

}

10.1.1.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clause 6.3.1.2.1, 6.3.1.2.2 and 6.4.1.4. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501 clause 6.3.1.2.1]

In order to initiate the PDU EAP message reliable transport procedure, the SMF shall create a PDU SESSION AUTHENTICATION COMMAND message.

The SMF shall set the PTI IE of the PDU SESSION AUTHENTICATION COMMAND message to "No procedure transaction identity assigned".

The SMF shall set the EAP message IE of the PDU SESSION AUTHENTICATION COMMAND message to the EAP-request message provided by the DN or generated locally.

The SMF shall send the PDU SESSION AUTHENTICATION COMMAND message, and the SMF shall start timer T3590 (see example in figure 6.3.1.1).

Upon receipt of a PDU SESSION AUTHENTICATION COMMAND message and a PDU session ID, using the NAS transport procedure as specified in subclause 5.4.5, the UE passes to the upper layers the EAP message received in the EAP message IE of the PDU SESSION AUTHENTICATION COMMAND message. Apart from this action, the authentication and authorization procedure initiated by the DN is transparent to the 5GSM layer of the UE.

[TS 24.501 clause 6.3.1.2.2]

When the upper layers provide an EAP-response message responding to the received EAP-request message, the UE shall create a PDU SESSION AUTHENTICATION COMPLETE message.

The UE shall set the EAP message IE of the PDU SESSION AUTHENTICATION COMPLETE message to the EAP-response message.

The UE shall transport the PDU SESSION AUTHENTICATION COMPLETE message and the PDU session ID, using the NAS transport procedure as specified in subclause 5.4.5. Apart from this action, the authentication and authorization procedure initiated by the DN is transparent to the 5GSM layer of the UE.

Upon receipt of a PDU SESSION AUTHENTICATION COMPLETE message, the SMF shall stop timer T3590 and provides the EAP message received in the EAP message IE of the PDU SESSION AUTHENTICATION COMPLETE message to the DN or handles it locally.

[TS 24.501 clause 6.4.1.4]

If the connectivity with the requested DN is rejected by the network, the SMF shall create a SM PDU SESSION ESTABLISHMENT REJECT message.

The SMF shall set the 5GSM cause IE of the PDU SESSION ESTABLISHMENT REJECT message to indicate the reason for rejecting the PDU session establishment.

The 5GSM cause IE typically indicates one of the following SM cause values:

#8 operator determined barring;

#26 insufficient resources;

#27 missing or unknown DNN;

#28 unknown PDU session type;

#29 user authentication or authorization failed;

10.1.1.1.3 Test description

10.1.1.1.3.1 Pre-test conditions

System Simulator:

NGC Cell A

UE:

None.

Preamble:

The UE is in state 1N-A with PDU session Active state using the generic procedure NR RRC\_IDLE according to TS 38.508-1 [4].

10.1.1.1.3.2 Test procedure sequence

Table 10.1.1.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Cause the UE to request connectivity to an additional PDU session. (see Note 1) | - | - | - | - |
| 2-2A | Steps 2-3 of the generic procedure for NR RRC\_Connected specified in TS 38.508-1 [4] Table 4.5.4.2-3 are performed. | - | - | - | - |
| 2B | The UE transmits an *RRCSetupComplete* message and a SERVICE REQUEST message with service type IE set to “signalling”. | --> | SERVICE REQUEST | - | - |
| 3-3A | Steps 5 and 6 of the generic procedure for NR RRC\_Connected specified in TS 38.508-1 [4] Table 4.5.4.2-3 are performed. | - | - | - | - |
| 4 | The SS transmits an *RRCReconfiguration* message and a SERVICE ACCEPT message to establish SRB2 and DRB. | <-- | NR RRC: RRCReconfiguration  5GMM: SERVICE ACCEPT | - | - |
| 4A | The UE transmits an *RRCReconfigurationComplete* message. | --> | NR RRC: RRCReconfigurationComplete | - | - |
| 5 | The UE transmits a PDU SESSION ESTABLISHMENT REQUEST message to request an additional PDU session.  Note: PDU SESSION ESTABLISHMENT REQUEST is included in UL NAS transport. UL NAS transport message is included in dedicatedNAS-Message of *ULInformationTransfer* message.  DNN information is included in UL NAS transport message. | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | - | - |
| 6 | The SS transmits PDU SESSION AUTHENTICATION COMMAND including an EAP-Request message. | <-- | PDU SESSION AUTHENTICATION COMMAND |  |  |
| 7 | Check: Does the UE transmit a PDU SESSION AUTHENTICATION COMPLETE containing EAP-Response message? | --> | PDU SESSION AUTHENTICATION COMPLETE | 1 | P |
| 8 | The SS transmits PDU SESSION ESTABLISHMENT REJECT message with 5GSM cause #29 including an EAP-Failure message. | <-- | PDU SESSION ESTABLISHMENT REJECT |  |  |
| 9 | The SS releases the RRC connection. | - |  | - | - |
| 10 | Cause the UE to request connectivity to an additional PDU session. (see Note 1) | - | - | - | - |
| 11-11A | Steps 2-3 of the generic procedure for NR RRC\_Connected specified in TS 38.508-1 [4] Table 4.5.4.2-3 are performed. | - | - | - | - |
| 11B | The UE transmits an *RRCSetupComplete* message and a SERVICE REQUEST message with service type IE set to “signalling”. | --> | SERVICE REQUEST | - | - |
| 12-12A | Steps 5 and 6 of the generic procedure for NR RRC\_Connected specified in TS 38.508-1 [4] Table 4.5.4.2-3 are performed. | - | - | - | - |
| 13 | The SS transmits an RRCReconfiguration message and a SERVICE ACCEPT message to establish SRB2 and DRB. | <-- | NR RRC: RRCReconfiguration  5GMM: SERVICE ACCEPT | - | - |
| 13A | The UE transmits an *RRCReconfigurationComplete* message. | --> | NR RRC: RRCReconfigurationComplete | - | - |
| 14 | The UE transmits a PDU SESSION ESTABLISHMENT REQUEST message to request an additional PDU session.  Note: PDU SESSION ESTABLISHMENT REQUEST is included in UL NAS transport. UL NAS transport message is included in dedicatedNAS-Message of *ULInformationTransfer* message  DNN information is included in UL NAS transport message. | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 2 | P |
| 15 | The SS transmits PDU SESSION AUTHENTICATION COMMAND including an EAP-Request message. | <-- | PDU SESSION AUTHENTICATION COMMAND |  |  |
| 16 | Check: Does the UE transmit a PDU SESSION AUTHENTICATION COMPLETE containing EAP-Response message? | --> | PDU SESSION AUTHENTICATION COMPLETE | - | - |
| 17 | The SS transmits *RRCReconfiguration* message containing PDU SESSION ESTABLISHMENT ACCEPT message containing an EAP-Success message. | <-- | PDU SESSION ESTABLISHMENT ACCEPT |  |  |
| 18 | The UE transmits *RRCReconfigurationComplete* message to confirm the establishment of DRB. | - | - | 3 | P |
| - | EXCEPTION: Step 19a1 describes behaviour depending UE implementation; the "lower case letter" identifies a step sequence that take place if the UE performs a specific action. | - | - | - | - |
| 19a1 | If initiated by the UE, the generic procedure for IP address allocation in the user plane, specified in clause 4.5A.3 of TS 38.508-1 [4], takes place performing IP address allocation in the user plane. | - | - | - | - |
| 20 | The SS releases the RRC connection. | - |  | - | - |
| Note 1: The request of connectivity to an additional PDU session may be performed by MMI or AT command +CGACT. | | | | | |

10.1.1.1.3.3 Specific message contents

Table 10.1.1.1.3.3-1: Void

Table 10.1.1.1.3.3-2: Void

Table 10.1.1.1.3.3-3: PDU SESSION ESTABLISHMENT REQUEST (step 5 and 14, Table 10.1.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | PSI-1 | UE assigns a  particular PSI not yet used between  1 and 15 |  |
| PTI | PTI-1 | UE assigns a  particular PTI not yet used between  1 and 254 |  |

Table 10.1.1.1.3.3-4: UL NAS Transport (step 5 and 14, Table 10.1.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-10 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0001’B | N1 SM information |  |
| PDU session ID | PSI-1 |  |  |
| Request type | ‘001’B | Initial request |  |
| S-NSSAI | Not Present |  |  |
| DNN | DNN-1 (New DNN name) | The requested  DNN is different  from default DNN. |  |

Table 10.1.1.1.3.3-5: PDU SESSION ESTABLISHMENT REJECT (step 8, Table 10.1.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-3 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | PSI-1 |  |  |
| PTI | PTI-1 |  |  |
| 5GSM cause | ‘00011 101’ | User authentication or authorization failed |  |

Table 10.1.1.1.3.3-6: PDU SESSION ESTABLISHMENT ACCEPT (step 17, Table 10.1.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-2 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | PSI-1 |  |  |
| PTI | PTI-1 |  |  |
| Authorized QoS rules |  |  |  |
| QoS rule |  |  |  |
| QoS rule identifier | ‘0000 0001’B |  |  |
| Rule operation code | ‘001’B | Create new QoS rule |  |
| DQR bit | ‘1’B | The QoS rule is the default QoS rule. |  |
| Number of packet filters | ‘0001’B | 1 packet filter |  |
| Packet filter list | See table 4.8.2.1-1 | Packet filter list #1 |  |
| Packet filter direction | ‘11’B | bidirectional |  |
| Packet filter identifier | ‘0000’B | Id 0 |  |
| Component type 1 ID | ‘0000 0001’B | Match-all type |  |
| QoS rule precedence | ‘0000 0000’B | 0 |  |
| QoS flow identifier (QFI) | ’00 0011’B | QFI 3 |  |
| EAP message | Set according to TS 38.508-1 [4] Table 4.7.3.2-3 | EAP-Success |  |
| QoS flow description |  |  |  |
| QFI | ‘00 0011’B | QFI 3 |  |
| Operation code | ‘001’B | Create new QoS flow description |  |
| E bit | ‘1’B | Parameters list is included |  |
| Number of parameters | ’00 0001’B | 1 parameters |  |
| 5QI | ‘0000 1001’B | 5QI 9 |  |
| EPS bearer identity | Any not yet assigned value different to '5' |  | Interworking\_with\_EPS |
| DNN | DNN-1 |  |  |

|  |  |
| --- | --- |
| Condition | Explanation |
| Interworking\_with\_EPS | If this flow is used in the Authorized QoS flow descriptions IE of a PDU SESSION ESTABLISHMENT ACCEPT message or PDU SESSION MODIFICATION COMMAND message also including the Mapped EPS bearer context IE. |

#### 10.1.1.2 PDU session authentication and authorization / After the UE-requested PDU session procedure

10.1.1.2.1 Test Purpose (TP)

(1)

**with** { the UE is in 5GMM-REGISTERED state with an established PDU session }

**ensure that** {

**when** { UE receives a PDU SESSION AUTHENTICATION COMMAND message }

**then** { UE transmits a PDU SESSION AUTHENTICATION COMPLETE message }

}

(2)

**with** { PDU session authentication and authorization procedure is performed after the UE-requested PDU session establishment procedure }

**ensure that** {

**when** { UE receives EAP-failure message in the PDU SESSION RELEASE COMMAND message }

**then** { the 5GSM state of the UE is PDU SESSION INACTIVE state }

}

(3)

**with** { PDU session authentication and authorization procedure is performed after the UE-requested PDU session establishment procedure }

**ensure that** {

**when** { UE receives EAP-success message in the PDU SESSION AUTHENTICATION RESULT message }

**then** { the 5GSM state of the UE is PDU SESSION ACTIVE state }

}

10.1.1.2.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clause 6.3.1.1, clause 6.3.1.2.1, 6.3.1.2.2 and 6.3.1.3.1. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501 clause 6.3.1.1]

The purpose of the PDU session authentication and authorization procedure is to enable the DN:

a) to authenticate the upper layers of the UE, when establishing the PDU session;

b) to authorize the upper layers of the UE, when establishing the PDU session;

c) both of the above; or

d) to re-authenticate the upper layers of the UE after establishment of the PDU session.

The PDU session authentication and authorization procedure can be performed only during or after the UE-requested PDU session procedure establishing a non-emergency PDU session. The PDU session authentication and authorization procedure shall not be performed during or after the UE-requested PDU session establishment procedure establishing an emergency PDU session.

The network authenticates the UE using the Extensible Authentication Protocol (EAP) as specified in IETF RFC 3748 [32].

EAP has defined four types of EAP messages:

a) an EAP-request message;

b) an EAP-response message;

c) an EAP-success message; and

d) an EAP-failure message.

The EAP-request message is transported from the network to the UE using the PDU SESSION AUTHENTICATION COMMAND message of the PDU EAP message reliable transport procedure.

The EAP-response message to the EAP-request message is transported from the UE to the network using the PDU SESSION AUTHENTICATION COMPLETE message of the PDU EAP message reliable transport procedure.

If the PDU session authentication and authorization procedure is performed during the UE-requested PDU session establishment procedure:

a) and the DN authentication of the UE completes successfully, the EAP-success message is transported from the network to the UE as part of the UE-requested PDU session establishment procedure in the PDU SESSION ESTABLISHMENT ACCEPT message.

b) and the DN authentication of the UE completes unsuccessfully, the EAP-failure message is transported from the network to the UE as part of the UE-requested PDU session establishment procedure in the PDU SESSION ESTABLISHMENT REJECT message.

If the PDU session authentication and authorization procedure is performed after the UE-requested PDU session establishment procedure:

a) and the DN authentication of the UE completes successfully, the EAP-success message is transported from the network to the UE using the PDU SESSION AUTHENTICATION RESULT message of the PDU EAP result message transport procedure.

b) and the DN authentication of the UE completes unsuccessfully, the EAP-failure message is transported from the network to the UE using the PDU SESSION RELEASE COMMAND message of the network-requested PDU session release procedure.

There can be several rounds of exchange of an EAP-request message and a related EAP-response message for the DN to complete the authentication and authorization of the request for a PDU session (see example in figure 6.3.1.1).

The SMF shall set the authenticator retransmission timer specified in IETF RFC 3748 [34] subclause 4.3 to infinite value.

NOTE: The PDU session authentication and authorization procedure provides a reliable transport of EAP messages and therefore retransmissions at the EAP layer of the SMF do not occur.



Figure 6.3.1.1: PDU session authentication and authorization procedure

[TS 24.501 clause 6.3.1.2.1]

In order to initiate the PDU EAP message reliable transport procedure, the SMF shall create a PDU SESSION AUTHENTICATION COMMAND message.

The SMF shall set the PTI IE of the PDU SESSION AUTHENTICATION COMMAND message to "No procedure transaction identity assigned".

The SMF shall set the EAP message IE of the PDU SESSION AUTHENTICATION COMMAND message to the EAP-request message provided by the DN or generated locally.

The SMF shall send the PDU SESSION AUTHENTICATION COMMAND message, and the SMF shall start timer T3590 (see example in figure 6.3.1.1).

Upon receipt of a PDU SESSION AUTHENTICATION COMMAND message and a PDU session ID, using the NAS transport procedure as specified in subclause 5.4.5, the UE passes to the upper layers the EAP message received in the EAP message IE of the PDU SESSION AUTHENTICATION COMMAND message. Apart from this action, the authentication and authorization procedure initiated by the DN is transparent to the 5GSM layer of the UE.

[TS 24.501 clause 6.3.1.2.2]

When the upper layers provide an EAP-response message responding to the received EAP-request message, the UE shall create a PDU SESSION AUTHENTICATION COMPLETE message.

The UE shall set the EAP message IE of the PDU SESSION AUTHENTICATION COMPLETE message to the EAP-response message.

The UE shall transport the PDU SESSION AUTHENTICATION COMPLETE message and the PDU session ID, using the NAS transport procedure as specified in subclause 5.4.5. Apart from this action, the authentication and authorization procedure initiated by the DN is transparent to the 5GSM layer of the UE.

Upon receipt of a PDU SESSION AUTHENTICATION COMPLETE message, the SMF shall stop timer T3590 and provides the EAP message received in the EAP message IE of the PDU SESSION AUTHENTICATION COMPLETE message to the DN or handles it locally.

[TS 24.501 clause 6.3.1.3.1]

In order to initiate the PDU EAP result message transport procedure, the SMF shall create a PDU SESSION AUTHENTICATION RESULT message.

The SMF shall set the PTI IE of the PDU SESSION AUTHENTICATION RESULT message to "No procedure transaction identity assigned".

The SMF shall set the EAP message IE of the PDU SESSION AUTHENTICATION RESULT message to the EAP-success message provided by the DN.

The SMF shall send the PDU SESSION AUTHENTICATION RESULT message.

Upon receipt of a PDU SESSION AUTHENTICATION RESULT message and a PDU session ID, using the NAS transport procedure as specified in subclause 5.4.5, the UE passes to the upper layers the EAP message received in the EAP message IE of the PDU SESSION AUTHENTICATION RESULT message. Apart from this action, the authentication and authorization procedure initiated by the DN is transparent to the 5GSM layer of the UE.

10.1.1.2.3 Test description

10.1.1.2.3.1 Pre-test conditions

System Simulator:

NGC Cell A

UE:

None.

Preamble:

The UE is in state 3N-A, on NGC Cell A with at least one PDU Session X (1<=X<=15) active according to TS 38.508-1 [4].

10.1.1.2.3.2 Test procedure sequence

Table 10.1.1.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 0A | Cause the UE to request establishment of PDU session Y to the DN.(Note 1) | - |  | - | - |
| 0B | The PDU session establishment procedure as specified in TS 38.508-1 [4] subclause 4.5A.2 take place. | - |  | - | - |
| 1 | The SS transmits PDU SESSION AUTHENTICATION COMMAND including an EAP-Request message. | <-- | PDU SESSION AUTHENTICATION COMMAND | - | - |
| 2 | Check: Does the UE transmit a PDU SESSION AUTHENTICATION COMPLETE containing EAP-Response message? | --> | PDU SESSION AUTHENTICATION COMPLETE | 1 | P |
| 3 | The SS transmits PDU SESSION AUTHENTICATION RESULT message containing an EAP-Success message. | <-- | PDU SESSION AUTHENTICATION RESULT | - | - |
| 4 | The SS transmits PDU SESSION AUTHENTICATION COMMAND including an EAP-Request message. | <-- | PDU SESSION AUTHENTICATION COMMAND | - | - |
| 5 | Check: Does the UE transmit a PDU SESSION AUTHENTICATION COMPLETE containing EAP-Response message? | --> | PDU SESSION AUTHENTICATION COMPLETE | 3 | P |
| 6 - 17 | Void | - | - | - | - |
| 18 | Check: Does the UE perform PDU session release procedure defined in clause 4.9.21 of TS 38.508-1 [4] with PDU SESSION RELEASE COMMAND including 5GSM cause #29 “user authentication or authorization failed"? | - | - | 2- | P |
| 19 | Void | - | - | - | - |
| Note 1: The request of connectivity to an additional PDU session may be performed by MMI or AT command. | | | | | |

10.1.1.2.3.3 Specific message contents

Table 10.1.1.2.3.3-1: PDU SESSION ESTABLISHMENT ACCEPT (step 0B, Table 10.1.1.2.3.2-1; step 3, Table 4.5A.2.2.2-1, TS 38.508-1 [4])

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-2 | | | |
| Information Element | Value/remark | Comment | Condition |
| Authorized QoS rules | 5GC QoS rule of the Config#1 in Table 4.8.4-1 |  |  |
| Mapped EPS bearer contexts |  |  |  |
| Mapped EPS bearer context |  |  |  |
| Mapped EPS QoS parameters | EPC default bearer context of the Config#1 in Table 4.8.4-1 |  |  |
| DNN | The same DNN value as sent in the UL NAS TRANSPORT message at (step 0B, Table 10.1.1.2.3.2-1; step 2a1, Table 4.5A.2.2.2-2, TS 38.508-1[4]) |  |  |

Table 10.1.1.2.3.3-2: Void

Table 10.1.1.2.3.3-2A: PDU SESSION AUTHENTICATION RESULT (step 3, Table 10.1.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 table 4.7.2-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| EAP message | EAP-success | See TS 24.501 [25] subclause 9.11.2.2 |  |

Table 10.1.1.2.3.3-3: Void

Table 10.1.1.2.3.3-3A: Void

Table 10.1.1.2.3.3-4: Void

Table 10.1.1.2.3.3-5: PDU SESSION RELEASE COMMAND (step 18, Table 10.1.1.2.3.2-1; step 1, TS 36.508 [4] Table 4.9.21.2.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.2-14 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | The same ID as the ID of PDU session which UE request in step 13 in Table 10.1.1.2.3.2-1 |  |  |
| 5GSM cause | '0001 1101'B | user authentication or authorization failed |  |
| Back-off timer value | ‘1010 0000’B | 0 minutes |  |
| EAP Message | EAP-Failure | See TS 24.501 [25] subclause 9.11.2.2 |  |

### 10.1.2 Network-requested PDU session modification

#### 10.1.2.1 Network-requested PDU session modification / Accepted

10.1.2.1.1 Test Purpose (TP)

(1)

**with** { the UE in 5GMM-REGISTERED state with an established PDU session }

**ensure that** {

**when** { the UE receives a PDU SESSION MODIFICATION COMMAND message }

**then** { UE sends a PDU SESSION MODIFICATION COMPLETE message and modifies the PDU session accordingly }

}

(2)

**with** { the UE in 5GMM-REGISTERED state with an established PDU session has been modified }

**ensure that** {

**when** { the UE has IP packets for transmission where each IP packet matches the modified packet filters configured in the UL TFTs for the PDU session }

**then** { the UE evaluates the packet filters in the correct evaluation order and transmits IP packets in uplink on the dedicated PDU session associated with the matched packet filter }

}

10.1.2.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clauses 6.3.2.3 and TS 24.008, clause 10.5.6.12. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 6.3.2.3]

Upon receipt of the PDU SESSION MODIFICATION COMMAND message, if the UE provided a DNN during the PDU session establishment, the UE shall stop timer T3396, if it is running for the DNN provided by the UE. If the UE did not provide a DNN during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", the UE shall stop the timer T3396 associated with no DNN if it is running. If the PDU SESSION MODIFICATION COMMAND message was received for an emergency PDU session, the UE shall not stop the timer T3396 associated with no DNN if it is running.

Upon receipt of the PDU SESSION MODIFICATION COMMAND message, if the UE provided an S-NSSAI and a DNN during the PDU session establishment, the UE shall stop timer T3584, if it is running for the same [S-NSSAI, DNN] combination provided by the UE. If the UE did not provide an S-NSSAI during the PDU session establishment, the UE shall stop timer T3584, if it is running for the same [no S-NSSAI, DNN] combination provided by the UE. If the UE provided neither a DNN nor an S-NSSAI during the PDU session establishment, the UE shall stop timer T3584, if it is running for the same [no S-NSSAI, no DNN] combination provided by the UE.

Upon receipt of the PDU SESSION MODIFICATION COMMAND message, if the UE provided an S-NSSAI during the PDU session establishment, the UE shall stop timer T3585, if it is running for the S-NSSAI provided by the UE. If the UE did not provide an S-NSSAI during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", the UE shall stop the timer T3585 associated with no S-NSSAI if it is running. If the PDU SESSION MODIFICATION COMMAND message was received for an emergency PDU session, the UE shall not stop the timer T3585 associated with no S-NSSAI if it is running.

NOTE 1: Upon receipt of the PDU SESSION MODIFICATION COMMAND message for a PDU session, if the UE provided a DNN (or no DNN) and an S-NSSAI (or no S-NSSAI) when the PDU session is established, timer T3396 associated with the DNN (or no DNN, if no DNN was provided by the UE) is running, and timer T3584 associated with the DNN (or no DNN, if no DNN was provided by the UE) and the S-NSSAI (or no S-NSSAI, if no S-NSSAI was provided by the UE) is running, then the UE stops both the timer T3396 and the timer T3584.

NOTE 2: Upon receipt of the PDU SESSION MODIFICATION COMMAND message for a PDU session, if the UE provided a DNN (or no DNN) and an S-NSSAI (or no S-NSSAI) when the PDU session is established, timer T3585 associated with the S-NSSAI (or no S-NSSAI, if no S-NSSAI was provided by the UE) is running, and timer T3584 associated with the DNN (or no DNN, if no DNN was provided by the UE) and the S-NSSAI (or no S-NSSAI, if no S-NSSAI was provided by the UE) is running, then the UE stops both the timer T3585 and the timer T3584.

If the PDU SESSION MODIFICATION COMMAND message includes the Authorized QoS rules IE, the UE shall process the QoS rules sequentially starting with the first QoS rule.

The UE shall replace the stored authorized QoS rules, authorized QoS flow descriptions and session-AMBR of the PDU session with the received value(s), if any, in the PDU SESSION MODIFICATION COMMAND message.

If the PDU SESSION MODIFICATION COMMAND message includes a Mapped EPS bearer contexts IE, the UE shall check each mapped EPS bearer context for different types of errors as follows:

NOTE 3: An error detected in a mapped EPS bearer context does not cause the UE to discard the Authorized QoS rules IE and Authorized QoS flow descriptions IE included in the PDU SESSION MODICATION COMMAND message, if any.

a) Semantic error in the mapped EPS bearer operation:

1) operation code = "Create new EPS bearer" and there is already an existing mapped EPS bearer context with the same EPS bearer identity associated with any PDU session.

2) operation code = "Delete existing EPS bearer" and there is no existing mapped EPS bearer context with the same EPS bearer identity associated with the PDU session that is being modified.

3) operation code = "Modify existing EPS bearer" and there is no existing mapped EPS bearer context with the same EPS bearer identity associated with the PDU session that is being modified.

In case 1, if the existing mapped EPS bearer context is associated with the PDU session that is being modified, the UE shall not diagnose an error, further process the create request and, if it was process successfully, delete the old EPS bearer context.

In case 2, the UE shall not diagnose an error, further process the delete request and, if it was processed successfully, consider the mapped EPS bearer context as successfully deleted.

Otherwise, after sending the PDU SESSSION MODIFICATION COMPLETE for the ongoing PDU session modification procedure, the UE shall initiate a PDU session modification procedure by sending a PDU SESSION MODIFICATION REQUEST message to delete the mapped EPS bearer context with 5GSM cause #85 "Invalid mapped EPS bearer identity".

b) if the mapped EPS bearer context includes a traffic flow template, the UE shall check the traffic flow template for different types of TFT IE errors as follows:

2) Semantic errors in TFT operations:

i) TFT operation = "Create a new TFT" when there is already an existing TFT for the EPS bearer context.

ii) When the TFT operation is an operation other than "Create a new TFT" and there is no TFT for the EPS bearer context.

iii) TFT operation = "Delete packet filters from existing TFT" when it would render the TFT empty.

iv) TFT operation = "Delete existing TFT" for a dedicated EPS bearer context.

In case iv, after sending the PDU SESSSION MODIFICATION COMPLETE for the ongoing PDU session modification procedure, the UE shall initiate a PDU session modification procedure by sending a PDU SESSION MODIFICATION REQUEST message to delete the mapped EPS bearer context with 5GSM cause #41 "semantic error in the TFT operation".

In the other cases the UE shall not diagnose an error and perform the following actions to resolve the inconsistency:

In case i, the UE shall further process the new activation request and, if it was processed successfully, delete the old TFT.

In case ii, the UE shall:

- process the new request and if the TFT operation is "Delete existing TFT" or "Delete packet filters from existing TFT", and if no error according to items b, c, and d was detected, consider the TFT as successfully deleted;

- process the new request as an activation request, if the TFT operation is "Add packet filters in existing TFT" or "Replace packet filters in existing TFT".

In case iii, if the packet filters belong to a dedicated EPS bearer context, the UE shall process the new deletion request and, if no error according to items b, c, and d was detected, after sending the PDU SESSSION MODIFICATION COMPLETE for the ongoing PDU session modification procedure, the UE shall initiate a PDU session modification procedure by sending a PDU SESSION MODIFICATION REQUEST message to delete the mapped EPS bearer context with 5GSM cause #41 "semantic error in the TFT operation".

In case iii, if the packet filters belong to the default EPS bearer context, the UE shall process the new deletion request and if no error according to items b, c, and d was detected then delete the existing TFT, this corresponds to using match-all packet filter for the default EPS bearer context.

2) Syntactical errors in TFT operations:

i) When the TFT operation = "Create a new TFT", "Add packet filters in existing TFT", "Replace packet filters in existing TFT" or "Delete packet filters from existing TFT" and the packet filter list in the TFT IE is empty.

ii) TFT operation = "Delete existing TFT" or "No TFT operation" with a non-empty packet filter list in the TFT IE.

iii) TFT operation = "Replace packet filters in existing TFT" when the packet filter to be replaced does not exist in the original TFT.

iv) TFT operation = "Delete packet filters from existing TFT" when the packet filter to be deleted does not exist in the original TFT.

v) TFT operation = "Delete packet filters from existing TFT" with a packet filter list also including packet filters in addition to the packet filter identifiers.

vi) When there are other types of syntactical errors in the coding of the TFT IE, such as a mismatch between the number of packet filters subfield, and the number of packet filters in the packet filter list.

In case iii, the UE shall not diagnose an error, further process the replace request and, if no error according to items c and d was detected, include the packet filters received to the existing TFT.

In case iv, the UE shall not diagnose an error, further process the deletion request and, if no error according to items c and d was detected, consider the respective packet filter as successfully deleted.

Otherwise, after sending the PDU SESSSION MODIFICATION COMPLETE for the ongoing PDU session modification procedure, the UE shall initiate a PDU session modification procedure by sending a PDU SESSION MODIFICATION REQUEST message to delete the mapped EPS bearer context with 5GSM cause #42 "syntactical error in the TFT operation".

3) Semantic errors in packet filters:

i) When a packet filter consists of conflicting packet filter components which would render the packet filter ineffective, i.e. no IP packet will ever fit this packet filter. How the UE determines a semantic error in a packet filter is outside the scope of the present document.

ii) When the resulting TFT, which is assigned to a dedicated EPS bearer context, does not contain any packet filter applicable for the uplink direction among the packet filters created on request from the network.

After sending the PDU SESSSION MODIFICATION COMPLETE for the ongoing PDU session modification procedure, the UE shall initiate a PDU session modification procedure by sending a PDU SESSION MODIFICATION REQUEST message to delete the mapped EPS bearer context with 5GSM cause #44 "semantic errors in packet filter(s)".

4) Syntactical errors in packet filters:

i) When the TFT operation = "Create a new TFT", "Add packet filters to existing TFT", and two or more packet filters in the resultant TFT would have identical packet filter identifiers.

ii) When the TFT operation = "Create a new TFT", "Add packet filters to existing TFT" or "Replace packet filters in existing TFT", and two or more packet filters among all TFTs associated with this PDN connection would have identical packet filter precedence values.

iii) When there are other types of syntactical errors in the coding of packet filters, such as the use of a reserved value for a packet filter component identifier.

In case i, if two or more packet filters with identical packet filter identifiers are contained in the new request, after sending the PDU SESSSION MODIFICATION COMPLETE for the ongoing PDU session modification procedure, the UE shall initiate a PDU session modification procedure by sending a PDU SESSION MODIFICATION REQUEST message to delete the mapped EPS bearer context with 5GSM cause #45 "syntactical error in packet filter(s)". Otherwise, the UE shall not diagnose an error, further process the new request and, if it was processed successfully, delete the old packet filters which have the identical packet filter identifiers.

In case ii, if the old packet filters do not belong to the default EPS bearer context, the UE shall not diagnose an error, shall further process the new request and, if it was processed successfully, shall delete the old packet filters which have identical filter precedence values.

In case ii, if one or more old packet filters belong to the default EPS bearer context, after sending the PDU SESSSION MODIFICATION COMPLETE for the ongoing PDU session modification procedure, the UE shall initiate a PDU session modification procedure by sending a PDU SESSION MODIFICATION REQUEST message to delete the mapped EPS bearer context with 5GSM cause #45 "syntactical errors in packet filter(s)".

Otherwise, after sending the PDU SESSSION MODIFICATION COMPLETE for the ongoing PDU session modification procedure, the UE shall initiate a PDU session modification procedure by sending a PDU SESSION MODIFICATION REQUEST message to delete the mapped EPS bearer context with 5GSM cause #45 "syntactical error in packet filter(s)".

And if a new EPS bearer identity parameter in authorized QoS flow descriptions IE is received for a QoS flow which can be transferred to EPS, the UE shall update the association between the QoS flow and the mapped EPS bearer context, based on the new EPS bearer identity and the mapped EPS bearer contexts. If the "Delete existing EPS bearer" operation code in the Mapped EPS bearer contexts IE was received, the UE shall discard the association between the QoS flow and the corresponding mapped EPS bearer context.

Upon receipt of a PDU SESSION MODIFICATION COMMAND message and a PDU session ID, using the NAS transport procedure as specified in subclause 5.4.5, if the UE accepts the PDU SESSION MODIFICATION COMMAND message, the UE considers the PDU session as modified and the UE shall create a PDU SESSION MODIFICATION COMPLETE message.

If the PDU SESSION MODIFICATION COMMAND message contains the PTI value allocated in the UE-requested PDU session modification procedure, the UE shall stop the timer T3581. The UE should ensure that the PTI value assigned to this procedure is not released immediately.

NOTE 4: The way to achieve this is implementation dependent. For example, the UE can ensure that the PTI value assigned to this procedure is not released during the time equal to or greater than the default value of timer T3591.

While the PTI value is not released, the UE regards any received PDU SESSION MODIFICATION COMMAND message with the same PTI value as a network retransmission (see subclause 7.3.1).

If the selected SSC mode of the PDU session is "SSC mode 3" and the PDU SESSION MODIFICATION COMMAND message includes 5GSM cause #39 "reactivation requested", the UE can provide to the upper layers the PDU session address lifetime if received in the PDU session address lifetime PCO parameter of the Extended protocol configuration options IE of the PDU SESSION MODIFICATION COMMAND message. After the completion of the network-requested PDU session modification procedure, the UE should re-initiate the UE-requested PDU session establishment procedure with a new PDU session ID as specified in subclause 6.4.1 for:

a) the PDU session type associated with the present PDU session;

b) the SSC mode associated with the present PDU session;

c) the DNN associated with the present PDU session; and

d) the S-NSSAI associated with (if available in roaming scenarios) a mapped S-NSSAI if provided in the UE-requested PDU session establishment procedure of the present PDU session.

The UE shall include the PDU session ID of the old PDU session which is about to get released in the old PDU session ID IE of the UL NAS TRANSPORT message that transports the PDU SESSION ESTABLISHMENT REQUEST message.

NOTE 5: The UE is expected to maintain the PDU session for which the PDU SESSION MODIFICATION COMMAND message including 5GSM cause #39 "reactivation requested" is received during the time indicated by the PDU session address lifetime value or until receiving an indication from upper layers (e.g. that the old PDU session is no more needed).

If the selected PDU session type of the PDU session is "Unstructured" or "Ethernet", the UE supports inter-system change from N1 mode to S1 mode, the UE does not support establishment of a PDN connection for the PDN type set to "non-IP" in S1 mode, and the parameters list field of one or more authorized QoS flow descriptions received in the authorized QoS flow descriptions IE of the PDU SESSION MODIFICATION COMMAND message contains an EPS bearer identity (EBI) then the UE shall locally remove the EPS bearer identity (EBI) from the parameters list field of such one or more authorized QoS flow descriptions.

If the Always-on PDU session indication IE is included in the PDU SESSION MODIFICATION COMMAND message and:

a) the value of the IE is set to "Always-on PDU session required", the UE shall consider the established PDU session as an always-on PDU session; or

b) the value of the IE is set to "Always-on PDU session not allowed", the UE shall not consider the established PDU session as an always-on PDU session.

If the UE does not receive the Always-on PDU session indication IE in the PDU SESSION MODIFICATION COMMAND message:

a) if the network-requested PDU session modification procedure is triggered by a UE-requested PDU session modification procedure upon the first inter-system change from S1 mode to N1 mode for a PDN connection established when in S1 mode, the UE shall not consider the modified PDU session as an always-on PDU session; or

b) otherwise:

1) if the UE has received the Always-on PDU session indication IE with the value set to "Always-on PDU session required" for this PDU session, the UE shall consider the PDU session as an always-on PDU session; or

2) otherwise the UE shall not consider the PDU session as an always-on PDU session.

The UE shall transport the PDU SESSION MODIFICATION COMPLETE message and the PDU session ID, using the NAS transport procedure as specified in subclause 5.4.5.

After sending the PDU SESSION MODIFICATION COMPLETE message, if the "Create new EPS bearer" operation code in the mapped EPS bearer contexts IE was received in the PDU SESSION MODIFICATION COMMAND message and there is neither a corresponding authorized QoS flow descriptions IE in the PDU SESSION MODIFICATION COMMAND message nor an existing QoS flow description corresponding to the EPS bearer identity included in the mapped EPS bearer context, the UE shall send a PDU SESSION MODIFICATION REQUEST message including a mapped EPS bearer contexts IE to delete the mapped EPS bearer context.

Upon receipt of a PDU SESSION MODIFICATION COMPLETE message, the SMF shall stop timer T3591 and shall consider the PDU session as modified. If the selected SSC mode of the PDU session is "SSC mode 3" and the PDU SESSION MODIFICATION COMMAND message included 5GSM cause #39 "reactivation requested", the SMF shall start timer T3593. If the PDU Session Address Lifetime value is sent to the UE in the PDU SESSION MODIFICATION COMMAND message then timer T3593 shall be started with the same value, otherwise it shall use a default value.

[TS 24.008, clause 10.5.6.12]

The purpose of the *traffic flow template* information element is to specify the TFT parameters and operations for a PDP context. In addition, this information element may be used to transfer extra parameters to the network (e.g. the Authorization Token; see 3GPP TS 24.229 [95]). The TFT may contain packet filters for the downlink direction, the uplink direction or packet filters that are applicable to both directions. The packet filters determine the traffic mapping to PDP contexts. The downlink packet filters shall be used by the network and the uplink packet filters shall be used by the MS. A packet filter that is applicable to both directions shall be used by the network as a downlink packet filter and by the MS as an uplink packet filter.

The *traffic flow template* is a type 4 information element with a minimum length of 3 octets. The maximum length for the IE is 257 octets.

NOTE 1: The IE length restriction is due to the maximum length that can be encoded in a single length octet.

NOTE 2: A maximum size IPv4 packet filter can be 32 bytes. Therefore, 7 maximum size IPv4 type packet filters, plus the last packet filter which can contain max 30 octets can fit into one TFT IE, i.e. if needed not all packet filter components can be defined into one message. A maximum size IPv6 packet filter can be 60 bytes. Therefore, only 4 maximum size IPv6 packet filters can fit into one TFT IE. However, using "Add packet filters to existing TFT", it's possible to create a TFT data structure including 16 maximum size IPv4 or IPv6 filters.

The *traffic flow template* information element is coded as shown in figure 10.5.144/3GPP TS 24.008 and table 10.5.162/3GPP TS 24.008.

NOTE 3: The 3GPP TS 24.301 [120] reuses the traffic flow template information element for the purpose of the traffic flow aggregate description, where the use of individual TFT parameters, e.g. the packet filter identifier in the parameter list, can differ from this specification.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 8 | 7 | 6 | 5 | 4 | | 3 | 2 | 1 |  |
|  | Traffic flow template IEI | | | | | | | | | Octet 1 |
|  | Length of traffic flow template IE | | | | | | | | | Octet 2 |
|  | TFT operation code | | | E bit | | Number of packet filters | | | | Octet 3 |
|  | Packet filter list | | | | | | | | | Octet 4  Octet z |
|  | Parameters list | | | | | | | | | Octet z+1  Octet v |

Figure 10.5.144/3GPP TS 24.008: *Traffic flow template* information element

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
|  | 0 | 0 | 0 | 0 | Packet filter identifier 1 | | | | Octet 4 |
| Spare | | | |
|  | 0 | 0 | 0 | 0 | Packet filter identifier 2 | | | | Octet 5 |
| Spare | | | |
|  | … | | | | | | | |  |
|  | 0 | 0 | 0 | 0 | Packet filter identifier N | | | | Octet N+3 |
| Spare | | | |

Figure 10.5.144a/3GPP TS 24.008: *Packet filter list* when the TFT operation is "delete packet filters from existing TFT" (z=N+3)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
|  | 0 | 0 | Packet filter direction 1 | | Packet filter identifier 1 | | | | Octet 4 |
| Spare | |
|  | Packet filter evaluation precedence 1 | | | | | | | | Octet 5 |
|  | Length of Packet filter contents 1 | | | | | | | | Octet 6 |
|  | Packet filter contents 1 | | | | | | | | Octet 7  Octet m |
|  | 0 | 0 | Packet filter direction 2 | | Packet filter identifier 2 | | | | Octet m+1 |
| Spare | |
|  | Packet filter evaluation precedence 2 | | | | | | | | Octet m+2 |
|  | Length of Packet filter contents 2 | | | | | | | | Octet m+3 |
|  | Packet filter contents 2 | | | | | | | | Octet m+4  Octet n |
|  | … | | | | | | | | Octet n+1  Octet y |
|  | 0 | 0 | Packet filter direction N | | Packet filter identifier N | | | | Octet y+1 |
| Spare | |
|  | Packet filter evaluation precedence N | | | | | | | | Octet y+2 |
|  | Length of Packet filter contents N | | | | | | | | Octet y+3 |
|  | Packet filter contents N | | | | | | | | Octet y+4  Octet z |

Figure 10.5.144b/3GPP TS 24.008: *Packet filter list* when the TFT operation is "create new TFT", or "add packet filters to existing TFT" or "replace packet filters in existing TFT"

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
|  | Parameter identifier 1 | | | | | | | | Octet z+1 |
|  | Length of Parameter contents 1 | | | | | | | | Octet z+2 |
|  | Parameter contents 1 | | | | | | | | Octet z+3  Octet k |
|  | Parameter identifier 2 | | | | | | | | Octet k+1 |
|  | Length of Parameter contents 2 | | | | | | | | Octet k+2 |
|  | Parameter contents 2 | | | | | | | | Octet k+3  Octet p |
|  | … | | | | | | | | Octet p+1  Octet q |
|  | Parameter identifier N | | | | | | | | Octet q+1 |
|  | Length of Parameter contents N | | | | | | | | Octet q+2 |
|  | Parameter contents N | | | | | | | | Octet q+3  Octet v |

Figure 10.5.144c/3GPP TS 24.008: *Parameters list*

Table 10.5.162/3GPP TS 24.008: *Traffic flow template* information element

|  |
| --- |
| TFT operation code (octet 3) Bits 8 7 6  0 0 0 Ignore this IE 0 0 1 Create new TFT  0 1 0 Delete existing TFT  0 1 1 Add packet filters to existing TFT  1 0 0 Replace packet filters in existing TFT  1 0 1 Delete packet filters from existing TFT  1 1 0 No TFT operation  1 1 1 Reserved  The TFT operation code "No TFT operation" shall be used if a *parameters list* is included but no *packet filter list* is included in the *traffic flow template* information element.  The TFT operation code "Ignore this IE" shall be used by the MS if the Traffic flow aggregate information element has presence requirement "M" in a message, but the information element does not serve any useful purpose in the specific procedure for which the message is sent (see 3GPP TS 24.301 [120], subclauses 6.5.3.2 and 6.5.4.2). If the TFT operation code indicates "Ignore this IE", the MS shall also set the E bit and the number of packet filters to zero.  If the TFT operation code is set to "Ignore this IE" and the E bit and the number of packet filters to zero, then the network shall ignore the contents of the traffic flow template information element.  E bit (bit 5 of octet 3)  The *E bit* indicates if a *parameters list* is included in the TFT IE and it is encoded as follows:  0 *parameters list* is not included  1 parameters list is included  Number of packet filters (octet 3)  The *number of packet filters* contains the binary coding for the number of packet filters in the *packet filter list*. The *number of packet filters* field is encoded in bits 4 through 1 of octet 3 where bit 4 is the most significant and bit 1 is the least significant bit. For the "delete existing TFT" operation and for the "no TFT operation", the *number of packet filters* shall be coded as 0. For all other operations, the number of packet filters shall be greater than 0 and less than or equal to 15.  Packet filter list (octets 4 to z)  The *packet filter list* contains a variable number of packet filters. For the "delete existing TFT" operation and the "no TFT operation", the *packet filter list* shall be empty.  For the "delete packet filters from existing TFT" operation, the *packet filter list* shall contain a variable number of packet filter identifiers. This number shall be derived from the coding of the *number of packet filters* field in octet 3.  For the "create new TFT", "add packet filters to existing TFT" and "replace packet filters in existing TFT" operations, the *packet filter list* shall contain a variable number of packet filters. This number shall be derived from the coding of the *number of packet filters* field in octet 3.  Each packet filter is of variable length and consists of  - a packet filter identifier and direction (1 octet);  - a packet filter evaluation precedence (1 octet);  - the length of the packet filter contents (1 octet); and - the packet filter contents itself (v octets).  The *packet filter identifier* field is used to identify each packet filter in a TFT. The least significant 4 bits are used.  The *packet filter direction* is used to indicate, in bits 5 and 6, for what traffic direction the filter applies:  00 - pre Rel-7 TFT filter 01 - downlink only 10 - uplink only 11 - bidirectional  Bits 8 through 7 are spare bits.  The *packet filter evaluation precedence* field is used to specify the precedence for the packet filter among all packet filters in all TFTs associated with this PDP address. Higher the value of the *packet filter evaluation precedence* field, lower the precedence of that packet filter is. The first bit in transmission order is the most significant bit.  The *length of the packet filter contents* field contains the binary coded representation of the length of the *packet filter contents* field of a packet filter. The first bit in transmission order is the most significant bit.  The *packet filter contents* field is of variable size and contains a variable number (at least one) of *packet filter components*. Each *packet filter component* shall be encoded as a sequence of a one octet *packet filter component type identifier* and a fixed length *packet filter component value* field. The *packet filter component type identifier* shall be transmitted first.  In each packet filter, there shall not be more than one occurrence of each packet filter component type. Among the "IPv4 remote address type" and "IPv6 remote address type" packet filter components, only one shall be present in one packet filter. Among the "single local port type" and "local port range type" packet filter components, only one shall be present in one packet filter. Among the "single remote port type" and "remote port range type" packet filter components, only one shall be present in one packet filter.  The term *local* refers to the MS and the term *remote* refers to an external network entity.  Packet filter component type identifier Bits 8 7 6 5 4 3 2 1  0 0 0 1 0 0 0 0 IPv4 remote address type 0 0 0 1 0 0 0 1 IPv4 local address type  0 0 1 0 0 0 0 0 IPv6 remote address type 0 0 1 0 0 0 0 1 IPv6 remote address/prefix length type 0 0 1 0 0 0 1 1 IPv6 local address/prefix length type 0 0 1 1 0 0 0 0 Protocol identifier/Next header type 0 1 0 0 0 0 0 0 Single local port type 0 1 0 0 0 0 0 1 Local port range type 0 1 0 1 0 0 0 0 Single remote port type  0 1 0 1 0 0 0 1 Remote port range type 0 1 1 0 0 0 0 0 Security parameter index type 0 1 1 1 0 0 0 0 Type of service/Traffic class type 1 0 0 0 0 0 0 0 Flow label type 1 0 0 0 0 0 0 1 Destination MAC address type 1 0 0 0 0 0 1 0 Source MAC address type 1 0 0 0 0 0 1 1 802.1Q C-TAG VID type 1 0 0 0 0 1 0 0 802.1Q S-TAG VID type 1 0 0 0 0 1 0 1 802.1Q C-TAG PCP/DEI type 1 0 0 0 0 1 1 0 802.1Q S-TAG PCP/DEI type 1 0 0 0 0 1 1 1 Ethertype type  All other values are reserved.  The description and valid combinations of packet filter component type identifiers in a packet filter are defined in 3GPP TS 23.060 [74] subclause 15.3.2.  For "IPv4 remote address type", the *packet filter component value* field shall be encoded as a sequence of a four octet *IPv4 address* field and a four octet *IPv4 address mask* field. The *IPv4 address* field shall be transmitted first.  For "IPv4 local address type", the *packet filter component value* field shall be encoded as defined for "IPv4 remote address type". Both the MS and network indication for support of the Local address in TFTs are required to use this packet filter component.  For "IPv6 remote address type", the *packet filter component value* field shall be encoded as a sequence of a sixteen octet *IPv6 address* field and a sixteen octet *IPv6 address mask* field. The *IPv6 address* field shall be transmitted first.  For "IPv6 remote address/prefix length type", the packet filter component value field shall be encoded as a sequence of a sixteen octet IPv6 address field and one octet prefix length field. The IPv6 address field shall be transmitted first. This parameter shall be used, instead of IPv6 remote address type, when both the MS and network indication for support of the Local address in TFT are present.  For "IPv6 local address/prefix length type", the packet filter component value field shall be encoded as defined for "IPv6 remote address /prefix length".  Both the MS and network indication for support of the Local address in TFTs are required to use this packet filter component.  NOTE: Local IP address and mask can be used when IPv6 prefix delegation is used (see 3GPP TS 23.060 [74] subclause  9.2.1.2).  For "Protocol identifier/Next header type", the *packet filter component value* field shall be encoded as one octet which specifies the IPv4 protocol identifier or IPv6 next header.  For "Single local port type" and "Single remote port type", the *packet filter component value* field shall be encoded as two octet which specifies a port number.  For "Local port range type" and "Remote port range type", the *packet filter component value* field shall be encoded as a sequence of a two octet *port range low limit* field and a two octet *port range high limit* field. The *port range low limit* field shall be transmitted first.  For "Security parameter index", the *packet filter component value* field shall be encoded as four octet which specifies the IPSec security parameter index.  For "Type of service/Traffic class type", the *packet filter component value* field shall be encoded as a sequence of a one octet *Type-of-Service/Traffic Class* field and a one octet *Type-of-Service/Traffic Class* *mask* field. The *Type-of-Service/Traffic Class* field shall be transmitted first.  For "Flow label type", the *packet filter component value* field shall be encoded as three octet which specifies the IPv6 flow label. The bits 8 through 5 of the first octet shall be spare whereas the remaining 20 bits shall contain the IPv6 flow label.  Parameters list (octets z+1 to v)  For "destination MAC address type" and "source MAC address type", the *packet filter component value* field shall be encoded as 6 octets which specify a MAC address.  For "802.1Q C-TAG VID type", the *packet filter component value* field shall be encoded as two octets which specify the VID of the customer-VLAN tag (C-TAG). The bits 8 through 5 of the first octet shall be spare whereas the remaining 12 bits shall contain the VID.  For "802.1Q S-TAG VID type", the *packet filter component value* field shall be encoded as two octets which specify the VID of the service-VLAN tag (S-TAG). The bits 8 through 5 of the first octet shall be spare whereas the remaining 12 bits shall contain the VID.  For "802.1Q C-TAG PCP/DEI type", the *packet filter component value* field shall be encoded as one octet which specifies the 802.1Q C-TAG PCP and DEI. The bits 8 through 5 of the octet shall be spare, the bits 4 through 2 contain the PCP and bit 1 contains the DEI.  For "802.1Q S-TAG PCP/DEI type", the *packet filter component value* field shall be encoded as one octet which specifies the 802.1Q S-TAG PCP. The bits 8 through 5 of the octet shall be spare, the bits 4 through 2 contain the PCP and bit 1 contains the DEI.  For "ethertype type", the *packet filter component value* field shall be encoded as two octets which specify an ethertype.  The *parameters list* contains a variable number of parameters that may be transferred. If the *parameters list* is included, the *E bit* is set to 1; otherwise, the *E bit* is set to 0.  Each parameter included in the *parameters list* is of variable length and consists of:  - a parameter identifier (1 octet);  - the length of the parameter contents (1 octet); and - the parameter contents itself (v octets).  The *parameter identifier* field is used to identify each parameter included in the *parameters list* and it contains the hexadecimal coding of the parameter identifier. Bit 8 of the *parameter identifier* field contains the most significant bit and bit 1 contains the least significant bit. In this version of the protocol, the following parameter identifiers are specified:  - 01H (Authorization Token);  - 02H (Flow Identifier); and - 03H (Packet Filter Identifier).  If the *parameters list* contains a parameter identifier that is not supported by the receiving entity the corresponding parameter shall be discarded.  The *length of parameter contents* field contains the binary coded representation of the length of the *parameter contents* field. The first bit in transmission order is the most significant bit.  When the *parameter identifier* indicates Authorization Token, the *parameter contents* field contains an authorization token, as specified in 3GPP TS 29.207 [100]. The first octet is the most significant octet of the authorization token and the last octet is the least significant octet of the authorization token.  The *parameters list* shall be coded in a way that an Authorization Token (i.e. a parameter with identifier 01H) is always followed by one or more Flow Identifiers (i.e. one or more parameters with identifier 02H).  If the *parameters list* contains two or more consecutive Authorization Tokens without any Flow Identifiers in between, the receiver shall treat this as a semantical TFT error.  When the *parameter identifier* indicates Flow Identifier, the *parameter contents* field contains the binary representation of a flow identifier. The Flow Identifier consists of four octets. Octets 1 and 2 contains the Media Component number as specified in 3GPP TS 29.207 [100]. Bit 1 of octet 2 is the least significant bit, and bit 8 of octet 1 is the most significant bit. Octets 3 and 4 contains the IP flow number as specified in 3GPP TS 29.207 [100]. Bit 1 of octet 4 is the least significant bit, and bit 8 of octet 3 is the most significant bit.  When the *parameter identifier* indicates Packet Filter Identifier, the parameter contents field contains the binary representation of one or more packet filter identifiers. Each packet filter identifier is encoded in one octet, in the 4 least significant bits. This parameter is used by the MS and the network to identify one or more packet filters in a TFT when modifying the QoS of a PDP context without modifying the packet filter itself. |

10.1.2.1.3 Test description

10.1.2.1.3.1 Pre-test conditions

System Simulator:

- NGC Cell A.

UE:

- None.

Preamble:

- The UE is in state 3N-A on NGC Cell A with at least one PDU session for Internet active according to TS 38.508-1 [4], clause 4.4A.3 Table 4.4A.3-1 and using the message condition UE TEST LOOP MODE B active.

10.1.2.1.3.2 Test procedure sequence

Table 10.1.2.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS transmits a PDU session modification command message with PDU session ID IE is set to the same value as the first PDU session ID for Internet in the PDU SESSION ESTABLISHMENT REQUEST message. This message is included in a DLInformationTransfer message. | <-- | PDU SESSION MODIFICATION COMMAND | - | - |
| 2 | Check: Does the UE transmit a PDU session modification complete? | --> | PDU SESSION MODIFICATION COMPLETE | 1 | P |
| 3 | The SS transmits one IP Packet matching with new packet filter (reference packet filter list #2). | - | - | - | - |
| 4 | Check: Does UE send the IP Packet on the data radio bearer associated with the PDU QoS rule? | - | - | 2 | P |

10.1.2.1.3.3 Specific message contents

Table 10.1.2.1.3.3-1: PDU SESSION MODIFICATION COMMAND (Step 1, Table 10.1.2.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.2-9 | | | |
| Information Element | Value/Remark | Comment | Condition |
| PDU session ID | The value the first PDU session ID for Internet indicated in PDU SESSION ESTABLISHMENT REQUEST message in the preamble |  |  |
| Authorized QoS rules | Reference QoS rule #3 as defined in 38.508-1 [4] table 4.8.2.1-3. |  |  |

#### 10.1.2.2 Network-requested PDU session modification / Abnormal / PDU session in state PDU SESSION INACTIVE

10.1.2.2.1 Test Purpose (TP)

(1)

**with** { the UE in PDU SESSION ACTIVE state and 5GMM-CONNECTED mode }

**ensure that** {

**when** { the UE receives a PDU SESSION MODIFICATION COMMAND message include the PDU session ID which belong to any PDU session in PDU SESSION INACTIVE state in UE }

**then** { UE sends a 5GSM STATUS message and set the 5GSM cause to #43: invalid PDU session identity }

}

10.1.2.2.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clauses 6.3.2.6 and 7.3.2. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 6.3.2.6]

The following abnormal cases can be identified:

a) PDU session inactive for the received PDU session ID.

If the PDU session ID in the PDU SESSION MODIFICATION COMMAND message belongs to any PDU session in state PDU SESSION INACTIVE in the UE, the UE shall set the 5GSM cause IE to #43 "Invalid PDU session identity" in the 5GSM STATUS message, and set the PDU session ID to the received PDU session ID in the UL NAS TRANSPORT message as specified in subclause 5.4.5.

[TS 24.501, clause 7.3.2]

The following UE procedures shall apply for handling an unknown, erroneous, or unforeseen PDU session identity received in the header of a 5GSM message:

a) If the UE receives a 5GSM message which includes an unassigned or reserved PDU session identity value, the UE shall ignore the message.

b) If the UE receives a 5GSM message which includes a PDU session identity belonging to any PDU session in state PDU SESSION INACTIVE in the UE, the UE shall respond with a 5GSM STATUS message including 5GSM cause #43 "invalid PDU session identity".

10.1.2.2.3 Test description

10.1.2.2.3.1 Pre-test conditions

System Simulator:

- NGC Cell A.

UE:

- None.

Preamble:

- The UE is in state 3N-A on NGC Cell A with at least one PDU session for Internet active according to 38.508-1 [4]

10.1.2.2.3.2 Test procedure sequence

Table 10.1.2.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 0A | Cause the UE to request establishment of PDU session Y to the DN. (Note 1) | - | - | - | - |
| 0B | The PDU session establishment procedure as specified in TS 38.508-1 [4] subclause 4.5A.2 takes place | - | - | - | - |
| 1 | The generic test procedure in TS 38.508-1 clause 4.9.21 for PDU Session Release is performed message with PDU session ID IE is set to the same value as the first PDU session ID for Internet in PDU SESSION ESTABLISHMENT REQUEST message in preamble. | - | - | - | - |
| 2 | Void | - |  | - | - |
| 3 | The SS transmits a PDU session modification command message with PDU session ID IE is set to the same value in PDU SESSION RELEASE COMMAND message. This message is included in a DLInformationTransfer message. | <-- | PDU SESSION MODIFICATION COMMAND | - | - |
| 4 | Check: Does the UE transmit a 5GSM STATUS with the 5GSM cause IE indicating #43 "invalid PDU session identity"? | --> | 5GSM STATUS | 1 | P |
| Note 1: he request of connectivity to an additional PDU session may be performed by MMI or AT command. | | | | | |

10.1.2.2.3.3 Specific message contents

Table 10.1.2.2.3.3-1: PDU SESSION MODIFICATION COMMAND (Step 3, Table 10.1.2.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.2-9 | | | |
| Information Element | Value/Remark | Comment | Condition |
| PDU session ID | The same value in PDU SESSION RELEASE COMMAND message |  |  |

Table 10.1.2.2.3.3-2: 5GSM STATUS (Step 4, Table 10.1.2.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.2-16 | | | |
| Information Element | Value/Remark | Comment | Condition |
| PDU session ID | The same value as the value set in PDU SESSION modification command message |  |  |
| 5GSM cause | ‘00101011’B | Invalid PDU session identity |  |

Table 10.1.2.2.3.3-3: PDU SESSION RELEASE COMMAND (Step 1, Table 10.1.2.2.3.2-1; step 1, TS 36.508 [4] Table 4.9.21.2.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.2-14 | | | |
| Information Element | Value/Remark | Comment | Condition |
| PDU session ID | The value of the first PDU session ID for Internet indicated in PDU SESSION ESTABLISHMENT REQUEST message in preamble |  |  |

### 10.1.3 Network-requested PDU session release

#### 10.1.3.1 Void

#### 10.1.3.2 Network-requested PDU session release / Insufficient resources, insufficient resources for specific slice and DNN, abnormal / Invalid PDU session identity

10.1.3.2.1 Test Purpose (TP)

(1)

**with** { UE is in PDU SESSION ACTIVE state }

**ensure that** {

**when** { UE receives a PDU SESSION RELEASE COMMAND message including 5GSM cause #26 "insufficient resources" and the Back-off timer value that indicates neither zero nor deactivated }

**then** { UE does not send a PDU SESSION ESTABLISHMENT REQUEST until timer T3396 expires or timer T3396 is stopped }

}

(2)

**with** { UE is in PDU SESSION ACTIVE state }

**ensure that** {

**when** { UE receives a PDU SESSION RELEASE COMMAND message including 5GSM cause #26 "insufficient resources" and the Back-off timer value that indicates zero }

**then** { UE sends a PDU SESSION ESTABLISHMENT REQUEST message }

}

(3)

**with** { UE is in PDU SESSION ACTIVE state }

**ensure that** {

**when** { UE receives a PDU SESSION RELEASE COMMAND message including 5GSM cause #26 "insufficient resources" and the Back-off timer value that indicates deactivated }

**then** { UE does not send a PDU SESSION ESTABLISHMENT REQUEST message until the UE is switched off or the USIM is removed }

}

(4)

**with** { UE is in PDU SESSION ACTIVE state }

**ensure that** {

**when** { UE receives a PDU SESSION RELEASE COMMAND message including 5GSM cause #67 "insufficient resources for specific slice and DNN" and the Back-off timer value that indicates neither zero nor deactivated }

**then** { UE does not send a PDU SESSION ESTABLISHMENT REQUEST message for the same [S-NSSAI, DNN] combination until timer T3584 expires }

}

(5)

**with** { UE is in PDU SESSION ACTIVE state }

**ensure that** {

**when** { UE receives a PDU SESSION RELEASE COMMAND message including 5GSM cause #67 "insufficient resources for specific slice and DNN" and the Back-off timer value that indicates zero }

**then** { UE sends a PDU SESSION ESTABLISHMENT REQUEST message for the same [S-NSSAI, DNN] combination }

}

(6)

**with** { UE is in PDU SESSION ACTIVE state }

**ensure that** {

**when** { UE receives a PDU SESSION RELEASE COMMAND message including 5GSM cause #67 "insufficient resources for specific slice and DNN" and the Back-off timer value that indicates deactivated }

**then** { UE does not send a PDU SESSION ESTABLISHMENT REQUEST message for the same [S-NSSAI, DNN] combination until the UE is switched off or the USIM is removed }

}

(7)

**with** { UE is in PDU SESSION ACTIVE state }

**ensure that** {

**when** { UE receives a PDU SESSION RELEASE COMMAND message, in which the PDU session ID belongs to any PDU session in state PDU SESSION INACTIVE in the UE }

**then** { UE sends 5GSM STATUS message including 5GSM cause #43 "Invalid PDU session identity" }

}

10.1.3.2.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501, clause 6.3.3.2 and 6.3.3.3. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 6.3.3.2]

In order to initiate the network-requested PDU session release procedure, the SMF shall create a PDU SESSION RELEASE COMMAND message.

The SMF shall set the SM cause IE of the PDU SESSION RELEASE COMMAND message to indicate the reason for releasing the PDU session.

The SM cause IE typically indicates one of the following SM cause values:

#26 insufficient resources;

…

#67 insufficient resources for specific slice and DNN;

…

The SMF may include a Back-off timer value IE in the PDU SESSION RELEASE COMMAND message when the 5GSM cause value #26 "insufficient resources" is included in the PDU SESSION RELEASE COMMAND message. If the 5GSM cause value is #26 "insufficient resources" and the PDU SESSION RELEASE COMMAND message is sent to a UE configured for high priority access in selected PLMN or the request type was set to "initial emergency request" or "existing emergency PDU session" for the establishment of the PDU session, the network shall not include a Back-off timer value IE.

The SMF may include a Back-off timer value IE in the PDU SESSION RELEASE COMMAND message when the 5GSM cause value #67 "insufficient resources for specific slice and DNN" is included in the PDU SESSION RELEASE COMMAND message. If the 5GSM cause value is #67 "insufficient resources for specific slice and DNN" and the PDU SESSION RELEASE COMMAND message is sent to a UE configured for high priority access in selected PLMN or the request type was set to "initial emergency request" or "existing emergency PDU session" for the establishment of the PDU session, the network shall not include a Back-off timer value IE.

[TS 24.501, clause 6.3.3.3]

Upon receipt of a PDU SESSION RELEASE COMMAND message and a PDU session ID, using the NAS transport procedure as specified in subclause 5.4.5, the UE considers the PDU session as released and the UE shall create a PDU SESSION RELEASE COMPLETE message.

…

If the PDU SESSION RELEASE COMMAND message includes 5GSM cause #26 "insufficient resources" and the Back-off timer value IE, the UE shall take different actions depending on the timer value received for timer T3396 in the Back-off timer value:

a) If the timer value indicates neither zero nor deactivated and a DNN was provided during the PDU session establishment, the UE shall stop timer T3396 associated with the corresponding DNN, if it is running. If the timer value indicates neither zero nor deactivated and no DNN was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", the UE shall stop timer T3396 associated with no DNN if it is running. The UE shall then start timer T3396 with the value provided in the Back-off timer value IE and:

1) shall not send a PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1, for the same DNN that was sent by the UE, until timer T3396 expires or timer T3396 is stopped; and

2) shall not send a PDU SESSION ESTABLISHMENT REQUEST message without an DNN and with request type different from "initial emergency request" and different from "existing emergency PDU session", or a PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1, for a non-emergency PDU session established without an DNN provided by the UE, if no DNN was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", until timer T3396 expires or timer T3396 is stopped.

The UE shall not stop timer T3396 upon a PLMN change or inter-system change;

b) if the timer value indicates that this timer is deactivated and a DNN was provided during the PDU session establishment, the UE shall stop timer T3396 associated with the corresponding DNN, if it is running. If the timer value indicates that this timer is deactivated and no DNN was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", the UE shall stop timer T3396 associated with no DNN if it is running. The UE:

1) shall not send a PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1, for the same DNN until the UE is switched off or the USIM is removed, or the UE receives a PDU SESSION MODIFICATION COMMAND message for the same DNN from the network or a PDU SESSION RELEASE COMMAND message including 5GSM cause #39 "reactivation requested" for the same DNN from the network; and

2) shall not send a PDU SESSION ESTABLISHMENT REQUEST message without an DNN and with request type different from "initial emergency request" and different from "existing emergency PDU session", or a PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1, for a non-emergency PDU session established without an DNN provided by the UE, if no DNN was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", until the UE is switched off or the USIM is removed, or the UE receives a PDU SESSION MODIFICATION COMMAND message for a non-emergency PDU session established without an DNN provided by the UE, or a PDU SESSION RELEASE COMMAND message including 5GSM cause IE set to 5GSM cause #39 "reactivation requested" for a non-emergency PDU session established without an DNN provided by the UE.

The timer T3396 remains deactivated upon a PLMN change or inter-system change; and

c) if the timer value indicates zero, the UE:

1) shall stop timer T3396 associated with the corresponding DNN, if running, and may send a PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same DNN; and

2) if no DNN was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", the UE shall stop timer T3396 associated with no DNN, if running, and may send a PDU SESSION ESTABLISHMENT REQUEST message without a DNN, or a PDU SESSION MODIFICATION REQUEST message without an DNN provided by the UE.

If the PDU SESSION RELEASE COMMAND message includes 5GSM cause #26 "insufficient resources" and the Back-off timer value IE is not included, then the UE may send a PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same DNN or without a DNN.

When the timer T3396 is running or the timer is deactivated, the UE is allowed to initiate a PDU session establishment procedure for emergency services.

If the timer T3396 is running when the UE enters state 5GMM-DEREGISTERED, the UE remains switched on, and the USIM in the UE remains the same, then timer T3396 is kept running until it expires or it is stopped.

If the UE is switched off when the timer T3396 is running, and if the USIM in the UE remains the same when the UE is switched on, the UE shall behave as follows:

- let t1 be the time remaining for T3396 timeout at switch off and let t be the time elapsed between switch off and switch on. If t1 is greater than t, then the timer shall be restarted with the value t1 – t. If t1 is equal to or less than t, then the timer need not be restarted. If the UE is not capable of determining t, then the UE shall restart the timer with the value t1.

If the 5GSM cause value is #67 "insufficient resources for specific slice and DNN" and the Back-off timer value IE is included, the UE shall take different actions depending on the timer value received for timer T3584 in the Back-off timer value:

a) If the timer value indicates neither zero nor deactivated, the UE shall stop timer T3584 associated with the same [S-NSSAI, DNN] combination as that the UE provided when the PDU session is established, if it is running. The UE shall then start timer T3584 with the value provided in the Back-off timer value IE.

The UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message with request type different from "initial emergency request" and different from "existing emergency PDU session", or PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1, for the same [S-NSSAI, DNN] combination that was sent by the UE, until timer T3584 expires or timer T3584 is stopped;

The UE shall not stop timer T3584 upon a PLMN change or inter-system change;

b) if the timer value indicates that this timer is deactivated, the UE shall stop timer T3584 associated with the same [S-NSSAI, DNN] combination as that the UE provided when the PDU session is established, if it is running.

The UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message with request type different from "initial emergency request" and different from "existing emergency PDU session", or PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1, for the same [S-NSSAI, DNN] combination that was sent by the UE, until the UE is switched off or the USIM is removed, or the UE receives a PDU SESSION MODIFICATION REQUEST message for the same [S-NSSAI, DNN] combination from the network or a PDU SESSION RELEASE COMMAND message including 5GSM cause #39 "reactivation requested" for the same [S-NSSAI, DNN] combination from the network; and

The timer T3584 remains deactivated upon a PLMN change or inter-system change; and

c) if the timer value indicates zero, the UE shall stop timer T3584 associated with the same [S-NSSAI, DNN] combination that was sent by the UE, if running, and may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same [S-NSSAI, DNN] combination.

If the 5GSM cause value is #67 "insufficient resources for specific slice and DNN" and the Back-off timer value IE is not included, then the UE may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same [S-NSSAI, DNN] combination.

When the timer T3584 is running or the timer is deactivated, the UE is allowed to initiate a PDU session establishment procedure for emergency services.

If the timer T3584 is running when the UE enters state 5GMM-DEREGISTERED, the UE remains switched on, and the USIM in the UE remains the same, then timer T3584 is kept running until it expires or it is stopped.

If the UE is switched off when the timer T3584 is running, and if the USIM in the UE remains the same when the UE is switched on, the UE shall behave as follows:

- let t1 be the time remaining for T3584 timeout at switch off and let t be the time elapsed between switch off and switch on. If t1 is greater than t, then the timer shall be restarted with the value t1 – t. If t1 is equal to or less than t, then the timer need not be restarted. If the UE is not capable of determining t, then the UE shall restart the timer with the value t1.

[TS 24.501, clause 6.3.3.6]

The following abnormal cases can be identified:

a) PDU session inactive for the received PDU session ID.

If the PDU session ID in the PDU SESSION RELEASE COMMAND message belongs to any PDU session in state PDU SESSION INACTIVE in the UE, the UE shall include the 5GSM cause #43 "Invalid PDU session identity" in the 5GSM STATUS message, and set the PDU session ID to the received PDU session ID in the UL NAS TRANSPORT message as specified in subclause 5.4.5.

[TS 24.501, clause B.1]

Cause #43 –Invalid PDU session identity

This 5GSM cause is used by the network or the UE to indicate that the PDU session identity value provided to it is not a valid value or the PDU session identified by the PDU session identity IE in the request or the command is not active.

[24.501, clause 7.3.2]

…

The following UE procedures shall apply for handling an unknown, erroneous, or unforeseen PDU session identity received in the header of a 5GSM message:

a) If the UE receives a 5GSM message which includes an unassigned or reserved PDU session identity value, the UE shall ignore the message.

b) If the UE receives a 5GSM message which includes a PDU session identity belonging to any PDU session in state PDU SESSION INACTIVE in the UE, the UE shall respond with a 5GSM STATUS message including 5GSM cause #43 "invalid PDU session identity".

10.1.3.2.3 Test description

10.1.3.2.3.1 Pre-test conditions

System Simulator:

- NGC Cell A.

UE:

None.

Preamble:

- The UE is in state 3N-A on NGC Cell A according to TS 38.508-1 [4].

10.1.3.2.3.2 Test procedure sequence

Table 10.1.3.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U – S | Message |  |  |
| 1 | Cause the UE to request establishment of PDU session without DNN.(Note 1) | - | - | - | - |
| 2 | The PDU session establishment procedure as specified in TS 38.508-1 [4] subclause 4.5A.2 take place. | - | - | - | - |
| 3 | The generic test procedure in TS 38.508-1 Table 4.9.21.2.2-1 of Procedure for PDU Session Release is performed. | - | - | - | - |
| 4 | Void | - | - | - | - |
| 5 | Cause the UE to request establishment of PDU session without DNN within 2 minutes of Step 3 (Note 1) | - | - | - | - |
| 6 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST message before timer T3396 has expired? | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 1 | F |
| 7 | Cause the UE to request establishment of PDU session without DNN after 2 minutes since Step 3.(Note 1) | - | - | - | - |
| 8 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST message? | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 1 | P |
| 9 | The SS transmits a PDU SESSION ESTABLISHMENT ACCEPT message. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |
| 10 | The generic test procedure in TS 38.508-1 Table 4.9.21.2.2-1 of Procedure for PDU Session Release is performed | - | - | - | - |
| 11 | Void | - | - | - | - |
| 12 | Cause the UE to request establishment of PDU session without DNN.(Note 1) | - | - | - | - |
| 13 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST message? | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 2 | P |
| 14 | The SS transmits a PDU SESSION ESTABLISHMENT ACCEPT message. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |
| 15 | The generic test procedure in TS 38.508-1 Table 4.9.21.2.2-1 of Procedure for PDU Session Release is performed | - | - | - | - |
| 16 | Void | - | - | - | - |
| 17 | Cause the UE to request establishment of PDU session without DNN.(Note 1) | - | - | - | - |
| 18 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST message in 5 seconds? | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 3 | F |
| 19 | Switch off UE in RRC CONNECTED as described in TS38.508-1 [4] subclause 4.9.6.3 | - |  |  |  |
| 20 | Switch on UE. | - |  |  |  |
| 21 | The general procedure is completed by executing of the UE registration procedure in TS 38.508-1 [4] table 4.5.2.2-2 , '*connected without release*'. | - |  |  |  |
| 22 | Cause the UE to request establishment of PDU session without DNN.(Note 1) | - | - | - | - |
| 23 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST message? | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 3 | P |
| 24 | The SS transmits a PDU SESSION ESTABLISHMENT ACCEPT message. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |
| 25 | Cause the UE to request establishment of PDU session with [S-NSSAI, DNN] combination.(Note 1) | - | - | - | - |
| 26 | The PDU session establishment procedure as specified in TS 38.508-1 [4] subclause 4.5A.2 take place. | - | - | - | - |
| 27 | The generic test procedure in TS 38.508-1 Table 4.9.21.2.2-1 of Procedure for PDU Session Release is performed | - | - | - | - |
| 28 | Void | - | - | - | - |
| 29 | Cause the UE to request establishment of PDU session with the same [S-NSSAI, DNN] combination as the PDU session established at step 26 within 2 minutes of Step 27.(Note 1) | - | - | - | - |
| 30 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST before timer T3584 has expired? | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 4 | F |
| 31 | Cause the UE to request establishment of PDU session with the same [S-NSSAI, DNN] combination as the PDU session established at step 26 after 2 minutes since Step 27.(Note 1) | - | - | - | - |
| 32 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST? | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 4 | P |
| 33 | The SS transmits a PDU SESSION ESTABLISHMENT ACCEPT message. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |
| 34 | The generic test procedure in TS 38.508-1 Table 4.9.21.2.2-1 of Procedure for PDU Session Release is performed | - | - | - | - |
| 35 | Void | - | - | - | - |
| 36 | Cause the UE to request establishment of PDU session with the same [S-NSSAI, DNN] combination as the PDU session established at step 26.(Note 1) | - | - | - | - |
| 37 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST? | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 5 | P |
| 38 | The SS transmits a PDU SESSION ESTABLISHMENT ACCEPT message. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |
| 39 | The generic test procedure in TS 38.508-1 Table 4.9.21.2.2-1 of Procedure for PDU Session Release is performed | - | - | - | - |
| 40 | Void | - | - | - | - |
| 41 | Cause the UE to request establishment of PDU session with the same [S-NSSAI, DNN] combination as the PDU session established at step 26.(Note 1) | - | - | - | - |
| 42 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST in 5 seconds? | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 6 | F |
| 43 | The SS transmits a PDU SESSION RELEASE COMMAND including the PDU session ID UE requested in step 42. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION RELEASE COMMAND | - | - |
| 44 | Check: Does the UE transmit a 5GSM STATUS message with value #43? | --> | 5GSM: UL NAS TRANSPORT  5GSM: 5GSM STATUS | 7 | P |
| 45 | Switch off UE in RRC CONNECTED as described in TS38.508-1 [4] subclause 4.9.6.3 | - | - | - | - |
| 46 | Switch on UE. | - | - | - | - |
| 47 | The general procedure is completed by executing of the UE registration procedure in TS 38.508-1 [4] table 4.5.2.2-2 , 'connected without release'. | - | - | - | - |
| 48 | Cause the UE to request establishment of PDU session with the same [S-NSSAI, DNN] combination as the PDU session established at step 26.(Note 1) | - | - | - | - |
| 49 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST? | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 6 | P |
| 50 | The SS transmits a PDU SESSION ESTABLISHMENT ACCEPT message. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |
| Note 1: The request to establish a PDU session may be performed by MMI or AT Command. | | | | | |

Table 10.1.3.2.3.2-2: Void

Table 10.1.3.2.3.2-3: Void

10.1.3.2.3.3 Specific message contents

Table 10.1.3.2.3.3-1: UL NAS TRANSPORT (step 2, 8, 13 and 23, Table 10.1.3.2.3.2-1; step 2a1, Table 4.5A.2.2.2-2, TS 38.508-1[4]); step 2a1, Table 4.5A.2.2.2-2, TS 38.508-1 [4]))

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.1-10 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0001’B | N1 SM information |  |
| Payload container | PDU SESSION ESTABLISHMENT REQUEST |  |  |
| DNN | Not present |  |  |

Table 10.1.3.2.3.3-1A: PDU SESSION ESTABLISHMENT ACCEPT (step 2, 9, 14 and 24, Table 10.1.3.2.3.2-1; step 3, Table 4.5A.2.2.2-1, TS 38.508-1 [4])

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-2 | | | |
| Information Element | Value/remark | Comment | Condition |
| Authorized QoS rules | 5GC QoS rule of the Config#1 in Table 4.8.4-1 |  |  |
| Mapped EPS bearer contexts |  |  |  |
| Mapped EPS bearer context |  |  |  |
| Mapped EPS QoS parameters | EPC default bearer context of the Config#1 in Table 4.8.4-1 |  |  |
| DNN | The DNN/APN ID of the Config#1 in Table 4.8.4-1 |  |  |

Table 10.1.3.2.3.3-2: PDU SESSION RELEASE COMMAND (step 3, Table 10.1.3.2.3.2-1; step 1, Table 4.9.21.2.2-1, TS 38.508-1 [4])

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.2-14 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | The same ID as the ID of PDU session which UE request in step 2 in Table 10.1.3.2.3.2-1 |  |  |
| 5GSM cause | '0001 1010'B | insufficient resources |  |
| Back-off timer value | ‘1010 0010’B | 2 minutes |  |

Table 10.1.3.2.3.3-3: Void

Table 10.1.3.2.3.3-4: PDU SESSION RELEASE COMMAND (step 10, Table 10.1.3.2.3.2-1; step 1, Table 4.9.21.2.2-1, TS 38.508-1 [4])

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.2-14 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | The same ID as the ID of PDU session which UE request in step 8 in Table 10.1.3.2.3.2-1 |  |  |
| 5GSM cause | '0001 1010'B | insufficient resources |  |
| Back-off timer value | ‘1010 0000’B | 0 minutes |  |

Table 10.1.3.2.3.3-5: PDU SESSION RELEASE COMMAND (step 15, Table 10.1.3.2.3.2-1; step 1, Table 4.9.21.2.2-1, TS 38.508-1 [4])

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.2-14 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | The same ID as the ID of PDU session which UE request in step 13 in Table 10.1.3.2.3.2-1 |  |  |
| 5GSM cause | '0001 1010'B | insufficient resources |  |
| Back-off timer value | ‘1110 0000’B | deactivated |  |

Table 10.1.3.2.3.3-6: UL NAS TRANSPORT (step 26, Table 10.1.3.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.1-10 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0001’B | N1 SM information |  |
| Payload container | PDU SESSION ESTABLISHMENT REQUEST |  |  |
| S-NSSAI | present |  |  |
| DNN | present |  |  |

Table 10.1.3.2.3.3-6A: PDU SESSION ESTABLISHMENT ACCEPT (step 26, 33, 38, and 50,Table 10.1.3.2.3.2-1; step 3, Table 4.5A.2.2.2-1, TS 38.508-1 [4])

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-2 | | | |
| Information Element | Value/remark | Comment | Condition |
| Authorized QoS rules | 5GC QoS rule of the Config#1 in Table 4.8.4-1 |  |  |
| Mapped EPS bearer contexts |  |  |  |
| Mapped EPS bearer context |  |  |  |
| Mapped EPS QoS parameters | EPC default bearer context of the Config#1 in Table 4.8.4-1 |  |  |
| DNN | The same DNN value as sent in the UL NAS TRANSPORT message at (step 26, 33, 38, and 50,Table 10.1.3.2.3.2-1; step 2a1, Table 4.5A.2.2.2-2, TS 38.508-1 [4]) |  |  |

Table 10.1.3.2.3.3-7: PDU SESSION RELEASE COMMAND (step 27, Table 10.1.3.2.3.2-1; step 1, Table 4.9.21.2.2-1, TS 38.508-1 [4])

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.2-14 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | The same ID as the ID of PDU session which UE request in step 26 in Table 10.1.3.2.3.2-1 |  |  |
| 5GSM cause | ‘0100 0011’B | insufficient resources for specific slice and DNN |  |
| Back-off timer value | ‘1010 0010’B | 2 minutes |  |

Table 10.1.3.2.3.3-8: UL NAS TRANSPORT (step 32, 37 and 49, Table 10.1.3.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.1-10 | | | |
| Information Element | Value/remark | Comment | Condition |
| Payload container type | ‘0001’B | N1 SM information |  |
| Payload container | PDU SESSION ESTABLISHMENT REQUEST |  |  |
| S-NSSAI | The same S-NSSAI as the S-NSSAI of the PDU session which UE request at step 26 |  |  |
| DNN | The same DNN as the DNN of the PDU session which UE request at step 26 |  |  |

Table 10.1.3.2.3.3-9: PDU SESSION RELEASE COMMAND (step 34, Table 10.1.3.2.3.2-1; step 1, Table 4.9.21.2.2-1, TS 38.508-1 [4])

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.2-14 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | The same ID as the ID of PDU session which UE request in step 32 in Table 10.1.3.2.3.2-1 |  |  |
| 5GSM cause | ‘0100 0011’B | insufficient resources for specific slice and DNN |  |
| Back-off timer value | ‘1010 0000’B | 0 minutes |  |

Table 10.1.3.2.3.3-10: PDU SESSION RELEASE COMMAND (step 39, Table 10.1.3.2.3.2-1; step 1, Table 4.9.21.2.2-1, TS 38.508-1 [4])

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.2-14 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | The same ID as the ID of PDU session which UE request in step 37 in Table 10.1.3.2.3.2-1 |  |  |
| 5GSM cause | ‘0100 0011’B | insufficient resources for specific slice and DNN |  |
| Back-off timer value | ‘1110 0000’B | deactivated |  |

Table 10.1.3.2.3.3-11: PDU SESSION RELEASE COMMAND (step 43, Table 10.1.3.2.3.2-1; step 1, Table 4.9.21.2.2-1, TS 38.508-1 [4])

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.2-14 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | The same ID as the ID of PDU session which UE request in step 37 in Table 10.1.3.2.3.2-1 |  |  |
| 5GSM cause | '0010 0100'B | #36 regular deactivation |  |

Table 10.1.3.2.3.3-11A: UL NAS TRANSPORT (step 44, Table 10.1.3.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.1-10 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | The same ID as the ID of PDU session which UE request in step 37 in Table 10.1.3.2.3.2-1 |  |  |
| Payload container type | ‘0001’B | N1 SM information |  |
| Payload container | 5GSM STATUS |  |  |

Table 10.1.3.2.3.3-12: 5GSM STATUS (Table 10.1.3.2.3.3-11A)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.2-16 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GSM cause | ‘0010 1011’B | #43 Invalid PDU session identity |  |

### 10.1.4 UE-requested PDU session establishment

#### 10.1.4.1 UE-requested PDU session establishment / Abnormal / T3580

10.1.4.1.1 Test Purpose (TP)

(1)

**with** { the UE in 5GMM-REGISTERED state and at least one PDU session has been established. the SS sends PDU SESSION RELEASE COMMAND with #39 "reactivation requested", and the UE has sent a PDU SESSION ESTABLISHMENT REQUEST message }

**ensure that** {

**when** { On the 1st, 2nd, 3rd, 4th expiry of timer T3580 }

**then** { the UE retransmits PDU SESSION ESTABLISHMENT REQUEST message and the PDU session information which was transported together with the initial transmission of the PDU SESSION ESTABLISHMENT REQUEST message }

}

(2)

**with** { the UE in 5GMM-REGISTERED state and has sent a PDU SESSION ESTABLISHMENT REQUEST message }

**ensure that** {

**when** { on the maximum 5th expiry of timer T3580 }

**then** { the UE aborts the procedure }

}

10.1.4.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clause 6.4.1.6. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 6.4.1.6]

The following abnormal cases can be identified:

a) Expiry of timer T3580

The UE shall, on the first expiry of the timer T3580, retransmit the PDU SESSION ESTABLISHMENT REQUEST message and the PDU session information which was transported together with the initial transmission of the PDU SESSION ESTABLISHMENT REQUEST message and shall reset and start timer T3580, if still needed. This retransmission can be repeated up to four times, i.e. on the fifth expiry of timer T3580, the UE shall abort the procedure, release the allocated PTI and enter the state PROCEDURE TRANSACTION INACTIVE.

10.1.4.1.3 Test description

10.1.4.1.3.1 Pre-test conditions

System Simulator:

- NGC Cell A.

UE:

- None.

Preamble:

- The UE is in state 3N-A on NGC Cell A with at least one PDU session X (1 <= X <= 15) active according to 38.508-1 [4].

10.1.4.1.3.2 Test procedure sequence

Table 10.1.4.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 0A | Cause the UE to request establishment of PDU session Y to the DN. (Note 3) | - | - | - | - |
| 0B | The PDU session establishment procedure as specified in TS 38.508-1 [4] subclause 4.5A.2 takes place | - | - | - | - |
| 1 | The generic test procedure in TS 38.508-1 clause 4.9.21 for PDU Session Release is performed with PDU SESSION RELEASE COMMAND message includes 5GSM cause #39 "reactivation requested" to release PDU session X. | - | - | - | - |
| 2-15 | Void. | - | - | - | - |
| 16 | The UE transmits a PDU SESSION ESTABLISHMENT REQUEST message and the S-NSSAI and DNN in UL NAS TRANSPORT message are the same values as released (Note 2). | --> | 5GMM: UL NAS TRANSPORT 5GSM: PDU SESSION ESTABLISHMENT REQUEST | - | - |
| 17 | The SS waits 16 seconds (T3580). | - | - | - | - |
| 18 | Check: Does the UE re-transmit the PDU SESSION ESTABLISHMENT REQUEST message and the S-NSSAI and DNN in UL NAS TRANSPORT message are the same values as sent in step 16? | --> | 5GMM: UL NAS TRANSPORT 5GSM: PDU SESSION ESTABLISHMENT REQUEST | 1 | P |
| 19 | The SS waits 16 seconds (2nd expiry of T3580). | - | - | - | - |
| 20 | Check: Does the UE re-transmit the PDU SESSION ESTABLISHMENT REQUEST message and the S-NSSAI and DNN in UL NAS TRANSPORT message are the same values as sent in step 16? | --> | 5GMM: UL NAS TRANSPORT 5GSM: PDU SESSION ESTABLISHMENT REQUEST | 1 | P |
| 21 | The SS waits 16 seconds (3rd expiry of T3580). | - | - | - | - |
| 22 | Check: Does the UE re-transmit the PDU SESSION ESTABLISHMENT REQUEST message and the S-NSSAI and DNN in UL NAS TRANSPORT message are the same values as sent in step 16? | --> | 5GMM: UL NAS TRANSPORT 5GSM: PDU SESSION ESTABLISHMENT REQUEST | 1 | P |
| 23 | The SS waits 16 seconds (4th expiry of T3580). | - | - | - | - |
| 24 | Check: Does the UE re-transmit the PDU SESSION ESTABLISHMENT REQUEST message and the S-NSSAI and DNN in UL NAS TRANSPORT message are the same values as sent in step 16? | --> | 5GMM: UL NAS TRANSPORT 5GSM: PDU SESSION ESTABLISHMENT REQUEST | 1 | P |
| 25 | The SS waits 16 seconds (5th expiry of T3580). | - | - | - | - |
| 26 | Check: Does the UE re-transmit the PDU SESSION ESTABLISHMENT REQUEST message and the S-NSSAI and DNN in UL NAS TRANSPORT message are the same values as sent in step 16 in the next 20 seconds? (Note 1) | --> | 5GMM: UL NAS TRANSPORT 5GSM: PDU SESSION ESTABLISHMENT REQUEST | 2 | F |
| Note 1: The 20 seconds is chosen randomly as long as it is greater than T3580 = 16 seconds.  Note 2 : At step 16 the SS waits for 1s for the UE to transmit the PDU Session Establishment REQ. Upon expiry of 1s, the PDU Session Establishment may be performed by MMI or AT command.  Note 3: The request of connectivity to an additional PDU session may be performed by MMI or AT command. | | | | | |

10.1.4.1.3.3 Specific message contents

Table 10.1.4.1.3.3-0: PDU SESSION ESTABLISHMENT ACCEPT (preamble; step 3, Table 4.5A.2.2.2-1, TS 38.508-1 [4])

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-2 | | | |
| Information Element | Value/remark | Comment | Condition |
| Authorized QoS rules | 5GC QoS rule of the Config#n in TS 38.508-1[4],Table 4.8.4-1 | ‘n’ in QoS rule#n corresponds to the default PDU session type as set in the PICS pc\_APN\_Default\_Configuration |  |
| Mapped EPS bearer contexts |  |  |  |
| Mapped EPS bearer context |  |  |  |
| Mapped EPS QoS parameters | EPC default bearer context of the Config#1 in Table 4.8.4-1 |  |  |
| DNN | The same DNN value as sent in the UL NAS TRANSPORT message during (preamble; step 2a1, Table 4.5A.2.2.2-2, TS 38.508-1 [4]) |  |  |

Table 10.1.4.1.3.3-1: PDU SESSION RELEASE COMMAND (Step 1, Table 10.1.4.1.3.2-1; step 1, TS 38.508-1 [4] Table 4.9.21.2.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.2-14 | | | |
| Information Element | Value/Remark | Comment | Condition |
| PDU session ID | X | ID of the active PDU session in preamble |  |
| 5GSM cause | ‘0010 0111’B | Reactivation requested |  |

Table 10.1.4.1.3.3-2: UL NAS TRANSPORT (Step 16, 18, 20, 22, 24 Table 10.1.4.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-10 | | | |
| Information Element | Value/Remark | Comment | Condition |
| S-NSSAI | Same as the S-NSSAI of PDU session X in the Preamble | "OMIT" can be a value for S-NSSAI |  |
| DNN | Same as the DNN of PDU session X in the Preamble | "OMIT" can be a value for DNN |  |

Table 10.1.4.1.3.3-3: UL NAS TRANSPORT (Preamble, step 2a1, Table 4.5A.2.2.2-2, TS 38.508-1 [4])

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.1-10 | | | |
| Information Element | Value/remark | Comment | Condition |
| S-NSSAI | Record value if present, otherwise record as "OMIT" | TTCN recorded the value to compare with value of same IE in step 16,18, 20, 22, 24 |  |
| DNN | Record value if present, otherwise record as "OMIT" | TTCN recorded the value to compare with value of same IE in step 16,18, 20, 22, 24 |  |

#### 10.1.4.2 UAS / UE requested PDU session establishment / UUAA / Release

10.1.4.2.1 Test Purpose (TP)

(1)

**with** { UE in 5GMM-REGISTERED state }

**ensure that** {

**when** { UE requests establishment of a new PDU session for UAS services by sending PDU Session establishment Request message }

**then** { The UE successfully completes the PDU session establishment procedure }

}

(2)

**with** { the UE is in PDU SESSION ACTIVE state}

**ensure that** {

**when** { UE is made to Release the PDU Session for UAS services }

**then** { the UE successfully completes the PDU session release procedure }

}

10.1.4.2.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clauses 6.3.1A.1, 6.3.1A.2, 6.3.1A.3, 6.4.1.2 and 6.4.1.3. Unless otherwise stated these are Rel-17 requirements.

[TS 24.501, clause 6.3.1A.1]

The purpose of the service-level authentication and authorization (service-level-AA) procedure is to enable the DN using NEF services for authentication:

a) to authenticate the upper layers of the UE, when establishing the PDU session;

b) to authorize the upper layers of the UE, when establishing the PDU session;

c) both of the above; or

d) to re-authenticate the upper layers of the UE after establishment of the PDU session.

The service-level authentication and authorization procedure are used for UUAA as specified in TS 23.256 [6AB].

NOTE 1: The authentication protocol for UUAA is out of scope of 3GPP in this release of specification.

The service-level authentication and authorization procedure can be performed only during or after the UE-requested PDU session procedure establishing a non-emergency PDU session. The service-level authentication and authorization procedure shall not be performed during or after the UE-requested PDU session establishment procedure establishing an emergency PDU session.

If the service-level authentication and authorization procedure is performed during the UE-requested PDU session establishment procedure:

a) and the service-level-AA procedure of the UE completes successfully, the service-level-AA response is transported from the network to the UE as a part of the UE-requested PDU session establishment procedure in the PDU SESSION ESTABLISHMENT ACCEPT message; or

b) and the service-level-AA procedure of the UE completes unsuccessfully, the service-level-AA response is transported from the network to the UE as a part of the UE-requested PDU session establishment procedure in the PDU SESSION ESTABLISHMENT REJECT message.

NOTE 2: If the SMF receives the HTTP code set to "4xx" or "5xx" as specified in 3GPP TS 29.500 [20AA] or the SMF detects a UUAA-SM failure as specified in 3GPP TS 29.256 [21B], then the SMF considers that the UUAA-SM procedure has completed unsuccessfully.

If the service-level authentication and authorization procedure is performed for the established PDU session with re-authentication purpose:

a) and the service-level-AA procedure of the UE completes successfully, the service-level-AA response is transported from the network to the UE as a part of the network-requested PDU session modification procedure in the PDU SESSION MODIFICATION COMMAND message; or

b) and the service-level-AA procedure of the UE completes unsuccessfully, the service-level-AA response is transported from the network to the UE as a part of the network-requested PDU session release procedure in the PDU SESSION RELEASE COMMAND message.

There can be several rounds of exchange of a service-level-AA payload for the service to complete the service-level authentication and authorization of the request for a PDU session (see example in figure 6.3.1A.1-1).

If the UE receives the service-level-AA response in the PDU SESSION ESTABLISHMENT ACCEPT message or the PDU SESSION ESTABLISHMENT REJECT message, the UE passes it to the upper layer.



Figure 6.3.1A.1-1: Service-level authentication and authorization procedure

[TS 24.501, clause 6.3.1A.2]

In order to initiate the service-level authentication and authorization procedure, the SMF shall create a SERVICE-LEVEL AUTHENTICATION COMMAND message.

The SMF shall set the PTI IE of the SERVICE-LEVEL AUTHENTICATION COMMAND message to "No procedure transaction identity assigned".

The SMF shall set the service-level-AA payload in the Service-level-AA container IE of the SERVICE-LEVEL AUTHENTICATION COMMAND message to the payload provided by the DN via the NEF. If a payload type associated with the payload is provided by the DN via the NEF, the SMF shall set the service-level-AA payload type with the value set to the payload type.

NOTE: In case of UUAA, the service-level-AA payload is provided by the DN via the UAS-NF.

The SMF shall send the SERVICE-LEVEL AUTHENTICATION COMMAND message, and the SMF shall start timer T3594 (see example in figure 6.3.1A.1-1).

Upon receipt of a SERVICE-LEVEL AUTHENTICATION COMMAND message and a PDU session ID, using the NAS transport procedure as specified in subclause 5.4.5, the UE passes to the upper layers the service-level-AA payload received in the Service-level-AA container IE of the SERVICE-LEVEL AUTHENTICATION COMMAND message. Apart from this action, the service-level authentication and authorization procedure initiated by the DN is transparent to the 5GSM layer of the UE.

[TS 24.501, clause 6.3.1A.2]

When the upper layers provide a service-level-AA payload, the UE shall create a SERVICE-LEVEL AUTHENTICATION COMPLETE message and set the service-level-AA payload of the Service-level-AA container IE to the service-level-AA payload received from the upper layers, and if the service-level-AA payload type is received in the SERVICE-LEVEL AUTHENTICATION COMMAND message from the SMF, set the service-level-AA payload type of the Service-level-AA container IE to the service-level-AA payload type received from the SMF.

The UE shall transport the SERVICE-LEVEL AUTHENTICATION COMPLETE message and the PDU session ID, using the NAS transport procedure as specified in subclause 5.4.5. Apart from this action, the service-level authentication and authorization procedure initiated by the DN is transparent to the 5GSM layer of the UE.

Upon receipt of a SERVICE-LEVEL AUTHENTICATION COMPLETE message, the SMF shall stop timer T3594 and provides the service-level-AA payload received in the Service-level-AA container IE of the SERVICE-LEVEL AUTHENTICATION COMPLETE message to the DN.

[TS 24.501, clause 6.4.1.2]

If requested by the upper layers, the UE supporting UAS services shall initiate a request to establish a PDU session for UAS services, where the UE:

a) shall include the service-level device ID with the value set to the CAA-level UAV ID;

b) if provided by the upper layers, shall include the service-level-AA server address, with the value set to the USS address; and

c) if provided by the upper layers, shall include:

i) the service-level-AA payload type, with the value set to "UUAA payload"; and

ii) the service-level-AA payload, with the value set to UUAA payload,

in the Service-level-AA container IE of the PDU SESSION ESTABLISHMENT REQUEST message.

If the PDU session being established is a non-emergency PDU session, the request type is not set to "existing PDU session", the Service-level-AA container IE is included in the PDU SESSION ESTABLISHMENT REQUEST message, and

a) the service-level authentication and authorization by the external DN is required due to local policy;

b) there is a valid user's subscription information for the requested DNN or for the requested DNN and S-NSSAI; and

c) the information for the service-level authentication and authorization by the external DN in the Service-level-AA container IE includes CAA-level UAV ID,

then the SMF shall proceed with the UUAA-SM procedure as specified in 3GPP TS 23.256 [6AB] and refrain from accepting or rejecting the PDU SESSION ESTABLISHMENT REQUEST message until the service-level authentication and authorization procedure is completed.

[TS 24.501, clause 6.4.1.3]

If the PDU SESSION ESTABLISHMENT REQUEST message includes the Service-level-AA container IE with the service-level device ID set to the CAA-level UAV ID, and the SMF is provided by the UAS-NF the successful UUAA-SM result and the CAA-level UAV ID, the SMF shall store the successful result together with the authorized CAA-level UAV ID and transmit the PDU SESSION ESTABLISHMENT ACCEPT message to the UE, where the PDU SESSION ESTABLISHMENT ACCEPT message shall include the Service-level-AA container IE containing:

a) the service-level-AA response, with the SLAR field set to "Service level authentication and authorization was successful";

b) the service-level device ID with the value set to the CAA-level UAV ID;

c) if a payload is received from the UAS-NF, the service-level-AA payload with the value set to the payload; and

d) if a payload type associated with the payload is received from the UAS-NF, the service-level-AA payload type with the values set to the associated payload type.

NOTE 21: UAS security information can be included in the UUAA payload by the USS as specified in 3GPP TS 33.256 [24B].

10.1.4.2.3 Test description

10.1.4.2.3.1 Pre-test conditions

System Simulator:

- NGC Cell A.

UE:

- The UE is capable of UAS operation and provisioned with CAA-level UAV ID.

Preamble:

- The UE is in state 3N-A on NGC Cell A according to TS 38.508-1 [4].

10.1.4.2.3.2 Test procedure sequence

Table 10.1.4.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Cause the UE to request establishment of PDU session. (Note 1) | - | - | - | - |
| 2 | The UE transmits an *ULInformationTransfer* message and a PDU SESSION ESTABLISHMENT REQUEST including the Service-level-AA container IE. | --> | NR RRC: *ULInformationTransfer*  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | - | - |
| 3 | UE is configured with a pseudorandom value for Service-level-AA container in SERVICE-LEVEL AUTHENTICATION COMPLETE using AT command +CUUAAPT | - | - | - | - |
| 4 | SS sends DL NAS TRANSPORT message including SERVICE-LEVEL AUTHENTICATION COMMAND containing Service-level-AA payload for authorization. | <-- | NR RRC: *DLInformationTransfer*  5GMM: DL NAS TRANSPORT  5GSM: SERVICE-LEVEL AUTHENTICATION COMMAND | - | - |
| 5 | UE sends UL NAS TRANSPORT message in response including SERVICE-LEVEL AUTHENTICATION COMPLETE containingService-level-AA response for authorization | --> | NR RRC: *ULInformationTransfer*  5GMM: UL NAS TRANSPORT  5GSM: SERVICE-LEVEL AUTHENTICATION COMPLETE | 1 | P |
| 6 | The SS transmits an *RRCReconfiguration* message and an PDU SESSION ESTABLISHMENT ACCEPT message including the Service-level-AA container IE containing the service-level-AA response with the value of SLAR field set to "Service level authentication and authorization was successful" | <-- | NR RRC: *RRCReconfiguration*  5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |
| 7 | The UE transmits an *RRCReconfigurationComplete* message. | --> | NR RRC: *RRCReconfigurationComplete* | 1 | P |
| 8 | Cause the UE to request release of the PDU session established in step 6. (Note 2) | - | - | - | - |
| 9 | The UE transmits a PDU SESSION RELEASE REQUEST message. | --> | NR RRC: *ULInformationTransfer*  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION RELEASE REQUEST | - | - |
| 10 | Check: Does the UE perform PDU session release procedure defined in clause 4.9.21 of TS 38.508-1 [4]? | - | - | 2 | P |
| Note 1: The request to establish a PDU session may be performed by MMI or AT command.  Note 2: The request to release a PDU session may be performed by MMI. | | | | | |

Table 10.1.4.2.3.3-1: Specific message contentsTable 10.1.4.2.3.3-1: PDU SESSION ESTABLISHMENT REQUEST (step 2, Table 10.1.4.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Service-level-AA container | Present, value stored |  |  |

Table 10.1.4.2.3.3-2: SERVICE-LEVEL AUTHENTICATION COMMAND (step 4, Table 10.1.4.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.2-17 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | The same value in PDU SESSION ESTABLISHMENT REQUEST message |  |  |
| PTI | The same value in PDU SESSION ESTABLISHMENT REQUEST message |  |  |
| SERVICE-LEVEL AUTHENTICATION COMMAND message identity | ‘1101 1000’B |  |  |
| Service-level-AA container | Presudorandom payload for service level authentication and authorization |  |  |

Table 10.1.4.2.3.3-3: SERVICE-LEVEL AUTHENTICATION COMPLETE (step 5, Table 10.1.4.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.2-18 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | The same value in PDU SESSION ESTABLISHMENT REQUEST message |  |  |
| PTI | The same value in PDU SESSION ESTABLISHMENT REQUEST message |  |  |
| SERVICE-LEVEL AUTHENTICATION COMPLETE message identity | ‘1101 1001’B |  |  |
| Service-level-AA container | Same value as configured in Step 3. |  |  |

Table 10.1.4.2.3.3-4: PDU SESSION ESTABLISHMENT ACCEPT (step 6, Table 10.1.4.2.3.2-1 )

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-2 | | | |
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Service-level-AA container | SS calculate service-level-AA response with the value of SLAR field set to "Service level authentication and authorization was successful" |  |  |

#### 10.1.4.3 UAS / UE requested PDU session establishment / UUAA / C2 authorisation / Modification / Release

10.1.4.3.1 Test Purpose (TP)

(1)

**with** { the UE in 5GMM-REGISTERED state and successfully authenticated for UAS services through UUAA-MM procedure and }

**ensure that** {

**when** { UE-requested PDU session by sending PDU Session establishment Request message for C2 communication }

**then** { The UE successfully completes the PDU session establishment procedure for C2 communication}

}

(2)

**with** { the UE is in PDU SESSION ACTIVE state for C2 communication }

**ensure that** {

**when** { UE is made to Modify the PDU Session for C2 communication }

**then** { the UE successfully completes the PDU session modification procedure for C2 communication }

}

(3)

**with** { the UE is in PDU SESSION ACTIVE state for C2 communication }

**ensure that** {

**when** { UE is made to Release the PDU Session for C2 communication }

**then** { the UE successfully completes the PDU session release procedure for C2 communication }

}

10.1.4.3.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clauses 6.3.1A.1, 6.3.1A.2, 6.3.1A.3, 6.3.2.2, 6.4.1.2, 6.4.1.3, 4.22.3 Unless otherwise stated these are Rel-17 requirements.

[TS 24.501, clause 6.3.1A.1]

The purpose of the service-level authentication and authorization (service-level-AA) procedure is to enable the DN using NEF services for authentication:

a) to authenticate the upper layers of the UE, when establishing the PDU session;

b) to authorize the upper layers of the UE, when establishing the PDU session;

c) both of the above; or

d) to re-authenticate the upper layers of the UE after establishment of the PDU session.

The service-level authentication and authorization procedure are used for UUAA as specified in TS 23.256 [6AB].

NOTE 1: The authentication protocol for UUAA is out of scope of 3GPP in this release of specification.

The service-level authentication and authorization procedure can be performed only during or after the UE-requested PDU session procedure establishing a non-emergency PDU session. The service-level authentication and authorization procedure shall not be performed during or after the UE-requested PDU session establishment procedure establishing an emergency PDU session.

If the service-level authentication and authorization procedure is performed during the UE-requested PDU session establishment procedure:

a) and the service-level-AA procedure of the UE completes successfully, the service-level-AA response is transported from the network to the UE as a part of the UE-requested PDU session establishment procedure in the PDU SESSION ESTABLISHMENT ACCEPT message; or

b) and the service-level-AA procedure of the UE completes unsuccessfully, the service-level-AA response is transported from the network to the UE as a part of the UE-requested PDU session establishment procedure in the PDU SESSION ESTABLISHMENT REJECT message.

NOTE 2: If the SMF receives the HTTP code set to “4xx” or “5xx” as specified in 3GPP TS 29.500 [20AA] or the SMF detects a UUAA-SM failure as specified in 3GPP TS 29.256 [21B], then the SMF considers that the UUAA-SM procedure has completed unsuccessfully.

If the service-level authentication and authorization procedure is performed for the established PDU session with re-authentication purpose:

a) and the service-level-AA procedure of the UE completes successfully, the service-level-AA response is transported from the network to the UE as a part of the network-requested PDU session modification procedure in the PDU SESSION MODIFICATION COMMAND message; or

b) and the service-level-AA procedure of the UE completes unsuccessfully, the service-level-AA response is transported from the network to the UE as a part of the network-requested PDU session release procedure in the PDU SESSION RELEASE COMMAND message.

There can be several rounds of exchange of a service-level-AA payload for the service to complete the service-level authentication and authorization of the request for a PDU session (see example in figure 6.3.1A.1-1).

If the UE receives the service-level-AA response in the PDU SESSION ESTABLISHMENT ACCEPT message or the PDU SESSION ESTABLISHMENT REJECT message, the UE passes it to the upper layer.



Figure 6.3.1A.1-1: Service-level authentication and authorization procedure

[TS 24.501, clause 6.3.1A.2]

In order to initiate the service-level authentication and authorization procedure, the SMF shall create a SERVICE-LEVEL AUTHENTICATION COMMAND message.

The SMF shall set the PTI IE of the SERVICE-LEVEL AUTHENTICATION COMMAND message to "No procedure transaction identity assigned".

The SMF shall set the service-level-AA payload in the Service-level-AA container IE of the SERVICE-LEVEL AUTHENTICATION COMMAND message to the payload provided by the DN via the NEF. If a payload type associated with the payload is provided by the DN via the NEF, the SMF shall set the service-level-AA payload type with the value set to the payload type.

NOTE: In case of UUAA, the service-level-AA payload is provided by the DN via the UAS-NF.

The SMF shall send the SERVICE-LEVEL AUTHENTICATION COMMAND message, and the SMF shall start timer T3594 (see example in figure 6.3.1A.1-1).

Upon receipt of a SERVICE-LEVEL AUTHENTICATION COMMAND message and a PDU session ID, using the NAS transport procedure as specified in subclause 5.4.5, the UE passes to the upper layers the service-level-AA payload received in the Service-level-AA container IE of the SERVICE-LEVEL AUTHENTICATION COMMAND message. Apart from this action, the service-level authentication and authorization procedure initiated by the DN is transparent to the 5GSM layer of the UE.

[TS 24.501, clause 6.3.1A.2]

When the upper layers provide a service-level-AA payload, the UE shall create a SERVICE-LEVEL AUTHENTICATION COMPLETE message and set the service-level-AA payload of the Service-level-AA container IE to the service-level-AA payload received from the upper layers, and if the service-level-AA payload type is received in the SERVICE-LEVEL AUTHENTICATION COMMAND message from the SMF, set the service-level-AA payload type of the Service-level-AA container IE to the service-level-AA payload type received from the SMF.

The UE shall transport the SERVICE-LEVEL AUTHENTICATION COMPLETE message and the PDU session ID, using the NAS transport procedure as specified in subclause 5.4.5. Apart from this action, the service-level authentication and authorization procedure initiated by the DN is transparent to the 5GSM layer of the UE.

Upon receipt of a SERVICE-LEVEL AUTHENTICATION COMPLETE message, the SMF shall stop timer T3594 and provides the service-level-AA payload received in the Service-level-AA container IE of the SERVICE-LEVEL AUTHENTICATION COMPLETE message to the DN.

[TS 24.501, clause 6.4.1.2]

If the UE supporting UAS services requests to establish a PDU session for C2 communication, the UE shall include the Service-level-AA container IE in the PDU SESSION ESTABLISHMENT REQUEST message. In the Service-level-AA container IE, the UE shall include:

a) the service-level device ID with the value set to the CAA-level UAV ID of the UE; and

b) if available, the service-level-AA payload with the value set to the C2 authorization payload and the service-level-AA payload type with the value set to "C2 authorization payload".

NOTE 10: The C2 authorization payload in the service-level-AA payload can include the pairing information for C2 communication and the UAV flight authorization information.

[TS 24.501, clause 6.4.1.3]

If the network accepts the request of the PDU session establishment for C2 communication, the network shall send the PDU SESSION ESTABLISHMENT ACCEPT message including the Service-level-AA container IE containing:

a) the service-level-AA response with the value of C2AR field set to the "C2 authorization was successful";

b) if a payload is provided from the UAS-NF, the service-level-AA payload with the value set to the payload; and

c) if a payload type associated with the payload is provided from the UAS-NF, the service-level-AA payload type with the value set to the payload type; and

d) if the CAA-level UAV ID is provided from the UAS-NF, the service-level device ID with the value set to the CAA-level UAV ID.

NOTE 22: The C2 authorization payload in the service-level-AA payload can include the C2 session security information.

Upon receipt of the PDU SESSION ESTABLISHMENT ACCEPT message of the PDU session for C2 communication, if the Service-level-AA container IE is included, the UE shall forward the service-level-AA contents of the Service-level-AA container IE to the upper layers.

[TS 24.501, clause 6.4.2.2]

The UE shall include the Service-level-AA container IE in the PDU SESSION MODIFICATION REQUEST message, when requesting to modify an established PDU session for C2 communication. In the Service-level-AA container IE, the UE shall include:

a) the service-level device ID with the value set to the CAA-level UAV ID of the UE; and

b) if available, the service-level-AA payload with the value set to the C2 authorization payload and the service-level-AA payload type with the value set to "C2 authorization payload".

NOTE 3: The C2 authorization payload in the service-level-AA payload can include the pairing information for C2 communication and the UAV flight authorization information.[TS 24.501, clause 4.22.3]

The 5GS supports USS authorization of C2 communication for pairing of UAV and UAV-C. The pairing of UAV and UAV-C needs to be authorized by USS successfully before the user plane connectivity for C2 communication is enabled. For C2 authorization procedure, the UE supporting UAS services provides to the network with CAA-level UAV ID.

The USS authorization of UAV flight can also be performed during the C2 authorization procedure. The UE supporting UAS services provides the UAV flight authorization information to the network if provided by upper layers.

NOTE 1: The C2 authorization payload in the service-level-AA payload can include the pairing information for C2 communication and the UAV flight authorization information (see subclauses 6.4.1.2 and 6.4.2.2).

If a UE supporting UAS services uses a common PDU session for both USS communication and C2 communication, the C2 communication can be authorized using UUAA-SM procedure during the PDU session establishment procedure or during the PDU session modification procedure. If the pairing of UAV and UAV-C is revoked, the network shall disable C2 communication for the PDU session.

NOTE 2: The network can disable C2 communication for the PDU session e.g., by removing the QoS flow for C2 communication during PDU session modification procedure as decribed in subclauses 6.3.2.2.

If a UE supporting UAS services uses separate PDU sessions for, respectively, USS communication and C2 communication, the C2 communication is authorized using UUAA-SM during the PDU session establishment procedure. If the pairing of UAV and UAV-C is revoked, the PDU session for C2 communication shall be released by the SMF.

10.1.4.3.3 Test description

10.1.4.3.3.1 Pre-test conditions

System Simulator:

- NGC Cell A.

UE:

- None.

Preamble:

- The UE is in state 3N-A on NGC Cell A according to TS 38.508-1 [4] and successfully authenticated for aerial services through UUAA-MM.

10.1.4.3.3.2 Test procedure sequence

Table 10.1.4.3.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Cause the UE to request establishment of PDU session for C2 communication. (Note 1) | – | - | - | - |
| 2 | The UE transmits an *ULInformationTransfer* message and a PDU SESSION ESTABLISHMENT REQUEST including the Service-level-AA container IE. | --> | NR RRC: *ULInformationTransfer*  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | - | - |
| 2A | Void | - | - | - | - |
| 5 | The SS transmits an *RRCReconfiguration* message and an PDU SESSION ESTABLISHMENT ACCEPT message including the Service-level-AA container IE containing the service-level-AA response with the value of C2AR field set to the "C2 authorization was successful" | <-- | NR RRC: *RRCReconfiguration*  5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | 1 | P |
| 6 | The UE transmits an *RRCReconfigurationComplete* message. | --> | NR RRC: *RRCReconfigurationComplete* | 1 | P |
| 7 | Cause the UE to pdu session modification for C2 Communication. (see Note 2) | - | - | - | - |
| 8 | Check: Does the UE transmit a PDU SESSION MODIFICATION REQUEST message including the Service-level-AA container with service-level device ID with the value set to the CAA-level UAV ID of the UE and C2 Payload? | --> | NR RRC: *ULInformationTransfer*  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION MODIFICATION REQUEST | 2 | P |
| 9 | The SS transmits an PDU SESSION MODIFICATION COMMAND message. | <-- | NR RRC: *RRCReconfiguration*  5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION MODIFICATION COMMAND | - | - |
| 10 | the UE transmit an PDU SESSION MODIFICATION COMPLETE message. | --> | NR RRC: *ULInformationTransfer*  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION MODIFICATION COMPLETE | - | - |
| 11 | Cause the UE to request release of PDU session established for C2 Communication.(Note 3) | - | - | - | - |
| 12 | The UE transmits a PDU SESSION RELEASE REQUEST message. | --> | NR RRC: *ULInformationTransfer*  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION RELEASE REQUEST | - | - |
| 13 | Check: Does the UE perform PDU session release procedure defined in clause 4.9.21 of TS 38.508-1 [4] for C2 communication? | - | - | 3 | P |
| Note 1: The request to establish a PDU session may be performed by MMI or AT command and UE may be configured with a pseudorandom value for service level AA container by AT command +CC2APT or MMI..  Note 2: The request to modify a PDU session may be performed by MMI.  Note 3: The request to release a PDU session may be performed by MMI. | | | | | |

10.1.4.3.3.3 Specific message contents

Table 10.1.4.3.3.3-1: Void

Table 10.1.4.3.3.3-2: Void

Table 10.1.4.3.3.3-3: PDU SESSION ESTABLISHMENT ACCEPT (step 5,)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-2 | | | |
| **Information Element** | | **Value/remark** | **Comment** | **Condition** |
| Service-level-AA container | | SS calculate service-level-AA response with the value of C2AR field set to the "C2 authorization was successful" |  |  |

### 10.1.5 UE-requested PDU session modification

#### 10.1.5.1 UE-requested PDU session modification

10.1.5.1.1 Test Purpose (TP)

(1)

**with** { UE in PDU SESSION ACTIVE state and in 5GMM-CONNECTED mode }

**ensure that** {

**when** { UE is requested to modify of PDU session }

**then** { UE sends a PDU SESSION MODIFICATION REQUEST message }

}

10.1.5.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clause 6.4.2.1 and 6.4.2.2. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 6.4.2.1]

The purpose of the UE-requested PDU session modification procedure is:

a) to enable the UE to request modification of a PDU session;

b) to indicate a change of 3GPP PS data off UE status for a PDU session;

c) to revoke the previously indicated support for reflective QoS;

d) to request specific QoS handling and segregation of service data flows;

e) to indicate to the network the relevant 5GSM parameters and capabilities (e.g. the UE's 5GSM capabilities, whether the UE supports more than 16 packet filters, the maximum data rate per UE for user-plane integrity protection supported by the UE for uplink and the maximum data rate per UE for user-plane integrity protection supported by the UE for downlink) for a PDN connection established when in S1 mode, after the first inter-system change from S1 mode to N1 mode, if the UE is operating in single-registration mode in the network supporting N26 interface; or

f) to delete one or more mapped EPS bearer contexts.

NOTE: The UE does not request a PDU session modification for an LADN when the UE is located outside the LADN service area.

[TS 24.501, clause 6.4.2.2]

In order to initiate the UE-requested PDU session modification procedure, the UE shall create a PDU SESSION MODIFICATION REQUEST message.

The UE shall allocate a PTI value currently not used and shall set the PTI IE of the PDU SESSION MODIFICATION REQUEST message to the allocated PTI value.

The UE shall not perform the UE-requested PDU session modification procedure for an emergency PDU session.

The UE shall not perform the UE-requested PDU session modification procedure for a PDU session for LADN when the UE is located outside the LADN service area.

If the UE requests a specific QoS handling, the UE shall include the requested QoS rules IE indicating requested QoS rules and the requested QoS flow descriptions IE indicating requested QoS flow descriptions for the specific QoS handling. The QoS rules IE includes the packet filters which describe the service data flows requested by the UE. The specific QoS parameters requested by the UE is specified in the QoS flow descriptions IE. If the UE requests the network to bind specific service data flows to a dedicated QoS flow, the UE shall create a new QoS rule by setting the rule operation code to "Create new QoS rule" and shall set the segregation bit to "Segregation requested" for the corresponding QoS rule in the QoS rules IE. The UE shall set the QRI values to "no QoS rule identifier assigned" in the requested QoS rules IE, if the QoS rules are newly created; otherwise, the UE shall set the QRI values to those of the existing QoS rules for which the specific QoS handling applies. The UE shall set the QFI values to "no QoS flow identifier assigned" in the requested QoS flow descriptions IE, if the QoS flow descriptions are newly created; otherwise, the UE shall set the QFI values to the QFIs of the existing QoS flow descriptions for which the specific QoS handling applies.

…

If the UE is performing the PDU session modification procedure to request the deletion of a non-default QoS rule due to errors in QoS operations or packet filters, the UE shall include the 5GSM cause IE in the PDU SESSION MODIFICATION REQUEST message as described in subclause 6.4.1.3.

Even if the timer T3396, T3584, or T3585 is running or is deactivated, the UE shall indicate a change of 3GPP PS data off UE status associated to a PDU session, by including the extended protocol configuration options IE in the PDU SESSION MODIFICATION REQUEST message and setting the 3GPP PS data off UE status.

For a PDN connection established when in S1 mode, after the first inter-system change from S1 mode to N1 mode, if the UE is operating in single-registration mode in the network supporting N26 interface and the UE requests the PDU session to be an always-on PDU session in the 5GS, the UE shall include the Always-on PDU session requested IE and set the value of the IE to "Always-on PDU session requested" in the PDU SESSION MODIFICATION REQUEST message.

The UE shall transport the PDU SESSION MODIFICATION REQUEST message, the PDU session ID, and the request type set to "modification request", using the NAS transport procedure as specified in subclause 5.4.5, and the UE shall start timer T3581 (see example in figure 6.4.2.2.1).

10.1.5.1.3 Test description

10.1.5.1.3.1 Pre-test conditions

System Simulator:

- NGC Cell A.

UE:

- None.

Preamble:

- The UE is in state 3N-A on NGC Cell A with PDU SESSION ACTIVE according to TS 38.508-1 [4].

10.1.5.1.3.2 Test procedure sequence

Table 10.1.5.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Cause the UE to pdu session modification with the previously established PDN session at preamble. (see Note) | - | - | - | - |
| 2 | Check: Does the UE transmit a PDU SESSION MODIFICATION REQUEST message? | --> | PDU SESSION MODIFICATION REQUEST | 1 | P |
| 3 | The SS transmits an PDU SESSION MODIFICATION COMMAND message. | <-- | PDU SESSION MODIFICATION COMMAND | - | - |
| 4 | the UE transmit an PDU SESSION MODIFICATION COMPLETE message. | --> | PDU SESSION MODIFICATION COMPLETE | - | - |
| Note: The request of pdu session modification may be performed by MMI or AT command. | | | | | |

10.1.5.1.3.3 Specific message contents

Table 10.1.5.1.3.3-1: PDU SESSION MODIFICATION COMMAND (step 3, Table 10.1.5.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1, Table 4.7.2-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | The value indicated in PDU SESSION MODIFICATION REQUEST |  |  |
| PTI | The value indicated in PDU SESSION MODIFICATION REQUEST |  |  |
| Authorized QoS rules | According to QoS rule #n as defined in TS 38.508-1 [4], Table 4.8.4-1 except for Rule operation code set to ‘100’B and QoS rule precedence set to ‘0000 0010’- see TS 38.508-1 [4] , clause 4.8.2.1 | ‘n’ in QoS rule#n corresponds to the default PDU session type as set in the PICS pc\_APN\_Default\_Configuration |  |

### 10.1.6 UE-requested PDU session release

#### 10.1.6.1 UE-requested PDU session release / Abnormal / Collision with network-requested PDU session modification procedure

10.1.6.1.1 Test Purpose (TP)

(1)

**with** { the UE is in PDU SESSION ACTIVE state and has sent a PDU SESSION RELEASE REQUEST message }

**ensure that** {  
 **when** { UE receives a PDU SESSION MODIFICATION COMMAND message indicating a PDU session that UE wants to release }

**then** { the UE ignores the PDU SESSION MODIFICATION COMMAND message and proceed with the PDU session release procedure }

}

10.1.6.1.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501, clause 6.4.3.2, 6.4.3.3 and 6.4.3.5. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 6.4.3.2]

In order to initiate the UE-requested PDU session release procedure, the UE shall create a PDU SESSION RELEASE REQUEST message.

The UE may set the 5GSM cause IE of the PDU SESSION RELEASE REQUEST message to indicate the reason for releasing the PDU session.

The 5GSM cause IE typically indicates one of the following 5GSM cause values:

#36 regular deactivation;

#41 Semantic error in the TFT operation;

#42 Syntactical error in the TFT operation;

#44 Semantic errors in packet filter(s);

#45 Syntactical error in packet filter(s).

The UE shall allocate a PTI value currently not used and shall set the PTI IE of the PDU SESSION RELEASE REQUEST message to the allocated PTI value.

The UE shall transport the PDU SESSION RELEASE REQUEST message and the PDU session ID, using the NAS transport procedure as specified in subclause 5.4.5, and the UE shall start timer T3582 (see example in figure 6.4.3.2.1).

[TS 24.501, clause 6.4.3.3]

Upon receipt of a PDU SESSION RELEASE REQUEST message and a PDU session ID, if the SMF accepts the request to release the PDU session, and shall perform the network-requested PDU session release procedure as specified in subclause 6.3.3.

[TS 24.501, clause 6.4.3.5]

The following abnormal cases can be identified:

b) Collision of UE-requested PDU session release procedure and network-requested PDU session modification procedure.

When the UE receives a PDU SESSION MODIFICATION COMMAND message during the UE-requested PDU session release procedure, and the PDU session indicated in PDU SESSION MODIFICATION COMMAND message is the PDU session that the UE had requested to release, the UE shall ignore the PDU SESSION MODIFICATION COMMAND message and proceed with the PDU session release procedure.

10.1.6.1.3 Test description

10.1.6.1.3.1 Pre-test conditions

System Simulator:

- NGC Cell A.

UE:

None.

Preamble:

The UE is in state 3N-A on NGC Cell A according to TS 38.508-1 [4].

10.1.6.1.3.2 Test procedure sequence

Table 10.1.6.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Cause the UE to request establishment of PDU session to the DN.(Note 1) | - | - | - | - |
| 2 | The PDU session establishment procedure as specified in TS 38.508-1 [4] subclause 4.5A.2 take place. | - | - | - | - |
| 3 | Cause the UE to request release of PDU session established during step 2.(Note 2) | - | - | - | - |
| 4 | The UE transmits a PDU SESSION RELEASE REQUEST message. | --> | PDU SESSION RELEASE REQUEST | - | - |
| 5 | The SS transmits a PDU SESSION MODIFICATION COMMAND message. | <-- | PDU SESSION MODIFICATION COMMAND | - | - |
| 6 | Check: Does the UE transmit a PDU SESSION MODIFICATION COMPLETE or PDU SESSION MODIFICATION COMMAND REJECT message in the next 3 seconds? | - | - | 1 | F |
| 7 | Check: Does the UE perform PDU session release procedure defined in clause 4.9.21 of TS 38.508-1 [4]? | - | - | 1 | P |
| 8 | Void | - | - |  |  |
| Note 1: The request to establish a PDU session may be performed by MMI or AT command.  Note 2: The request to release a PDU session may be performed by MMI. | | | | | |

10.1.6.1.3.3 Specific message contents

Table 10.1.6.1.3.3-0: PDU SESSION ESTABLISHMENT ACCEPT (Step 2, Table 10.1.6.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-2 | | | |
| Information Element | Value/remark | Comment | Condition |
| Authorized QoS rules | 5GC QoS rule of the Config#1 in Table 4.8.4-1 |  |  |
| Mapped EPS bearer contexts |  |  |  |
| Mapped EPS bearer context |  |  |  |
| Mapped EPS QoS parameters | EPC default bearer context of the Config#1 in Table 4.8.4-1 |  |  |
| DNN | The same DNN value as sent in the UL NAS TRANSPORT message at (step 2, Table 10.1.6.1.3.2-1; step 2a1, Table 4.5A.2.2.2-2, TS 38.508-1 [4]) |  |  |

Table 10.1.6.1.3.3-1: PDU SESSION RELEASE REQUEST (step 4, Table 10.1.6.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.2-12 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | Set to the ID UE requested in step 2 in Table 10.1.6.1.3.2-1 |  |  |
| PTI | Any value from 1 to 254 |  |  |

Table 10.1.6.1.3.3-2: PDU SESSION MODIFICATION COMMAND (step 5, Table 10.1.6.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.2-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | Set to the ID UE requested in step 2 in Table 10.1.6.1.3.2-1 |  |  |
| PTI | '0000 0000'B | No procedure transaction identity assigned |  |

Table 10.1.6.1.3.3-3: PDU SESSION RELEASE COMMAND (step 7, Table 10.1.6.1.3.2-1; step 1, TS 36.508 [4] Table 4.9.21.2.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.2-14 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | Same ID as  the ID UE requested in step 2 in Table 10.1.6.1.3.2-1 |  |  |
| PTI | The value indicated in PDU SESSION RELEASE REQUEST |  |  |
| 5GSM cause | '0010 0100'B | #36 regular deactivation |  |

Table 10.1.6.1.3.3-4: PDU SESSION RELEASE COMPLETE (step 8, Table 10.1.6.1.3.2-1; step 2, TS 36.508 [4] Table 4.9.21.2.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.2-15 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | Same ID as  the ID UE requested in step 2 in Table 10.1.6.1.3.2-1 |  |  |
| PTI | The value indicated in PDU SESSION RELEASE REQUEST |  |  |

#### 10.1.6.2 UE-requested PDU session release / Abnormal / Collision with network-requested PDU session release procedure

10.1.6.2.1 Test Purpose (TP)

(1)

**with** { the UE is in PDU SESSION ACTIVE state and transported the PDU SESSION RELEASE REQUEST message }

**ensure that** {  
 **when** { UE receives a PDU SESSION RELEASE COMMAND message with the PTI IE set to “No procedure transaction identity assigned” indicating a PDU session that UE wants to release }

**then** { the UE aborts the UE-requested PDU session release procedure and proceeds with the network-requested PDU session release procedure }

}

10.1.6.2.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501, clause 6.4.3.2, 6.4.3.3 and 6.4.3.5. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 6.4.3.2]

In order to initiate the UE-requested PDU session release procedure, the UE shall create a PDU SESSION RELEASE REQUEST message.

The UE may set the 5GSM cause IE of the PDU SESSION RELEASE REQUEST message to indicate the reason for releasing the PDU session.

The 5GSM cause IE typically indicates one of the following 5GSM cause values:

#36 regular deactivation;

#41 Semantic error in the TFT operation;

#42 Syntactical error in the TFT operation;

#44 Semantic errors in packet filter(s);

#45 Syntactical error in packet filter(s).

The UE shall allocate a PTI value currently not used and shall set the PTI IE of the PDU SESSION RELEASE REQUEST message to the allocated PTI value.

The UE shall transport the PDU SESSION RELEASE REQUEST message and the PDU session ID, using the NAS transport procedure as specified in subclause 5.4.5, and the UE shall start timer T3582 (see example in figure 6.4.3.2.1).

[TS 24.501, clause 6.4.3.3]

Upon receipt of a PDU SESSION RELEASE REQUEST message and a PDU session ID, if the SMF accepts the request to release the PDU session, and shall perform the network-requested PDU session release procedure as specified in subclause 6.3.3.

[TS 24.501, clause 6.4.3.5]

The following abnormal cases can be identified:

…

c) Collision of UE-requested PDU session release procedure and network-requested PDU session release procedure.

When the UE receives a PDU SESSION RELEASE COMMAND message with the PTI IE set to "No procedure transaction identity assigned" during the UE-requested PDU session release procedure, and the PDU session indicated in the PDU SESSION RELEASE COMMAND message is the same as the PDU session that the UE requests to release, the UE shall abort the UE-requested PDU session release procedure and proceed with the network-requested PDU session release procedure.

10.1.6.2.3 Test description

10.1.6.2.3.1 Pre-test conditions

System Simulator:

- NGC Cell A.

UE:

None.

Preamble:

- The UE is in state 3N-A on NGC Cell A according to TS 38.508-1 [4].

10.1.6.2.3.2 Test procedure sequence

Table 10.1.6.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Cause the UE to request establishment of PDU session to the DN.(Note 1) | - | - | - | - |
| 2 | The PDU session establishment procedure as specified in TS 38.508-1 [4] subclause 4.5A.2 take place. | - | - | - | - |
| 3 | Cause the UE to request release of PDU session established during step 2.(Note 2) | - | - | - | - |
| 4 | The UE transmits a PDU SESSION RELEASE REQUEST message. | --> | PDU SESSION RELEASE REQUEST | - | - |
| 5 | Check: Does the UE perform PDU session release procedure defined in clause 4.9.21 of TS 38.508-1 [4]? | - | - | 1 | P |
| 6 | Void | - | - | - | - |
| Note 1: The request to establish a PDU session may be performed by MMI or AT command.  Note 2: The request to release a PDU session may be performed by MMI. | | | | | |

10.1.6.2.3.3 Specific message contents

Table 10.1.6.2.3.3-0: PDU SESSION ESTABLISHMENT ACCEPT (Step 2, Table 10.1.6.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-2 | | | |
| Information Element | Value/remark | Comment | Condition |
| Authorized QoS rules | 5GC QoS rule of the Config#1 in Table 4.8.4-1 |  |  |
| Mapped EPS bearer contexts |  |  |  |
| Mapped EPS bearer context |  |  |  |
| Mapped EPS QoS parameters | EPC default bearer context of the Config#1 in Table 4.8.4-1 |  |  |
| DNN | The same DNN value as sent in the UL NAS TRANSPORT message at (step 2, Table 10.1.6.2.3.2-1; step 2a1, Table 4.5A.2.2.2-2, TS 38.508-1 [4]) |  |  |

Table 10.1.6.2.3.3-1: PDU SESSION RELEASE REQUEST (step 4, Table 10.1.6.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.2-12 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | Set to the ID UE requested in step 2 in Table 10.1.6.2.3.2-1 |  |  |
| PTI | Any value from 1 to 254 |  |  |

Table 10.1.6.2.3.3-2: PDU SESSION RELEASE COMMAND (step 5, Table 10.1.6.2.3.2-1; step 1, TS 36.508 [4] Table 4.9.21.2.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.2-14 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | Set to the ID UE requested in step 2 in Table 10.1.6.2.3.2-1 |  |  |
| PTI | '0000 0000'B | No procedure transaction identity assigned |  |
| 5GSM cause | '0010 0100'B | #36 regular deactivation |  |

Table 10.1.6.2.3.3-3: PDU SESSION RELEASE COMPLETE (step 6, Table 10.1.6.2.3.2-1; step 2, TS 36.508 [4] Table 4.9.21.2.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.2-15 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | Set to the ID UE requested in step 2 in Table 10.1.6.2.3.2-1 |  |  |
| PTI | '0000 0000'B | unassigned |  |

### 10.1.7 SNPN / Network-requested PDU session release

#### 10.1.7.1 Void

### 10.1.8 NSAC / Session management aspects

#### 10.1.8.1 NSAC / PDU session establishment reject / Maximum number of PDU sessions reached / Back-off timer is neither zero nor deactivated

10.1.8.1.1 Test Purpose (TP)

(1)

**with** { UE is establishing UE-requested PDU session by sending PDU Session establishment Request message with S-NSSAI }

**ensure that** {

**when** { UE receives PDU SESSION ESTABLISHMENT REJECT with 5GSM cause value #69 "insufficient resources for specific slice" and Back-off timer value which is neither zero nor deactivated }

**then** { UE shall start timer T3585 and shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same S-NSSAI }

}

(2)

**with** { The timer T3585 associated with a S-NSSAI is running }

**ensure that** {

**when** { UE is switched off and switched on }

**then** { UE shall restart the timer T3585 if the time remaining for T3585 timeout at switch off is greater than the time elapsed between switch off and switch on }

}

(3)

**with** { UE in 5GMM-REGISTERED state }

**ensure that** {

**when** { The timer T3585 associated with the S-NSSAI expires }

**then** { UE could initiate PDU session establishment request with the S-NSSAI }

}

(4)

**with** { UE is establishing UE-requested PDU session by sending PDU Session establishment Request message with no S-NSSAI provided }

**ensure that** {

**when** { UE receives PDU SESSION ESTABLISHMENT REJECT with 5GSM cause value #69 "insufficient resources for specific slice" and Back-off timer value which is neither zero nor deactivated }

**then** { UE shall start timer T3585 and shall not send another PDU SESSION ESTABLISHMENT REQUEST message without an S-NSSAI }

}

10.1.8.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clause 4.6.3.1, clause 6.4.1.4.2.Unless otherwise stated these are Rel-17 requirements.

[TS 24.501, clause 4.6.3.1]

A serving PLMN or the HPLMN, or SNPN can perform network slice admission control for the S-NSSAI(s) subject to NSAC to monitor and control the total number of established PDU sessions per network slice. The SMF performs network slice admission control on the S-NSSAI during the PDU session establishment procedure. If the maximum number of PDU sessions on a network slice associated with an S-NSSAI has been already reached, the SMF rejects the PDU session establishment request using S-NSSAI based congestion control as specified in subclause 6.2.8 and 6.4.1.4.2.

The SMF performs network slice admission control on the S-NSSAI for a PDU session that is associated with the non-3GPP access, when the UE requests to transfer a session from the non-3GPP access to the 3GPP access with the Allowed PDU session status IE as described in subclause 5.6.1.4. If the maximum number of PDU sessions on a network slice associated with an S-NSSAI has been already reached, the SMF rejects the request to establish the user-plane resources (see 3GPP TS 29.502 [20A]).

Based on operator policy, the session management based network slice admission control is not applicable for the PDU session for emergency services, or the session management based network slice admission control result is ignored for the PDU session for emergency services.

Based on operator policy, the session management based network slice admission control is not applicable for the PDU session for priority services, or the session management based network slice admission control result is ignored for the PDU session for priority services.

NOTE: How the SMF determines that the PDU session is used for priority services is outside the scope of this release of the present document.

The session management based network slice admission control is not applicable to PDU session established for onboarding services in SNPN.

NOTE 1: For the MA PDU session during the PDU session establishment procedure, the SMF performs network slice admission control only when it is newly established over the associated access type.

NOTE 2: For a set of redundant PDU sessions, the SMF performs network slice admission control for each PDU session independently.

[TS 24.501, clause 6.4.1.4.2]

If:

- the 5GSM cause value #69 "insufficient resources for specific slice" and the Back-off timer value IE are included in the PDU SESSION ESTABLISHMENT REJECT message; or

- an indication that the 5GSM message was not forwarded due to S-NSSAI only based congestion control is received along a Back-off timer value and a PDU SESSION ESTABLISHMENT REQUEST message with the PDU session ID IE set to the PDU session ID of the PDU session;

the UE shall ignore the Re-attempt indicator IE provided by the network, if any, and take different actions depending on the timer value received for timer T3585 in the Back-off timer value IE or depending on the Back-off timer value received from the 5GMM sublayer (if the UE is a UE configured for high priority access in selected PLMN, exceptions are specified in subclause 6.2.8):

a) If the timer value indicates neither zero nor deactivated and an S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", the UE shall stop timer T3585 associated with the corresponding S-NSSAI, if it is running. If the timer value indicates neither zero nor deactivated and no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", the UE shall stop timer T3585 associated with no S-NSSAI if it is running. The timer T3585 to be stopped includes the timer T3585 applied for all the PLMNs, if running, and the timer T3585 applied for the registered PLMN, if running. The UE shall then start timer T3585 with the value provided in the Back-off timer value IE or with the Back-off timer value received from the 5GMM sublayer and:

1) shall not send another PDU SESSION ESTABLISHMENT REQUEST message with request type different from "initial emergency request" and different from "existing emergency PDU session", or another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1, for a non-emergency PDU session for the same S-NSSAI that was sent by the UE, until timer T3585 expires or timer T3585 is stopped; and

2) shall not send another PDU SESSION ESTABLISHMENT REQUEST message without an S-NSSAI and with request type different from "initial emergency request" and different from "existing emergency PDU session", or another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1, for a non-emergency PDU session established without an S-NSSAI provided by the UE, if no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", until timer T3585 expires or timer T3585 is stopped.

The UE shall not stop timer T3585 upon a PLMN change or inter-system change;

b) if the timer value indicates that this timer is deactivated and an S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", the UE shall stop timer T3585 associated with the corresponding S-NSSAI, if it is running. If the timer value indicates that this timer is deactivated and no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", the UE shall stop timer T3585 associated with no S-NSSAI if it is running. The timer T3585 to be stopped includes the timer T3585 applied for all the PLMNs, if running, and the timer T3585 applied for the registered PLMN, if running. The UE:

1) shall not send another PDU SESSION ESTABLISHMENT REQUEST message with request type different from "initial emergency request" and different from "existing emergency PDU session", or another PDU SESSION MODIFICATION REQUEST with exception of those identified in subclause 6.4.2.1, for a non-emergency PDU session for the same S-NSSAI until the UE is switched off, the USIM is removed, the entry in the "list of subscriber data" for the current SNPN is updated if the UE does not support access to an SNPN using credentials from a credentials holder, or the selected entry of the "list of subscriber data" is updated if the UE supports access to an SNPN using credentials from a credentials holder, or the UE receives a PDU SESSION MODIFICATION COMMAND message for a non-emergency PDU session for the same S-NSSAI from the network, or a PDU SESSION AUTHENTICATION COMMAND message for a non-emergency PDU session for the same S-NSSAI from the network, or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE for the same S-NSSAI from the network; and

2) shall not send another PDU SESSION ESTABLISHMENT REQUEST message without an S-NSSAI and with request type different from "initial emergency request" and different from "existing emergency PDU session", or another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1, for a non-emergency PDU session established without an S-NSSAI provided by the UE, if no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", until the UE is switched off, the USIM is removed, the entry in the "list of subscriber data" for the current SNPN is updated if the UE does not support access to an SNPN using credentials from a credentials holder, or the selected entry of the "list of subscriber data" is updated if the UE supports access to an SNPN using credentials from a credentials holder, or the UE receives a PDU SESSION MODIFICATION COMMAND message for a non-emergency PDU session established without an S-NSSAI provided by the UE, or a PDU SESSION AUTHENTICATION COMMAND message for a non-emergency PDU session established without an S-NSSAI provided by the UE, or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE for a non-emergency PDU session established without an S-NSSAI provided by the UE.

The timer T3585 remains deactivated upon a PLMN change or inter-system change; and

c) if the timer value indicates zero, the UE:

1) shall stop timer T3585 associated with the corresponding S-NSSAI (including the timer T3585 applied for all the PLMNs, if running, and the timer T3585 applied for the registered PLMN, if running), if running, and may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same S-NSSAI; and

2) if no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request " and different from "existing emergency PDU session", the UE shall stop timer T3585 associated with no S-NSSAI, if running, and may send another PDU SESSION ESTABLISHMENT REQUEST message without an S-NSSAI (including the timer T3585 applied for all the PLMNs, if running, and the timer T3585 applied for the registered PLMN, if running), or another PDU SESSION MODIFICATION REQUEST message without an S-NSSAI provided by the UE.

If the 5GSM congestion re-attempt indicator IE with the ABO bit set to "The back-off timer is applied in all PLMNs" is included in the PDU SESSION ESTABLISHMENT REJECT message with the 5GSM cause value #69 "insufficient resources for specific slice", then the UE shall apply the timer T3585 for all the PLMNs. Otherwise, the UE shall apply the timer T3585 for the registered PLMN. Additionally, if the 5GSM congestion re-attempt indicator IE with the CATBO bit set to "The back-off timer is applied in the current access type" is included in the PDU SESSION ESTABLISHMENT REJECT message with the 5GSM cause value #69 "insufficient resources for specific slice", then the UE shall apply the timer T3585 for the current access type. Otherwise, the UE shall apply the timer T3585 for both 3GPP access type and non-3GPP access type.

If the Back-off timer value IE is not included or no Back-off timer value is received from the 5GMM sublayer, then the UE may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same S-NSSAI or without an S-NSSAI.

When the timer T3585 is running or the timer is deactivated, the UE is allowed to initiate a PDU session establishment procedure for emergency services.

If the timer T3585 is running when the UE enters state 5GMM-DEREGISTERED, the UE remains switched on, and the USIM in the UE (if any) remains the same and the entry in the "list of subscriber data" to which timer T3585 is associated (if any) is not updated, then timer T3585 is kept running until it expires or it is stopped.

If the UE is switched off when the timer T3585 is running, and if the USIM in the UE (if any) remains the same and the entry in the "list of subscriber data" to which timer T3585 is associated (if any) is not updated when the UE is switched on, the UE shall behave as follows:

let t1 be the time remaining for T3585 timeout at switch off and let t be the time elapsed between switch off and switch on. If t1 is greater than t, then the timer shall be restarted with the value t1 – t. If t1 is equal to or less than t, then the timer need not be restarted. If the UE is not capable of determining t, then the UE shall restart the timer with the value t1.

NOTE: As described in this subclause, upon PLMN change or inter-system change, the UE does not stop the timer T3584 or T3585. This means the timer T3584 or T3585 can still be running or be deactivated for the given 5GSM procedure, the PLMN, the S-NSSAI and optionally the DNN combination when the UE returns to the PLMN or when it performs inter-system change back from S1 mode to N1 mode. Thus the UE can still be prevented from sending another PDU SESSION ESTABLISHMENT REQUEST or PDU SESSION MODIFICATION REQUEST message in the PLMN for the same S-NSSAI and optionally the same DNN.

Upon PLMN change, if T3584 is running or is deactivated for an S-NSSAI, a DNN, and old PLMN, but T3584 is not running and is not deactivated for the S-NSSAI, the DNN, and new PLMN, then the UE is allowed to send a PDU SESSION ESTABLISHMENT REQUEST message for the same S-NSSAI and the same DNN in the new PLMN.

Upon PLMN change, if T3585 is running or is deactivated for an S-NSSAI and old PLMN, but T3585 is not running and is not deactivated for the S-NSSAI and new PLMN, then the UE is allowed to send a PDU SESSION ESTABLISHMENT REQUEST message for the same S-NSSAI in the new PLMN.

10.1.8.1.3 Test description

10.1.8.1.3.1 Pre-test conditions

System Simulator:

- NGC Cell A.

UE:

- None.

Preamble:

- The UE is in state 3N-A on NGC Cell A according to TS 38.508-1 [4].

10.1.8.1.3.2 Test procedure sequence

**Table 10.1.8.1.3.2-1: Main behaviour**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **St** | **Procedure** | **Message Sequence** | | **TP** | **Verdict** |
|  |  | **U - S** | **Message** |  |  |
| 1 | Cause the UE to request establishment of PDU session with S-NSSAI.  Note: This step is triggered by MMI or AT command. | - | - | - | - |
| 2 | The UE transmits an ULInformationTransfer message and a PDU SESSION ESTABLISHMENT REQUEST message with S-NSSAI. | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | - | - |
| 3 | The SS transmits PDU SESSION ESTABLISHMENT REJECT message with 5GSM cause value #69 and Back-off timer value which is neither zero nor deactivated | <-- | PDU SESSION ESTABLISHMENT REJECT | - | - |
| 3A | Cause the UE to request establishment of PDU session with the same S-NSSAI as step 1.  Note: This step is triggered by MMI or AT command. | - | - | - | - |
| 4 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST message with S-NSSAI within 60 seconds? | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 1 | F |
| 5 | The SS transmits an *RRCRelease* message. | <-- | NR RRC: *RRCRelease* | - | - |
| 6 | The UE is switched off by executing generic procedure in Table 4.9.6.1-1 in TS 38.508-1 [4] | - | - | - | - |
| 7 | The UE is switched on | - | - | - | - |
| 8 | The general procedure is completed by executing of the UE registration procedure in TS 38.508-1 [4] table 4.5.2.2-2 , 'connected without release'. | - | - | - | - |
| 9 | Cause the UE to request establishment of PDU session with the same S-NSSAI as step 1.  Note: This step is triggered by MMI or AT command. | - | - | - | - |
| 10 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST message with S-NSSAI within 60 seconds? | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 2 | F |
| 11 | Cause the UE to request establishment of PDU session with the same S-NSSAI as step 1 after 1 minute since end of step 10.  Note: This step is triggered by MMI or AT command. | - | - | - | - |
| 12 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST message with S-NSSAI within 60 seconds? | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 2,3 | P |
| 13 | The SS transmits a PDU SESSION ESTABLISHMENT ACCEPT message. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |
| 14 | Cause the UE to request establishment of PDU session without S-NSSAI.  Note: This step is triggered by MMI or AT command. | - | - | - | - |
| 15 | The UE transmits an ULInformationTransfer message and a PDU SESSION ESTABLISHMENT REQUEST message without S-NSSAI. | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | - | - |
| 16 | The SS transmits PDU SESSION ESTABLISHMENT REJECT message with 5GSM cause value #69 and Back-off timer value which is neither zero nor deactivated | <-- | PDU SESSION ESTABLISHMENT REJECT | - | - |
| 16A | Cause the UE to request establishment of PDU session without S-NSSAI.  Note: This step is triggered by MMI or AT command. | - | - | - | - |
| 17 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST message without S-NSSAI within 60 seconds? | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 4 | F |
| 18 | The SS transmits an *RRCRelease* message. | <-- | NR RRC: *RRCRelease* | - | - |

10.1.8.1.3.3 Specific message contents

Table 10.1.8.1.3.3-1:UL NAS TRANSPORT (step 2, step 12, Table 10.1.8.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] table 4.7.1-10, condition INITIAL\_PDU\_REQUEST. | | | |
| Information Element | Value/remark | Comment | Condition |
| S-NSSAI | present |  |  |

Table 10.1.8.1.3.3-2: PDU SESSION ESTABLISHMENT REJECT (step 3, step 16, Table 10.1.8.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-3 | | | |
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| 5GSM cause | ‘0100 0101’ | insufficient resources for specific slice |  |
| Back-off timer value | ‘1010 0011’B | 3 minutes |  |

Table 10.1.8.1.3.3-3: PDU SESSION ESTABLISHMENT ACCEPT (step 13, Table 10.1.8.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 clause 4.7.2-2 | | | |
| Information Element | Value/remark | Comment | Condition |
| S-NSSAI | The same S-NSSAI as the S-NSSAI of the PDU session which UE request at step 11 |  |  |

Table 10.1.8.1.3.3-4:UL NAS TRANSPORT (step 15, Table 10.1.8.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] table 4.7.1-10, condition INITIAL\_PDU\_REQUEST. | | | |
| Information Element | Value/remark | Comment | Condition |
| S-NSSAI | not present |  |  |

#### 10.1.8.2 NSAC / PDU session establishment reject / Maximum number of PDU sessions reached / Back-off timer is deactivated

10.1.8.2.1 Test Purpose (TP)

(1)

**with** { UE is establishing UE-requested PDU session by sending PDU Session establishment Request message with S-NSSAI }

**ensure that** {

**when** { UE receives PDU SESSION ESTABLISHMENT REJECT with 5GSM cause value #69 "insufficient resources for specific slice" and Back-off timer value which is deactivated }

**then** { UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same S-NSSAI until UE is switched off, the USIM is removed, the entry in the "list of subscriber data" for the current SNPN is updated if the UE does not support access to an SNPN using credentials from a credentials holder }

}

(2)

**with** { UE is establishing UE-requested PDU session by sending PDU Session establishment Request message with S-NSSAI }

**ensure that** {

**when** { UE receives PDU SESSION ESTABLISHMENT REJECT with 5GSM cause value #69 "insufficient resources for specific slice" and Back-off timer value which is deactivated }

**then** { UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same S-NSSAI until UE receives a PDU SESSION MODIFICATION COMMAND message for the same S-NSSAI }

}

(3)

**with** { UE is establishing UE-requested PDU session by sending PDU Session establishment Request message with S-NSSAI }

**ensure that** {

**when** { UE receives PDU SESSION ESTABLISHMENT REJECT with 5GSM cause value #69 "insufficient resources for specific slice" and Back-off timer value which is deactivated }

**then** { UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same S-NSSAI until UE receives a PDU SESSION AUTHENTICATION COMMAND message for the same S-NSSAI }

}

(4)

**with** { UE is establishing UE-requested PDU session by sending PDU Session establishment Request message with S-NSSAI }

**ensure that** {

**when** { UE receives PDU SESSION ESTABLISHMENT REJECT with 5GSM cause value #69 "insufficient resources for specific slice" and Back-off timer value which is deactivated }

**then** { UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same S-NSSAI until UE receives a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE for the same S-NSSAI }

}

10.1.8.2.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clause 4.6.3.1, clause 6.4.1.4.2.Unless otherwise stated these are Rel-17 requirements.

[TS 24.501, clause 4.6.3.1]

A serving PLMN or the HPLMN, or SNPN can perform network slice admission control for the S-NSSAI(s) subject to NSAC to monitor and control the total number of established PDU sessions per network slice. The SMF performs network slice admission control on the S-NSSAI during the PDU session establishment procedure. If the maximum number of PDU sessions on a network slice associated with an S-NSSAI has been already reached, the SMF rejects the PDU session establishment request using S-NSSAI based congestion control as specified in subclause 6.2.8 and 6.4.1.4.2.

The SMF performs network slice admission control on the S-NSSAI for a PDU session that is associated with the non-3GPP access, when the UE requests to transfer a session from the non-3GPP access to the 3GPP access with the Allowed PDU session status IE as described in subclause 5.6.1.4. If the maximum number of PDU sessions on a network slice associated with an S-NSSAI has been already reached, the SMF rejects the request to establish the user-plane resources (see 3GPP TS 29.502 [20A]).

Based on operator policy, the session management based network slice admission control is not applicable for the PDU session for emergency services, or the session management based network slice admission control result is ignored for the PDU session for emergency services.

Based on operator policy, the session management based network slice admission control is not applicable for the PDU session for priority services, or the session management based network slice admission control result is ignored for the PDU session for priority services.

NOTE: How the SMF determines that the PDU session is used for priority services is outside the scope of this release of the present document.

The session management based network slice admission control is not applicable to PDU session established for onboarding services in SNPN.

NOTE 1: For the MA PDU session during the PDU session establishment procedure, the SMF performs network slice admission control only when it is newly established over the associated access type.

NOTE 2: For a set of redundant PDU sessions, the SMF performs network slice admission control for each PDU session independently.

[TS 24.501, clause 6.4.1.4.2]

If:

- the 5GSM cause value #69 "insufficient resources for specific slice" and the Back-off timer value IE are included in the PDU SESSION ESTABLISHMENT REJECT message; or

- an indication that the 5GSM message was not forwarded due to S-NSSAI only based congestion control is received along a Back-off timer value and a PDU SESSION ESTABLISHMENT REQUEST message with the PDU session ID IE set to the PDU session ID of the PDU session;

the UE shall ignore the Re-attempt indicator IE provided by the network, if any, and take different actions depending on the timer value received for timer T3585 in the Back-off timer value IE or depending on the Back-off timer value received from the 5GMM sublayer (if the UE is a UE configured for high priority access in selected PLMN, exceptions are specified in subclause 6.2.8):

a) If the timer value indicates neither zero nor deactivated and an S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", the UE shall stop timer T3585 associated with the corresponding S-NSSAI, if it is running. If the timer value indicates neither zero nor deactivated and no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", the UE shall stop timer T3585 associated with no S-NSSAI if it is running. The timer T3585 to be stopped includes the timer T3585 applied for all the PLMNs, if running, and the timer T3585 applied for the registered PLMN, if running. The UE shall then start timer T3585 with the value provided in the Back-off timer value IE or with the Back-off timer value received from the 5GMM sublayer and:

1) shall not send another PDU SESSION ESTABLISHMENT REQUEST message with request type different from "initial emergency request" and different from "existing emergency PDU session", or another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1, for a non-emergency PDU session for the same S-NSSAI that was sent by the UE, until timer T3585 expires or timer T3585 is stopped; and

2) shall not send another PDU SESSION ESTABLISHMENT REQUEST message without an S-NSSAI and with request type different from "initial emergency request" and different from "existing emergency PDU session", or another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1, for a non-emergency PDU session established without an S-NSSAI provided by the UE, if no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", until timer T3585 expires or timer T3585 is stopped.

The UE shall not stop timer T3585 upon a PLMN change or inter-system change;

b) if the timer value indicates that this timer is deactivated and an S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", the UE shall stop timer T3585 associated with the corresponding S-NSSAI, if it is running. If the timer value indicates that this timer is deactivated and no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", the UE shall stop timer T3585 associated with no S-NSSAI if it is running. The timer T3585 to be stopped includes the timer T3585 applied for all the PLMNs, if running, and the timer T3585 applied for the registered PLMN, if running. The UE:

1) shall not send another PDU SESSION ESTABLISHMENT REQUEST message with request type different from "initial emergency request" and different from "existing emergency PDU session", or another PDU SESSION MODIFICATION REQUEST with exception of those identified in subclause 6.4.2.1, for a non-emergency PDU session for the same S-NSSAI until the UE is switched off, the USIM is removed, the entry in the "list of subscriber data" for the current SNPN is updated if the UE does not support access to an SNPN using credentials from a credentials holder, or the selected entry of the "list of subscriber data" is updated if the UE supports access to an SNPN using credentials from a credentials holder, or the UE receives a PDU SESSION MODIFICATION COMMAND message for a non-emergency PDU session for the same S-NSSAI from the network, or a PDU SESSION AUTHENTICATION COMMAND message for a non-emergency PDU session for the same S-NSSAI from the network, or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE for the same S-NSSAI from the network; and

2) shall not send another PDU SESSION ESTABLISHMENT REQUEST message without an S-NSSAI and with request type different from "initial emergency request" and different from "existing emergency PDU session", or another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1, for a non-emergency PDU session established without an S-NSSAI provided by the UE, if no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", until the UE is switched off, the USIM is removed, the entry in the "list of subscriber data" for the current SNPN is updated if the UE does not support access to an SNPN using credentials from a credentials holder, or the selected entry of the "list of subscriber data" is updated if the UE supports access to an SNPN using credentials from a credentials holder, or the UE receives a PDU SESSION MODIFICATION COMMAND message for a non-emergency PDU session established without an S-NSSAI provided by the UE, or a PDU SESSION AUTHENTICATION COMMAND message for a non-emergency PDU session established without an S-NSSAI provided by the UE, or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE for a non-emergency PDU session established without an S-NSSAI provided by the UE.

The timer T3585 remains deactivated upon a PLMN change or inter-system change; and

c) if the timer value indicates zero, the UE:

1) shall stop timer T3585 associated with the corresponding S-NSSAI (including the timer T3585 applied for all the PLMNs, if running, and the timer T3585 applied for the registered PLMN, if running), if running, and may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same S-NSSAI; and

2) if no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request " and different from "existing emergency PDU session", the UE shall stop timer T3585 associated with no S-NSSAI, if running, and may send another PDU SESSION ESTABLISHMENT REQUEST message without an S-NSSAI (including the timer T3585 applied for all the PLMNs, if running, and the timer T3585 applied for the registered PLMN, if running), or another PDU SESSION MODIFICATION REQUEST message without an S-NSSAI provided by the UE.

If the 5GSM congestion re-attempt indicator IE with the ABO bit set to "The back-off timer is applied in all PLMNs" is included in the PDU SESSION ESTABLISHMENT REJECT message with the 5GSM cause value #69 "insufficient resources for specific slice", then the UE shall apply the timer T3585 for all the PLMNs. Otherwise, the UE shall apply the timer T3585 for the registered PLMN. Additionally, if the 5GSM congestion re-attempt indicator IE with the CATBO bit set to "The back-off timer is applied in the current access type" is included in the PDU SESSION ESTABLISHMENT REJECT message with the 5GSM cause value #69 "insufficient resources for specific slice", then the UE shall apply the timer T3585 for the current access type. Otherwise, the UE shall apply the timer T3585 for both 3GPP access type and non-3GPP access type.

If the Back-off timer value IE is not included or no Back-off timer value is received from the 5GMM sublayer, then the UE may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same S-NSSAI or without an S-NSSAI.

When the timer T3585 is running or the timer is deactivated, the UE is allowed to initiate a PDU session establishment procedure for emergency services.

If the timer T3585 is running when the UE enters state 5GMM-DEREGISTERED, the UE remains switched on, and the USIM in the UE (if any) remains the same and the entry in the "list of subscriber data" to which timer T3585 is associated (if any) is not updated, then timer T3585 is kept running until it expires or it is stopped.

If the UE is switched off when the timer T3585 is running, and if the USIM in the UE (if any) remains the same and the entry in the "list of subscriber data" to which timer T3585 is associated (if any) is not updated when the UE is switched on, the UE shall behave as follows:

let t1 be the time remaining for T3585 timeout at switch off and let t be the time elapsed between switch off and switch on. If t1 is greater than t, then the timer shall be restarted with the value t1 – t. If t1 is equal to or less than t, then the timer need not be restarted. If the UE is not capable of determining t, then the UE shall restart the timer with the value t1.

NOTE: As described in this subclause, upon PLMN change or inter-system change, the UE does not stop the timer T3584 or T3585. This means the timer T3584 or T3585 can still be running or be deactivated for the given 5GSM procedure, the PLMN, the S-NSSAI and optionally the DNN combination when the UE returns to the PLMN or when it performs inter-system change back from S1 mode to N1 mode. Thus the UE can still be prevented from sending another PDU SESSION ESTABLISHMENT REQUEST or PDU SESSION MODIFICATION REQUEST message in the PLMN for the same S-NSSAI and optionally the same DNN.

Upon PLMN change, if T3584 is running or is deactivated for an S-NSSAI, a DNN, and old PLMN, but T3584 is not running and is not deactivated for the S-NSSAI, the DNN, and new PLMN, then the UE is allowed to send a PDU SESSION ESTABLISHMENT REQUEST message for the same S-NSSAI and the same DNN in the new PLMN.

Upon PLMN change, if T3585 is running or is deactivated for an S-NSSAI and old PLMN, but T3585 is not running and is not deactivated for the S-NSSAI and new PLMN, then the UE is allowed to send a PDU SESSION ESTABLISHMENT REQUEST message for the same S-NSSAI in the new PLMN.

10.1.8.2.3 Test description

10.1.8.2.3.1 Pre-test conditions

System Simulator:

- NGC Cell A.

UE:

- None.

Preamble:

- The UE is in state 3N-A on NGC Cell A according to TS 38.508-1 [4].

10.1.8.2.3.2 Test procedure sequence

**Table 10.1.8.2.3.2-1: Main behaviour**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **St** | **Procedure** | **Message Sequence** | | **TP** | **Verdict** |
|  |  | **U - S** | **Message** |  |  |
| 1 | Cause the UE to request establishment of PDU session with S-NSSAI-1.  Note: This step is triggered by MMI or AT command. | - | - | - | - |
| 2 | The UE transmits an ULInformationTransfer message and a PDU SESSION ESTABLISHMENT REQUEST message with S-NSSAI. | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | - | - |
| 3 | The SS transmits PDU SESSION ESTABLISHMENT REJECT message with 5GSM cause value #69 and Back-off timer value which is deactivated | <-- | PDU SESSION ESTABLISHMENT REJECT | - | - |
| 4 | Cause the UE to request establishment of PDU session with S-NSSAI-1.  Note: This step is triggered by MMI or AT command. | - | - | - | - |
| 5 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST message with S-NSSAI-1 within 15 seconds? | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 1,2,3,4 | F |
| 6 | The SS transmits an *RRCRelease* message. | <-- | NR RRC: *RRCRelease* | - | - |
| 7 | The UE is switched off by executing generic procedure in Table 4.9.6.1-1 in TS 38.508-1 [4] | - | - | - | - |
| 8 | The UE is switched on | - | - | - | - |
| 9 | The general procedure is completed by executing of the UE registration procedure in TS 38.508-1 [4] table 4.5.2.2-2 , 'connected without release'.  Note: At least one non-IMS PDU session Y (1 <= Y <= 15) with S-NSSAI-1 is established successfully after step 9. S-NSSAI-1 is used by the UE in the UL NAS TRANSPORT which includes PDU Session Establishment REQ sent by the UE for PDU Session Y | - | - | - | - |
| 9a1 | Void |  |  | - | - |
| 9a2 | Void | - | - | - | - |
| 10 | Cause the UE to request establishment of PDU session with S-NSSAI-1 and Session ID X where X is different from Y (established in Step 9).  Note: This step is triggered by MMI or AT command. | - | - | - | - |
| 11 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST message with S-NSSAI-1? | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 1 | P |
| 12 | The SS transmits PDU SESSION ESTABLISHMENT REJECT message with 5GSM cause value #69 and Back-off timer value which is deactivated | <-- | PDU SESSION ESTABLISHMENT REJECT | - | - |
| 13 | The SS transmits a PDU SESSION MODIFICATION COMMAND message with PDU session ID =Y. | <-- | PDU SESSION MODIFICATION COMMAND | - | - |
| 14 | The UE transmits a PDU SESSION MODIFICATION COMPLETE message. | --> | PDU SESSION MODIFICATION COMPLETE | - | - |
| 15 | Cause the UE to request establishment of PDU session with S-NSSAI-1 and session ID X where X is different from Y (established in Step 9).  Note: This step is triggered by MMI or AT command. | - | - | - | - |
| 16 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST message with S-NSSAI-1? | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 2 | P |
| 17 | The SS transmits PDU SESSION ESTABLISHMENT REJECT message with 5GSM cause value #69 and Back-off timer value which is deactivated | <-- | PDU SESSION ESTABLISHMENT REJECT |  |  |
| - | EXCEPTION: Steps 17Aa1-17Aa6 describe behaviour that depends on UE configuration, and are followed if pc\_5GC\_PDU\_EAP\_AKA\_Prime = TRUE | - | - | - | - |
| 17Aa1 | The SS transmits PDU SESSION AUTHENTICATION COMMAND with PDU session ID =Y including an EAP-Request message. | <-- | PDU SESSION AUTHENTICATION COMMAND | - | - |
| 17Aa2 | The UE transmits a PDU SESSION AUTHENTICATION COMPLETE containing EAP-Response message. | --> | PDU SESSION AUTHENTICATION COMPLETE | - | - |
| 17Aa3 | The SS transmits PDU SESSION AUTHENTICATION RESULT message containing an EAP-Success message. | <-- | PDU SESSION AUTHENTICATION RESULT | - | - |
| 17Aa4 | Cause the UE to request establishment of PDU session with the same S-NSSAI as step 1.  Note: This step is triggered by MMI or AT command. | - | - |  |  |
| 17Aa5 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST message with S-NSSAI? | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 3 | P |
| 17Aa6 | The SS transmits PDU SESSION ESTABLISHMENT REJECT message with 5GSM cause value #69 and Back-off timer value which is deactivated | <-- | PDU SESSION ESTABLISHMENT REJECT | - | - |
| 18-23 | Void | - | - | - | - |
| 24 | The SS transmits a PDU SESSION RELEASE COMMAND without Back-off timer value IE for S-NSSAI-1 with PDU session ID =Y. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION RELEASE COMMAND | - | - |
| 25 | The UE transmits a PDU SESSION RELEASE COMPLETE message | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION RELEASE COMPLETE | - | - |
| 26 | Cause the UE to request establishment of PDU session with S-NSSAI-1.  Note: This step is triggered by MMI or AT command. | - | - | - | - |
| 27 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST message with S-NSSAI-1? | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 4 | P |
| 28 | The SS transmits a PDU SESSION ESTABLISHMENT ACCEPT message. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |

10.1.8.2.3.3 Specific message contents

Table 10.1.8.2.3.3-1:UL NAS TRANSPORT (step 2, step 11, step 16, step 17Aa5, step 27,Table 10.1.8.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] table 4.7.1-10, condition INITIAL\_PDU\_REQUEST. | | | |
| Information Element | Value/remark | Comment | Condition |
| S-NSSAI | Same as the S-NSSAI of PDU session X in the Preamble |  |  |

Table 10.1.8.2.3.3-2: PDU SESSION ESTABLISHMENT REJECT (step 3, step 12, step 17, step 17Aa6,Table 10.1.8.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-3 | | | |
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
|  |  |  |  |
| 5GSM cause | ‘0100 0101’ | insufficient resources for specific slice |  |
| Back-off timer value | ‘1110 0000’B | deactivated |  |

Table 10.1.8.2.3.3-3: PDU SESSION ESTABLISHMENT ACCEPT (step 28, Table 10.1.8.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 clause 4.7.2-2 | | | |
| Information Element | Value/remark | Comment | Condition |
| S-NSSAI | S-NSSAI-1 |  |  |

Table 10.1.8.2.3.3-4: PDU SESSION AUTHENTICATION RESULT (step 17Aa3, Table 10.1.8.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 table 4.7.2-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| EAP message | EAP-success | See TS 24.501 [25] subclause 9.11.2.2 |  |

#### 10.1.8.3 NSAC / PDU session establishment reject / Maximum number of PDU sessions reached / Back-off timer is zero or not included

10.1.8.3.1 Test Purpose (TP)

(1)

**with** { UE is establishing UE-requested PDU session by sending PDU Session establishment Request message with S-NSSAI }

**ensure that** {

**when** { UE receives PDU SESSION ESTABLISHMENT REJECT with 5GSM cause value #69 "insufficient resources for specific slice" and Back-off timer value set to zero }

**then** { UE could send another PDU SESSION ESTABLISHMENT REQUEST message for the same S-NSSAI }

}

(2)

**with** { UE is establishing UE-requested PDU session by sending PDU Session establishment Request message with no S-NSSAI provided }

**ensure that** {

**when** { UE receives PDU SESSION ESTABLISHMENT REJECT with 5GSM cause value #69 "insufficient resources for specific slice" and Back-off timer value set to zero }

**then** { UE could send another PDU SESSION ESTABLISHMENT REQUEST message without an S-NSSAI }

}

(3)

**with** { UE is establishing UE-requested PDU session by sending PDU Session establishment Request message with S-NSSAI }

**ensure that** {

**when** { UE receives PDU SESSION ESTABLISHMENT REJECT with 5GSM cause value #69 "insufficient resources for specific slice" and Back-off timer value IE is not included }

**then** { UE could send another PDU SESSION ESTABLISHMENT REQUEST message for the same S-NSSAI }

10.1.8.3.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clause 4.6.3.1, clause 6.4.1.4.2.Unless otherwise stated these are Rel-17 requirements.

[TS 24.501, clause 4.6.3.1]

A serving PLMN or the HPLMN, or SNPN can perform network slice admission control for the S-NSSAI(s) subject to NSAC to monitor and control the total number of established PDU sessions per network slice. The SMF performs network slice admission control on the S-NSSAI during the PDU session establishment procedure. If the maximum number of PDU sessions on a network slice associated with an S-NSSAI has been already reached, the SMF rejects the PDU session establishment request using S-NSSAI based congestion control as specified in subclause 6.2.8 and 6.4.1.4.2.

The SMF performs network slice admission control on the S-NSSAI for a PDU session that is associated with the non-3GPP access, when the UE requests to transfer a session from the non-3GPP access to the 3GPP access with the Allowed PDU session status IE as described in subclause 5.6.1.4. If the maximum number of PDU sessions on a network slice associated with an S-NSSAI has been already reached, the SMF rejects the request to establish the user-plane resources (see 3GPP TS 29.502 [20A]).

Based on operator policy, the session management based network slice admission control is not applicable for the PDU session for emergency services, or the session management based network slice admission control result is ignored for the PDU session for emergency services.

Based on operator policy, the session management based network slice admission control is not applicable for the PDU session for priority services, or the session management based network slice admission control result is ignored for the PDU session for priority services.

NOTE: How the SMF determines that the PDU session is used for priority services is outside the scope of this release of the present document.

The session management based network slice admission control is not applicable to PDU session established for onboarding services in SNPN.

NOTE 1: For the MA PDU session during the PDU session establishment procedure, the SMF performs network slice admission control only when it is newly established over the associated access type.

NOTE 2: For a set of redundant PDU sessions, the SMF performs network slice admission control for each PDU session independently.

[TS 24.501, clause 6.4.1.4.2]

If:

- the 5GSM cause value #69 "insufficient resources for specific slice" and the Back-off timer value IE are included in the PDU SESSION ESTABLISHMENT REJECT message; or

- an indication that the 5GSM message was not forwarded due to S-NSSAI only based congestion control is received along a Back-off timer value and a PDU SESSION ESTABLISHMENT REQUEST message with the PDU session ID IE set to the PDU session ID of the PDU session;

the UE shall ignore the Re-attempt indicator IE provided by the network, if any, and take different actions depending on the timer value received for timer T3585 in the Back-off timer value IE or depending on the Back-off timer value received from the 5GMM sublayer (if the UE is a UE configured for high priority access in selected PLMN, exceptions are specified in subclause 6.2.8):

a) If the timer value indicates neither zero nor deactivated and an S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", the UE shall stop timer T3585 associated with the corresponding S-NSSAI, if it is running. If the timer value indicates neither zero nor deactivated and no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", the UE shall stop timer T3585 associated with no S-NSSAI if it is running. The timer T3585 to be stopped includes the timer T3585 applied for all the PLMNs, if running, and the timer T3585 applied for the registered PLMN, if running. The UE shall then start timer T3585 with the value provided in the Back-off timer value IE or with the Back-off timer value received from the 5GMM sublayer and:

1) shall not send another PDU SESSION ESTABLISHMENT REQUEST message with request type different from "initial emergency request" and different from "existing emergency PDU session", or another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1, for a non-emergency PDU session for the same S-NSSAI that was sent by the UE, until timer T3585 expires or timer T3585 is stopped; and

2) shall not send another PDU SESSION ESTABLISHMENT REQUEST message without an S-NSSAI and with request type different from "initial emergency request" and different from "existing emergency PDU session", or another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1, for a non-emergency PDU session established without an S-NSSAI provided by the UE, if no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", until timer T3585 expires or timer T3585 is stopped.

The UE shall not stop timer T3585 upon a PLMN change or inter-system change;

b) if the timer value indicates that this timer is deactivated and an S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", the UE shall stop timer T3585 associated with the corresponding S-NSSAI, if it is running. If the timer value indicates that this timer is deactivated and no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", the UE shall stop timer T3585 associated with no S-NSSAI if it is running. The timer T3585 to be stopped includes the timer T3585 applied for all the PLMNs, if running, and the timer T3585 applied for the registered PLMN, if running. The UE:

1) shall not send another PDU SESSION ESTABLISHMENT REQUEST message with request type different from "initial emergency request" and different from "existing emergency PDU session", or another PDU SESSION MODIFICATION REQUEST with exception of those identified in subclause 6.4.2.1, for a non-emergency PDU session for the same S-NSSAI until the UE is switched off, the USIM is removed, the entry in the "list of subscriber data" for the current SNPN is updated if the UE does not support access to an SNPN using credentials from a credentials holder, or the selected entry of the "list of subscriber data" is updated if the UE supports access to an SNPN using credentials from a credentials holder, or the UE receives a PDU SESSION MODIFICATION COMMAND message for a non-emergency PDU session for the same S-NSSAI from the network, or a PDU SESSION AUTHENTICATION COMMAND message for a non-emergency PDU session for the same S-NSSAI from the network, or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE for the same S-NSSAI from the network; and

2) shall not send another PDU SESSION ESTABLISHMENT REQUEST message without an S-NSSAI and with request type different from "initial emergency request" and different from "existing emergency PDU session", or another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1, for a non-emergency PDU session established without an S-NSSAI provided by the UE, if no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", until the UE is switched off, the USIM is removed, the entry in the "list of subscriber data" for the current SNPN is updated if the UE does not support access to an SNPN using credentials from a credentials holder, or the selected entry of the "list of subscriber data" is updated if the UE supports access to an SNPN using credentials from a credentials holder, or the UE receives a PDU SESSION MODIFICATION COMMAND message for a non-emergency PDU session established without an S-NSSAI provided by the UE, or a PDU SESSION AUTHENTICATION COMMAND message for a non-emergency PDU session established without an S-NSSAI provided by the UE, or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE for a non-emergency PDU session established without an S-NSSAI provided by the UE.

The timer T3585 remains deactivated upon a PLMN change or inter-system change; and

c) if the timer value indicates zero, the UE:

1) shall stop timer T3585 associated with the corresponding S-NSSAI (including the timer T3585 applied for all the PLMNs, if running, and the timer T3585 applied for the registered PLMN, if running), if running, and may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same S-NSSAI; and

2) if no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request " and different from "existing emergency PDU session", the UE shall stop timer T3585 associated with no S-NSSAI, if running, and may send another PDU SESSION ESTABLISHMENT REQUEST message without an S-NSSAI (including the timer T3585 applied for all the PLMNs, if running, and the timer T3585 applied for the registered PLMN, if running), or another PDU SESSION MODIFICATION REQUEST message without an S-NSSAI provided by the UE.

If the 5GSM congestion re-attempt indicator IE with the ABO bit set to "The back-off timer is applied in all PLMNs" is included in the PDU SESSION ESTABLISHMENT REJECT message with the 5GSM cause value #69 "insufficient resources for specific slice", then the UE shall apply the timer T3585 for all the PLMNs. Otherwise, the UE shall apply the timer T3585 for the registered PLMN. Additionally, if the 5GSM congestion re-attempt indicator IE with the CATBO bit set to "The back-off timer is applied in the current access type" is included in the PDU SESSION ESTABLISHMENT REJECT message with the 5GSM cause value #69 "insufficient resources for specific slice", then the UE shall apply the timer T3585 for the current access type. Otherwise, the UE shall apply the timer T3585 for both 3GPP access type and non-3GPP access type.

If the Back-off timer value IE is not included or no Back-off timer value is received from the 5GMM sublayer, then the UE may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same S-NSSAI or without an S-NSSAI.

When the timer T3585 is running or the timer is deactivated, the UE is allowed to initiate a PDU session establishment procedure for emergency services.

If the timer T3585 is running when the UE enters state 5GMM-DEREGISTERED, the UE remains switched on, and the USIM in the UE (if any) remains the same and the entry in the "list of subscriber data" to which timer T3585 is associated (if any) is not updated, then timer T3585 is kept running until it expires or it is stopped.

If the UE is switched off when the timer T3585 is running, and if the USIM in the UE (if any) remains the same and the entry in the "list of subscriber data" to which timer T3585 is associated (if any) is not updated when the UE is switched on, the UE shall behave as follows:

let t1 be the time remaining for T3585 timeout at switch off and let t be the time elapsed between switch off and switch on. If t1 is greater than t, then the timer shall be restarted with the value t1 – t. If t1 is equal to or less than t, then the timer need not be restarted. If the UE is not capable of determining t, then the UE shall restart the timer with the value t1.

NOTE: As described in this subclause, upon PLMN change or inter-system change, the UE does not stop the timer T3584 or T3585. This means the timer T3584 or T3585 can still be running or be deactivated for the given 5GSM procedure, the PLMN, the S-NSSAI and optionally the DNN combination when the UE returns to the PLMN or when it performs inter-system change back from S1 mode to N1 mode. Thus the UE can still be prevented from sending another PDU SESSION ESTABLISHMENT REQUEST or PDU SESSION MODIFICATION REQUEST message in the PLMN for the same S-NSSAI and optionally the same DNN.

Upon PLMN change, if T3584 is running or is deactivated for an S-NSSAI, a DNN, and old PLMN, but T3584 is not running and is not deactivated for the S-NSSAI, the DNN, and new PLMN, then the UE is allowed to send a PDU SESSION ESTABLISHMENT REQUEST message for the same S-NSSAI and the same DNN in the new PLMN.

Upon PLMN change, if T3585 is running or is deactivated for an S-NSSAI and old PLMN, but T3585 is not running and is not deactivated for the S-NSSAI and new PLMN, then the UE is allowed to send a PDU SESSION ESTABLISHMENT REQUEST message for the same S-NSSAI in the new PLMN.

10.1.8.3.3 Test description

10.1.8.3.3.1 Pre-test conditions

System Simulator:

- NGC Cell A.

UE:

- None.

Preamble:

- The UE is in state 3N-A on NGC Cell A according to TS 38.508-1 [4].

10.1.8.3.3.2 Test procedure sequence

**Table 10.1.8.3.3.2-1: Main behaviour**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **St** | **Procedure** | **Message Sequence** | | **TP** | **Verdict** |
|  |  | **U - S** | **Message** |  |  |
| 1 | Cause the UE to request establishment of PDU session with S-NSSAI.  Note: This step is triggered by MMI or AT command. | - | - | - | - |
| 2 | The UE transmits an ULInformationTransfer message and a PDU SESSION ESTABLISHMENT REQUEST message with S-NSSAI. | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | - | - |
| 3 | The SS transmits PDU SESSION ESTABLISHMENT REJECT message with 5GSM cause value #69 and Back-off timer value which is set to zero. | <-- | PDU SESSION ESTABLISHMENT REJECT | - | - |
| 3A | Cause the UE to request establishment of PDU session with S-NSSAI.  Note: This step is triggered by MMI or AT command. | - | - | - | - |
| 4 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST message with S-NSSAI? | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 1 | P |
| 5 | The SS transmits a PDU SESSION ESTABLISHMENT ACCEPT message. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |
| 6 | The generic test procedure in TS 38.508-1 Table 4.9.21.2.2-1 of Procedure for PDU Session Release is performed for session established at step 4. | - | - | - | - |
| 7 | Cause the UE to request establishment of PDU session without S-NSSAI.  Note: This step is triggered by MMI or AT command. | - | - | - | - |
| 8 | The UE transmits an ULInformationTransfer message and a PDU SESSION ESTABLISHMENT REQUEST message without S-NSSAI. | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | - | - |
| 9 | The SS transmits PDU SESSION ESTABLISHMENT REJECT message with 5GSM cause value #69 and Back-off timer value which is set to zero. | <-- | PDU SESSION ESTABLISHMENT REJECT | - | - |
| 9A | Cause the UE to request establishment of PDU session without S-NSSAI.  Note: This step is triggered by MMI or AT command. | - | - | - | - |
| 10 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST message without S-NSSAI? | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 2 | P |
| 11 | The SS transmits a PDU SESSION ESTABLISHMENT ACCEPT message. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |
| 12 | The generic test procedure in TS 38.508-1 Table 4.9.21.2.2-1 of Procedure for PDU Session Release is performed for session established at step 10. | - | - | - | - |
| 13 | Cause the UE to request establishment of PDU session with S-NSSAI.  Note: This step is triggered by MMI or AT command. | - | - | - | - |
| 14 | The UE transmits an ULInformationTransfer message and a PDU SESSION ESTABLISHMENT REQUEST message with S-NSSAI. | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | - | - |
| 15 | The SS transmits PDU SESSION ESTABLISHMENT REJECT message with 5GSM cause value #69 and Back-off timer value IE is not included. | <-- | PDU SESSION ESTABLISHMENT REJECT | - | - |
| 16 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST message with S-NSSAI? | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 3 | P |
| 17 | The SS transmits a PDU SESSION ESTABLISHMENT ACCEPT message. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |

10.1.8.3.3.3 Specific message contents

Table 10.1.8.3.3.3-1:UL NAS TRANSPORT (step 2, step 4, step 14, step 16, Table 10.1.8.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] table 4.7.1-10, condition INITIAL\_PDU\_REQUEST. | | | |
| Information Element | Value/remark | Comment | Condition |
| S-NSSAI | present |  |  |

Table 10.1.8.1.3.3-2: PDU SESSION ESTABLISHMENT REJECT (step 3, step 9, Table 10.1.8.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-3 | | | |
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
|  |  |  |  |
| 5GSM cause | ‘0100 0101’ | insufficient resources for specific slice |  |
| Back-off timer value | ‘1010 0000’B | 0 minutes |  |

Table 10.1.8.1.3.3-3: PDU SESSION ESTABLISHMENT ACCEPT (step 5, step 17, Table 10.1.8.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 clause 4.7.2-2 | | | |
| Information Element | Value/remark | Comment | Condition |
| S-NSSAI | The same S-NSSAI as the S-NSSAI of the PDU session which UE request at step 1 |  |  |

Table 10.1.8.1.3.3-4: PDU SESSION ESTABLISHMENT REJECT (step 15, Table 10.1.8.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-3 | | | |
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
|  |  |  |  |
| 5GSM cause | ‘0100 0101’ | insufficient resources for specific slice |  |
| Back-off timer value | Not present |  |  |

Table 10.1.8.3.3.3-5:UL NAS TRANSPORT (step 8, step 10, Table 10.1.8.3.3.2-1)

|  |
| --- |
| Derivation Path: TS 38.508-1 [4] table 4.7.1-10, condition INITIAL\_PDU\_REQUEST. |

#### 10.1.8.4 NSAC / 5GSM message not forwarded / Back-off timer

10.1.8.4.1 Test Purpose (TP)

(1)

**with** { UE is establishing UE-requested PDU session by sending PDU Session establishment Request message with S-NSSAI }

**ensure that** {

**when** { UE receives DL NAS TRANSPORT with Payload container type set to the 5GSM message which was not forwarded, with 5GMM cause #69 "insufficient resources for specific slice" and Back-off timer value }

**then** { UE shall start timer T3585 and shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same S-NSSAI until T3585 expires }

}

10.1.8.4.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clauses 4.6.3.1, 5.4.5.3.3, 5.4.5.3.2, and 6.4.1.4.2. Unless otherwise stated these are Rel-17 requirements.

[TS 24.501, clause 4.6.3.1]

A serving PLMN or the HPLMN, or SNPN can perform network slice admission control for the S-NSSAI(s) subject to NSAC to monitor and control the total number of established PDU sessions per network slice. The SMF performs network slice admission control on the S-NSSAI during the PDU session establishment procedure. If the maximum number of PDU sessions on a network slice associated with an S-NSSAI has been already reached, the SMF rejects the PDU session establishment request using S-NSSAI based congestion control as specified in subclause 6.2.8 and 6.4.1.4.2.

The SMF performs network slice admission control on the S-NSSAI for a PDU session that is associated with the non-3GPP access, when the UE requests to transfer a session from the non-3GPP access to the 3GPP access with the Allowed PDU session status IE as described in subclause 5.6.1.4. If the maximum number of PDU sessions on a network slice associated with an S-NSSAI has been already reached, the SMF rejects the request to establish the user-plane resources (see 3GPP TS 29.502 [20A]).

Based on operator policy, the session management based network slice admission control is not applicable for the PDU session for emergency services, or the session management based network slice admission control result is ignored for the PDU session for emergency services.

Based on operator policy, the session management based network slice admission control is not applicable for the PDU session for priority services, or the session management based network slice admission control result is ignored for the PDU session for priority services.

NOTE: How the SMF determines that the PDU session is used for priority services is outside the scope of this release of the present document.

The session management based network slice admission control is not applicable to PDU session established for onboarding services in SNPN.

NOTE 1: For the MA PDU session during the PDU session establishment procedure, the SMF performs network slice admission control only when it is newly established over the associated access type.

NOTE 2: For a set of redundant PDU sessions, the SMF performs network slice admission control for each PDU session independently.

[TS 24.501, clause 5.4.5.3.2]

In 5GMM-CONNECTED mode, the AMF initiates the NAS transport procedure by sending the DL NAS TRANSPORT message, as shown in figure 5.4.5.3.2.1.

…

In case h4) in subclause 5.4.5.3.1, i.e. upon sending a single uplink 5GSM message which was not forwarded, because the maximum number of UEs for a network slice has been reached, the AMF shall:

a) include the PDU session ID in the PDU session ID IE;

b) set the Payload container type IE to "N1 SM information";

c) set the Payload container IE to the 5GSM message which was not forwarded;

d) set the 5GMM cause IE to the 5GMM cause #69 "insufficient resources for specific slice"; and

e) include the Back-off timer value IE.

…

[TS 24.501, clause 5.4.5.3.3]

Upon reception of a DL NAS TRANSPORT message, the UE shall stop the timer T3346 if running.

Upon reception of a DL NAS TRANSPORT message, if the Payload container type IE is set to:

…

g) "N1 SM information" and:

1) the 5GMM cause IE is set to the 5GMM cause #22 "Congestion", the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded due to DNN based congestion control along with the 5GSM message from the Payload container IE of the DL NAS TRANSPORT message, and the time value from the Back-off timer value IE;

2) the 5GMM cause IE is set to the 5GMM cause #28 "Restricted service area", the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded due to service area restrictions along with the 5GSM message from the Payload container IE of the DL NAS TRANSPORT message, enters the state 5GMM-REGISTERED.NON-ALLOWED-SERVICE and, if the DL NAS TRANSPORT message is received over 3GPP access, performs the registration procedure for mobility and periodic registration update without waiting for the release of the N1 NAS signalling connection (see subclauses 5.3.5 and 5.5.1.3);

3) the 5GMM cause IE is set to the 5GMM cause #65 "maximum number of PDU sessions reached", the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded because the PLMN's maximum number of PDU sessions has been reached, along with the 5GSM message from the Payload container IE of the DL NAS TRANSPORT message;

4) the 5GMM cause IE is set to the 5GMM cause #67 "insufficient resources for specific slice and DNN", the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded due to S-NSSAI and DNN based congestion control along with the 5GSM message from the Payload container IE of the DL NAS TRANSPORT message, and the time value from the Back-off timer value IE;

5) the 5GMM cause IE is set to the 5GMM cause #69 "insufficient resources for specific slice", the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded due to S-NSSAI only based congestion control along with the 5GSM message from the Payload container IE of the DL NAS TRANSPORT message, and the time value from the Back-off timer value IE;

5a) the 5GMM cause IE is set to the 5GMM cause #78 "PLMN not allowed to operate at the present UE location", the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded because the UE is registered to a PLMN via a satellite NG-RAN cell that is not allowed to operate at the present UE location along with the 5GSM message from the Payload container IE of the DL NAS TRANSPORT message. Additionally, the UE shall not send the UL NAS TRANSPORT message to transport any of the data types listed in subclause 5.4.5.2.1;

6) the 5GMM cause IE is set to the 5GMM cause #90 "payload was not forwarded", the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded due to routing failure along with the 5GSM message from the Payload container IE of the DL NAS TRANSPORT message;

7) the 5GMM cause IE is set to the 5GMM cause #91 "DNN not supported or not subscribed in the slice", the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded because the DNN is not supported or not subscribed in a slice along with the 5GSM message from the Payload container IE of the DL NAS TRANSPORT message, and the time value from the Back-off timer value IE, if any;

8) the 5GMM cause IE is set to the 5GMM cause #92 "insufficient user-plane resources for the PDU session", the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded due to insufficient user-plane resources along with the 5GSM message from the Payload container IE of the DL NAS TRANSPORT message.

9) the 5GMM cause IE is set to the 5GMM cause #79 "UAS services not allowed", the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded because the UE is marked in the UE's 5GMM context that it is not allowed to request UAS services along with the 5GSM message from the Payload container IE of the DL NAS TRANSPORT message.

…

[TS 24.501, clause 6.4.1.4.2]

…

If:

- the 5GSM cause value #69 "insufficient resources for specific slice" and the Back-off timer value IE are included in the PDU SESSION ESTABLISHMENT REJECT message; or

- an indication that the 5GSM message was not forwarded due to S-NSSAI only based congestion control is received along a Back-off timer value and a PDU SESSION ESTABLISHMENT REQUEST message with the PDU session ID IE set to the PDU session ID of the PDU session;

the UE shall ignore the Re-attempt indicator IE provided by the network, if any, and take different actions depending on the timer value received for timer T3585 in the Back-off timer value IE or depending on the Back-off timer value received from the 5GMM sublayer (if the UE is a UE configured for high priority access in selected PLMN or SNPN, exceptions are specified in subclause 6.2.8):

a) If the timer value indicates neither zero nor deactivated and an S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", the UE shall stop timer T3585 associated with the corresponding S-NSSAI, if it is running. If the timer value indicates neither zero nor deactivated and no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", the UE shall stop timer T3585 associated with no S-NSSAI if it is running. The timer T3585 to be stopped includes:

- the timer T3585 applied for all the PLMNs and for the access over which the PDU SESSION ESTABLISHMENT REJECT is received, if running;

- the timer T3585 applied for all the PLMNs and for both 3GPP access type and non-3GPP access type, if running;

- the timer T3585 applied for the registered PLMN and for the access over which the PDU SESSION ESTABLISHMENT REJECT is received, if running; and

- the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type, if running;

The UE shall then start timer T3585 with the value provided in the Back-off timer value IE or with the Back-off timer value received from the 5GMM sublayer and:

1) shall not send another PDU SESSION ESTABLISHMENT REQUEST message with request type different from "initial emergency request" and different from "existing emergency PDU session", or another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1, for a non-emergency PDU session for the same S-NSSAI that was sent by the UE, until timer T3585 expires or timer T3585 is stopped; and

2) shall not send another PDU SESSION ESTABLISHMENT REQUEST message without an S-NSSAI and with request type different from "initial emergency request" and different from "existing emergency PDU session", or another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1, for a non-emergency PDU session established without an S-NSSAI provided by the UE, if no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", until timer T3585 expires or timer T3585 is stopped.

The UE shall not stop timer T3585 upon a PLMN change or inter-system change;

b) if the timer value indicates that this timer is deactivated and an S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", the UE shall stop timer T3585 associated with the corresponding S-NSSAI, if it is running. If the timer value indicates that this timer is deactivated and no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", the UE shall stop timer T3585 associated with no S-NSSAI if it is running. The timer T3585 to be stopped includes:

- the timer T3585 applied for all the PLMNs and for the access over which the PDU SESSION ESTABLISHMENT REJECT is received, if running;

- the timer T3585 applied for all the PLMNs and for both 3GPP access type and non-3GPP access type, if running;

- the timer T3585 applied for the registered PLMN and for the access over which the PDU SESSION ESTABLISHMENT REJECT is received, if running; and

- the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type, if running;

The UE:

1) shall not send another PDU SESSION ESTABLISHMENT REQUEST message with request type different from "initial emergency request" and different from "existing emergency PDU session", or another PDU SESSION MODIFICATION REQUEST with exception of those identified in subclause 6.4.2.1, for a non-emergency PDU session for the same S-NSSAI until the UE is switched off, the USIM is removed, the entry in the "list of subscriber data" for the current SNPN is updated if the UE does not support access to an SNPN using credentials from a credentials holder, or the selected entry of the "list of subscriber data" is updated if the UE supports access to an SNPN using credentials from a credentials holder, or the UE receives a PDU SESSION MODIFICATION COMMAND message for a non-emergency PDU session for the same S-NSSAI from the network, or a PDU SESSION AUTHENTICATION COMMAND message for a non-emergency PDU session for the same S-NSSAI from the network, or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE for the same S-NSSAI from the network; and

2) shall not send another PDU SESSION ESTABLISHMENT REQUEST message without an S-NSSAI and with request type different from "initial emergency request" and different from "existing emergency PDU session", or another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1, for a non-emergency PDU session established without an S-NSSAI provided by the UE, if no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", until the UE is switched off, the USIM is removed, the entry in the "list of subscriber data" for the current SNPN is updated if the UE does not support access to an SNPN using credentials from a credentials holder, or the selected entry of the "list of subscriber data" is updated if the UE supports access to an SNPN using credentials from a credentials holder, or the UE receives a PDU SESSION MODIFICATION COMMAND message for a non-emergency PDU session established without an S-NSSAI provided by the UE, or a PDU SESSION AUTHENTICATION COMMAND message for a non-emergency PDU session established without an S-NSSAI provided by the UE, or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE for a non-emergency PDU session established without an S-NSSAI provided by the UE.

The timer T3585 remains deactivated upon a PLMN change or inter-system change; and

c) if the timer value indicates zero, the UE:

1) shall stop timer T3585 associated with the corresponding S-NSSAI (including the timer T3585 applied for all the PLMNs, if running, and the timer T3585 applied for the registered PLMN, if running), if running, and may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same S-NSSAI; and

2) if no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request " and different from "existing emergency PDU session", the UE shall stop timer T3585 associated with no S-NSSAI, if running, and may send another PDU SESSION ESTABLISHMENT REQUEST message without an S-NSSAI (including the timer T3585 applied for all the PLMNs, if running, and the timer T3585 applied for the registered PLMN, if running), or another PDU SESSION MODIFICATION REQUEST message without an S-NSSAI provided by the UE.

If the 5GSM congestion re-attempt indicator IE with the ABO bit set to "The back-off timer is applied in all PLMNs" is included in the PDU SESSION ESTABLISHMENT REJECT message with the 5GSM cause value #69 "insufficient resources for specific slice", then the UE shall apply the timer T3585 for all the PLMNs. Otherwise, the UE shall apply the timer T3585 for the registered PLMN. Additionally, if the 5GSM congestion re-attempt indicator IE with the CATBO bit set to "The back-off timer is applied in the current access type" is included in the PDU SESSION ESTABLISHMENT REJECT message with the 5GSM cause value #69 "insufficient resources for specific slice", then the UE shall apply the timer T3585 for the current access type. Otherwise, the UE shall apply the timer T3585 for both 3GPP access type and non-3GPP access type and the UE shall stop any running timer T3585 for the applied PLMN and for the access different from the access from which the PDU SESSION ESTABLISHMENT REJECT message is received.

If the Back-off timer value IE is not included or no Back-off timer value is received from the 5GMM sublayer, then the UE may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same S-NSSAI or without an S-NSSAI.

When the timer T3585 is running or the timer is deactivated, the UE is allowed to initiate a PDU session establishment procedure for emergency services.

If the timer T3585 is running when the UE enters state 5GMM-DEREGISTERED, the UE remains switched on, and the USIM in the UE (if any) remains the same and the entry in the "list of subscriber data" to which timer T3585 is associated (if any) is not updated, then timer T3585 is kept running until it expires or it is stopped.

If the UE is switched off when the timer T3585 is running, and if the USIM in the UE (if any) remains the same and the entry in the "list of subscriber data" to which timer T3585 is associated (if any) is not updated when the UE is switched on, the UE shall behave as follows:

let t1 be the time remaining for T3585 timeout at switch off and let t be the time elapsed between switch off and switch on. If t1 is greater than t, then the timer shall be restarted with the value t1 – t. If t1 is equal to or less than t, then the timer need not be restarted. If the UE is not capable of determining t, then the UE shall restart the timer with the value t1.

NOTE: As described in this subclause, upon PLMN change or inter-system change, the UE does not stop the timer T3584 or T3585. This means the timer T3584 or T3585 can still be running or be deactivated for the given 5GSM procedure, the PLMN, the S-NSSAI and optionally the DNN combination when the UE returns to the PLMN or when it performs inter-system change back from S1 mode to N1 mode. Thus the UE can still be prevented from sending another PDU SESSION ESTABLISHMENT REQUEST or PDU SESSION MODIFICATION REQUEST message in the PLMN for the same S-NSSAI and optionally the same DNN.

Upon PLMN change, if T3584 is running or is deactivated for an S-NSSAI, a DNN, and old PLMN, but T3584 is not running and is not deactivated for the S-NSSAI, the DNN, and new PLMN, then the UE is allowed to send a PDU SESSION ESTABLISHMENT REQUEST message for the same S-NSSAI and the same DNN in the new PLMN.

Upon PLMN change, if T3585 is running or is deactivated for an S-NSSAI and old PLMN, but T3585 is not running and is not deactivated for the S-NSSAI and new PLMN, then the UE is allowed to send a PDU SESSION ESTABLISHMENT REQUEST message for the same S-NSSAI in the new PLMN.

10.1.8.4.3 Test description

10.1.8.4.3.1 Pre-test conditions

System Simulator:

- NGC Cell A.

UE:

- None.

Preamble:

- The UE is in state 3N-A on NGC Cell A according to TS 38.508-1 [4].

10.1.8.4.3.2 Test procedure sequence

Table 10.1.8.4.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **St** | **Procedure** | **Message Sequence** | | **TP** | **Verdict** |
|  |  | **U - S** | **Message** |  |  |
| 1 | Cause the UE to request establishment of PDU session with S-NSSAI.  Note: This step is triggered by MMI or AT command. | - | - | - | - |
| 2 | The UE transmits an ULInformationTransfer message and a PDU SESSION ESTABLISHMENT REQUEST message with S-NSSAI. | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | - | - |
| 3 | The SS transmits DL NAS TRANSPORT message with 5GMM cause value #69 and Back-off timer value which is set to 5 minutes.  Note: The PDU SESSION ESTABLISHMENT REQUEST message received in Step 2 is included in the payload container | <-- | 5GMM: DL NAS TRANSPORT | - | - |
| 4 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST message with S-NSSAI within 60 seconds? | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 1 | F |
| 5 | Cause the UE to request establishment of PDU session with the same S-NSSAI.  Note: This step is triggered by MMI or AT command. | - | - | - | - |
| 6 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST message with S-NSSAI? | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 1 | F |
| 7 | Cause the UE to request establishment of PDU session without S-NSSAI.  Note: This step is triggered by MMI or AT command. | - | - | - | - |
| 8 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST message? | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 1 | P |
| 9 | The SS transmits a PDU SESSION ESTABLISHMENT ACCEPT message. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |
| 10 | The generic test procedure in TS 38.508-1 Table 4.9.21.2.2-1 of Procedure for PDU Session Release is performed for session established at step 8. | - | - | - | - |
| 11 | Wait for timer T3585 expired. | - | - | - | - |
| 12 | Cause the UE to request establishment of PDU session with S-NSSAI.  Note: This step is triggered by MMI or AT command. | - | - | - | - |
| 13 | Void | - | - | - | - |
| 14 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST message with S-NSSAI? | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 1 | P |
| 15 | The SS transmits a PDU SESSION ESTABLISHMENT ACCEPT message. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |
| 16 | The generic test procedure in TS 38.508-1 Table 4.9.21.2.2-1 of Procedure for PDU Session Release is performed for session established at step 14. | - | - | - | - |

10.1.8.4.3.3 Specific message contents

Table 10.1.8.4.3.3-1:UL NAS TRANSPORT (step 2 and step 14, Table 10.1.8.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] table 4.7.1-10, with condition INITIAL\_PDU\_REQUEST. | | | |
| Information Element | Value/remark | Comment | Condition |
| S-NSSAI | present |  |  |
| S-NSSAI IEI | 22 |  |  |
| Length of S-NSSAI contents | ‘0000 0001’B |  |  |
| SST | ‘0000 0001’B |  |  |

Table 10.1.8.4.3.3-2: PDU SESSION ESTABLISHMENT REJECT (step 3, Table 10.1.8.4.3.2-1)

Table 10.1.8.4.3.3-2: DL NAS TRANSPORT (step 3, Table 10.1.8.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-11 with condition 5GSM\_MESSAGE | | | |
| Information Element | | Value/remark | Comment | Condition |
| Payload container type | | ‘0001’B | N1 SM information |  |
| Payload container | | PDU SESSION ESTABLISHMENT REQUEST according to TS 38.508-1 [4],Table 4.7.2-1 | Same as the message received in step 2. |  |
| 5GMM cause | | ‘0100 0101‘B | Insufficient resources for specific slice |  |
| Back-off timer value | | ‘1010 0101’B | 5 minutes |  |

Table 10.1.8.4.3.3-3:UL NAS TRANSPORT (step 8, Table 10.1.8.4.3.2-1)

|  |
| --- |
| Derivation Path: TS 38.508-1 [4] table 4.7.1-10, with condition INITIAL\_PDU\_REQUEST. |

Table 10.1.8.4.3.3-4: PDU SESSION ESTABLISHMENT ACCEPT (step 15, Table 10.1.8.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 clause 4.7.2-2 | | | |
| Information Element | Value/remark | Comment | Condition |
| S-NSSAI | The same S-NSSAI as the S-NSSAI of the PDU session which UE request at step 1 |  |  |

#### 10.1.8.5 NSAC / Maximum number of PDU sessions reached / Emergency service

10.1.8.5.1 Test Purpose (TP)

(1)

**with** { UE has received PDU SESSION ESTABLISHMENT REJECT with 5GSM cause value #69 ""insufficient resources for specific slice"" and Back-off timer value }

**ensure that** {

**when** { The timer T3585 is running and the UE needs to initial PDU session establishment for emergency services }

**then** { UE starts emergency PDU session establishment procedure }

}

10.1.8.5.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clauses 4.6.3.1, and 6.4.1.4.2. Unless otherwise stated these are Rel-17 requirements.

[TS 24.501, clause 4.6.3.1]

A serving PLMN or the HPLMN, or SNPN can perform network slice admission control for the S-NSSAI(s) subject to NSAC to monitor and control the total number of established PDU sessions per network slice. The SMF performs network slice admission control on the S-NSSAI during the PDU session establishment procedure. If the maximum number of PDU sessions on a network slice associated with an S-NSSAI has been already reached, the SMF rejects the PDU session establishment request using S-NSSAI based congestion control as specified in subclause 6.2.8 and 6.4.1.4.2.

The SMF performs network slice admission control on the S-NSSAI for a PDU session that is associated with the non-3GPP access, when the UE requests to transfer a session from the non-3GPP access to the 3GPP access with the Allowed PDU session status IE as described in subclause 5.6.1.4. If the maximum number of PDU sessions on a network slice associated with an S-NSSAI has been already reached, the SMF rejects the request to establish the user-plane resources (see 3GPP TS 29.502 [20A]).

Based on operator policy, the session management based network slice admission control is not applicable for the PDU session for emergency services, or the session management based network slice admission control result is ignored for the PDU session for emergency services.

Based on operator policy, the session management based network slice admission control is not applicable for the PDU session for priority services, or the session management based network slice admission control result is ignored for the PDU session for priority services.

NOTE: How the SMF determines that the PDU session is used for priority services is outside the scope of this release of the present document.

The session management based network slice admission control is not applicable to PDU session established for onboarding services in SNPN.

NOTE 1: For the MA PDU session during the PDU session establishment procedure, the SMF performs network slice admission control only when it is newly established over the associated access type.

NOTE 2: For a set of redundant PDU sessions, the SMF performs network slice admission control for each PDU session independently.

[TS 24.501, clause 5.4.5.3.2]

In 5GMM-CONNECTED mode, the AMF initiates the NAS transport procedure by sending the DL NAS TRANSPORT message, as shown in figure 5.4.5.3.2.1.

…

In case h4) in subclause 5.4.5.3.1, i.e. upon sending a single uplink 5GSM message which was not forwarded, because the maximum number of UEs for a network slice has been reached, the AMF shall:

a) include the PDU session ID in the PDU session ID IE;

b) set the Payload container type IE to "N1 SM information";

c) set the Payload container IE to the 5GSM message which was not forwarded;

d) set the 5GMM cause IE to the 5GMM cause #69 "insufficient resources for specific slice"; and

e) include the Back-off timer value IE.

…

[TS 24.501, clause 6.4.1.4.2]

…

If:

- the 5GSM cause value #69 "insufficient resources for specific slice" and the Back-off timer value IE are included in the PDU SESSION ESTABLISHMENT REJECT message; or

- an indication that the 5GSM message was not forwarded due to S-NSSAI only based congestion control is received along a Back-off timer value and a PDU SESSION ESTABLISHMENT REQUEST message with the PDU session ID IE set to the PDU session ID of the PDU session;

the UE shall ignore the Re-attempt indicator IE provided by the network, if any, and take different actions depending on the timer value received for timer T3585 in the Back-off timer value IE or depending on the Back-off timer value received from the 5GMM sublayer (if the UE is a UE configured for high priority access in selected PLMN or SNPN, exceptions are specified in subclause 6.2.8):

a) If the timer value indicates neither zero nor deactivated and an S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", the UE shall stop timer T3585 associated with the corresponding S-NSSAI, if it is running. If the timer value indicates neither zero nor deactivated and no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", the UE shall stop timer T3585 associated with no S-NSSAI if it is running. The timer T3585 to be stopped includes:

- the timer T3585 applied for all the PLMNs and for the access over which the PDU SESSION ESTABLISHMENT REJECT is received, if running;

- the timer T3585 applied for all the PLMNs and for both 3GPP access type and non-3GPP access type, if running;

- the timer T3585 applied for the registered PLMN and for the access over which the PDU SESSION ESTABLISHMENT REJECT is received, if running; and

- the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type, if running;

The UE shall then start timer T3585 with the value provided in the Back-off timer value IE or with the Back-off timer value received from the 5GMM sublayer and:

1) shall not send another PDU SESSION ESTABLISHMENT REQUEST message with request type different from "initial emergency request" and different from "existing emergency PDU session", or another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1, for a non-emergency PDU session for the same S-NSSAI that was sent by the UE, until timer T3585 expires or timer T3585 is stopped; and

2) shall not send another PDU SESSION ESTABLISHMENT REQUEST message without an S-NSSAI and with request type different from "initial emergency request" and different from "existing emergency PDU session", or another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1, for a non-emergency PDU session established without an S-NSSAI provided by the UE, if no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", until timer T3585 expires or timer T3585 is stopped.

The UE shall not stop timer T3585 upon a PLMN change or inter-system change;

b) if the timer value indicates that this timer is deactivated and an S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", the UE shall stop timer T3585 associated with the corresponding S-NSSAI, if it is running. If the timer value indicates that this timer is deactivated and no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", the UE shall stop timer T3585 associated with no S-NSSAI if it is running. The timer T3585 to be stopped includes:

- the timer T3585 applied for all the PLMNs and for the access over which the PDU SESSION ESTABLISHMENT REJECT is received, if running;

- the timer T3585 applied for all the PLMNs and for both 3GPP access type and non-3GPP access type, if running;

- the timer T3585 applied for the registered PLMN and for the access over which the PDU SESSION ESTABLISHMENT REJECT is received, if running; and

- the timer T3585 applied for the registered PLMN and for both 3GPP access type and non-3GPP access type, if running;

The UE:

1) shall not send another PDU SESSION ESTABLISHMENT REQUEST message with request type different from "initial emergency request" and different from "existing emergency PDU session", or another PDU SESSION MODIFICATION REQUEST with exception of those identified in subclause 6.4.2.1, for a non-emergency PDU session for the same S-NSSAI until the UE is switched off, the USIM is removed, the entry in the "list of subscriber data" for the current SNPN is updated if the UE does not support access to an SNPN using credentials from a credentials holder, or the selected entry of the "list of subscriber data" is updated if the UE supports access to an SNPN using credentials from a credentials holder, or the UE receives a PDU SESSION MODIFICATION COMMAND message for a non-emergency PDU session for the same S-NSSAI from the network, or a PDU SESSION AUTHENTICATION COMMAND message for a non-emergency PDU session for the same S-NSSAI from the network, or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE for the same S-NSSAI from the network; and

2) shall not send another PDU SESSION ESTABLISHMENT REQUEST message without an S-NSSAI and with request type different from "initial emergency request" and different from "existing emergency PDU session", or another PDU SESSION MODIFICATION REQUEST message with exception of those identified in subclause 6.4.2.1, for a non-emergency PDU session established without an S-NSSAI provided by the UE, if no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", until the UE is switched off, the USIM is removed, the entry in the "list of subscriber data" for the current SNPN is updated if the UE does not support access to an SNPN using credentials from a credentials holder, or the selected entry of the "list of subscriber data" is updated if the UE supports access to an SNPN using credentials from a credentials holder, or the UE receives a PDU SESSION MODIFICATION COMMAND message for a non-emergency PDU session established without an S-NSSAI provided by the UE, or a PDU SESSION AUTHENTICATION COMMAND message for a non-emergency PDU session established without an S-NSSAI provided by the UE, or a PDU SESSION RELEASE COMMAND message without the Back-off timer value IE for a non-emergency PDU session established without an S-NSSAI provided by the UE.

The timer T3585 remains deactivated upon a PLMN change or inter-system change; and

c) if the timer value indicates zero, the UE:

1) shall stop timer T3585 associated with the corresponding S-NSSAI (including the timer T3585 applied for all the PLMNs, if running, and the timer T3585 applied for the registered PLMN, if running), if running, and may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same S-NSSAI; and

2) if no S-NSSAI was provided during the PDU session establishment and the request type was different from "initial emergency request " and different from "existing emergency PDU session", the UE shall stop timer T3585 associated with no S-NSSAI, if running, and may send another PDU SESSION ESTABLISHMENT REQUEST message without an S-NSSAI (including the timer T3585 applied for all the PLMNs, if running, and the timer T3585 applied for the registered PLMN, if running), or another PDU SESSION MODIFICATION REQUEST message without an S-NSSAI provided by the UE.

If the 5GSM congestion re-attempt indicator IE with the ABO bit set to "The back-off timer is applied in all PLMNs" is included in the PDU SESSION ESTABLISHMENT REJECT message with the 5GSM cause value #69 "insufficient resources for specific slice", then the UE shall apply the timer T3585 for all the PLMNs. Otherwise, the UE shall apply the timer T3585 for the registered PLMN. Additionally, if the 5GSM congestion re-attempt indicator IE with the CATBO bit set to "The back-off timer is applied in the current access type" is included in the PDU SESSION ESTABLISHMENT REJECT message with the 5GSM cause value #69 "insufficient resources for specific slice", then the UE shall apply the timer T3585 for the current access type. Otherwise, the UE shall apply the timer T3585 for both 3GPP access type and non-3GPP access type and the UE shall stop any running timer T3585 for the applied PLMN and for the access different from the access from which the PDU SESSION ESTABLISHMENT REJECT message is received.

If the Back-off timer value IE is not included or no Back-off timer value is received from the 5GMM sublayer, then the UE may send another PDU SESSION ESTABLISHMENT REQUEST message or PDU SESSION MODIFICATION REQUEST message for the same S-NSSAI or without an S-NSSAI.

When the timer T3585 is running or the timer is deactivated, the UE is allowed to initiate a PDU session establishment procedure for emergency services.

If the timer T3585 is running when the UE enters state 5GMM-DEREGISTERED, the UE remains switched on, and the USIM in the UE (if any) remains the same and the entry in the "list of subscriber data" to which timer T3585 is associated (if any) is not updated, then timer T3585 is kept running until it expires or it is stopped.

If the UE is switched off when the timer T3585 is running, and if the USIM in the UE (if any) remains the same and the entry in the "list of subscriber data" to which timer T3585 is associated (if any) is not updated when the UE is switched on, the UE shall behave as follows:

let t1 be the time remaining for T3585 timeout at switch off and let t be the time elapsed between switch off and switch on. If t1 is greater than t, then the timer shall be restarted with the value t1 – t. If t1 is equal to or less than t, then the timer need not be restarted. If the UE is not capable of determining t, then the UE shall restart the timer with the value t1.

NOTE: As described in this subclause, upon PLMN change or inter-system change, the UE does not stop the timer T3584 or T3585. This means the timer T3584 or T3585 can still be running or be deactivated for the given 5GSM procedure, the PLMN, the S-NSSAI and optionally the DNN combination when the UE returns to the PLMN or when it performs inter-system change back from S1 mode to N1 mode. Thus the UE can still be prevented from sending another PDU SESSION ESTABLISHMENT REQUEST or PDU SESSION MODIFICATION REQUEST message in the PLMN for the same S-NSSAI and optionally the same DNN.

Upon PLMN change, if T3584 is running or is deactivated for an S-NSSAI, a DNN, and old PLMN, but T3584 is not running and is not deactivated for the S-NSSAI, the DNN, and new PLMN, then the UE is allowed to send a PDU SESSION ESTABLISHMENT REQUEST message for the same S-NSSAI and the same DNN in the new PLMN.

Upon PLMN change, if T3585 is running or is deactivated for an S-NSSAI and old PLMN, but T3585 is not running and is not deactivated for the S-NSSAI and new PLMN, then the UE is allowed to send a PDU SESSION ESTABLISHMENT REQUEST message for the same S-NSSAI in the new PLMN.

10.1.8.5.3 Test description

10.1.8.5.3.1 Pre-test conditions

System Simulator:

- NGC Cell A.

UE:

- None.

Preamble:

- The UE is in state 3N-A on NGC Cell A according to TS 38.508-1 [4].

10.1.8.5.3.2 Test procedure sequence

**Table 10.1.8.5.3.2-1: Main behaviour**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **St** | **Procedure** | **Message Sequence** | | **TP** | **Verdict** |
|  |  | **U - S** | **Message** |  |  |
| 1 | Cause the UE to request establishment of PDU session with S-NSSAI.  Note: This step is triggered by MMI or AT command. | - | - | - | - |
| 2 | The UE transmits an ULInformationTransfer message and a PDU SESSION ESTABLISHMENT REQUEST message with S-NSSAI. | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | - | - |
| 3 | The SS transmits PDU SESSION ESTABLISHMENT REJECT message with 5GSM cause value #69 and Back-off timer value which is set to 5 minutes. | <-- | PDU SESSION ESTABLISHMENT REJECT | - | - |
| 3A | Cause the UE to request establishment of PDU session with same S-NSSAI used in Step 1.  Note: This step is triggered by MMI or AT command. | - | - | - | - |
| 4 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST message with S-NSSAI within 60 seconds? | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 1 | F |
| 5-6 | Void |  |  |  |  |
| 7 | Cause the UE to request establishment of emergency PDU session  Note: This step is triggered by MMI or AT command. | - | - | - | - |
| 8 | Check: Does the UE transmit an UL NAS TRANSPORT message with 'Request type' set to 'initial emergency request', and, a PDU SESSION ESTABLISHMENT REQUEST? | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 1 | P |
| 9 | The SS transmits a PDU SESSION ESTABLISHMENT ACCEPT message. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |

10.1.8.5.3.3 Specific message contents

Table 10.1.8.5.3.3-1:UL NAS TRANSPORT (step 2, Table 10.1.8.5.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] table 4.7.1-10, with condition INITIAL\_PDU\_REQUEST. | | | |
| Information Element | Value/remark | Comment | Condition |
| S-NSSAI | present |  |  |
| S-NSSAI IEI | 22 |  |  |
| Length of S-NSSAI contents | ‘0000 0001’B |  |  |
| SST | ‘0000 0001’B |  |  |

Table 10.1.8.5.3.3-2: PDU SESSION ESTABLISHMENT REJECT (step 3, Table 10.1.8.5.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-3 | | | |
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| 5GSM cause | ‘0100 0101’ | insufficient resources for specific slice |  |
| Back-off timer value | ‘1010 0101’B | 5 minutes |  |

Table 10.1.8.5.3.3-3:UL NAS TRANSPORT (step 8, Table 10.1.8.5.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] table 4.7.1-10, with condition INITIAL\_PDU\_REQUEST. | | | |
| Information Element | Value/remark | Comment | Condition |
| Request type | ‘011’B | initial emergency request |  |
| S-NSSAI | Not Present |  |  |
| DNN | Not Present |  |  |

## 10.2 EN-DC session management

### 10.2.1 Network initiated procedures

#### 10.2.1.1 Default EPS bearer context activation

10.2.1.1.1 Test Purpose (TP)

(1)

**with** { UE has sent a PDN CONNECTIVITY REQUEST message }

**ensure that** {

**when** { UE receives an RRCConnectionReconfiguration message including an ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message with IE Procedure transaction identity matching the PDN CONNECTIVITY REQUEST message and including the Extended APN-AMBR IE }

**then** { UE transmits an ACTIVATE DEFAULT EPS BEARER CONTEXT ACCEPT message and enters BEARER CONTEXT ACTIVE state }

}

10.2.1.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.301, clause 6.4.1.3, 8.3.6.17and 9.9.4.29. Unless otherwise stated these are Rel-15 requirements.

[TS 24.301, clause 6.4.1.3]

Upon receipt of the ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message, if the UE provided an APN for the establishment of the PDN connection, the UE shall stop timer T3396 if it is running for the APN provided by the UE. If the UE did not provide an APN for the establishment of the PDN connection and the request type was different from "emergency" and from "handover of emergency bearer services", the UE shall stop the timer T3396 associated with no APN if it is running. If the ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message was received in response to a request for an emergency PDN connection, the UE shall not stop the timer T3396 associated with no APN if it is running. For any case, the UE shall then send an ACTIVATE DEFAULT EPS BEARER CONTEXT ACCEPT message and enter the state BEARER CONTEXT ACTIVE. When the default bearer is activated as part of the attach procedure, the UE shall send the ACTIVATE DEFAULT EPS BEARER CONTEXT ACCEPT message together with ATTACH COMPLETE message. When the default bearer is activated as the response to the stand-alone PDN CONNECTIVITY REQUEST message, the UE shall send the ACTIVATE DEFAULT EPS BEARER CONTEXT ACCEPT message alone.

If a WLAN offload indication information element is included in the ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message, the UE shall store the WLAN offload acceptability values for this PDN connection and use the E-UTRAN offload acceptability value to determine whether this PDN connection is offloadable to WLAN or not.

The UE checks the PTI in the ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message to identify the UE requested PDN connectivity procedure to which the default bearer context activation is related (see subclause 6.5.1).

If the UE receives a serving PLMN rate control IE in the ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message, the UE shall store the serving PLMN rate control IE value and use the stored serving PLMN rate control value as the maximum allowed limit of uplink User data container IEs included in ESM DATA TRANSPORT messages for the corresponding PDN connection in accordance with 3GPP TS 23.401 [10].

If the UE receives an APN rate control parameters container in the protocol configuration options IE or extended protocol configuration options IE in the ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message, the UE shall store the APN rate control parameters value and use the stored APN rate control parameters value as the maximum allowed limit of uplink user data related to the APN indicated in the ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message in accordance with 3GPP TS 23.401 [10]. If the UE has a previously stored APN rate control parameters value for this APN, the UE shall replace the stored APN rate control parameters value for this APN with the received APN rate control parameters value.

If the UE receives an additional APN rate control parameters for exception data container in the protocol configuration options IE or extended protocol configuration options IE in the ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message, the UE shall store the additional APN rate control parameters for exception data value and use the stored additional APN rate control parameters for exception data value as the maximum allowed limit of uplink exception data related to the APN indicated in the ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message in accordance with 3GPP TS 23.401 [10]. If the UE has a previously stored additional APN rate control parameters for exception data value for this APN, the UE shall replace the stored additional APN rate control parameters for exception data value for this APN with the received additional APN rate control parameters for exception data value.

If the UE receives non-IP Link MTU parameter or IPv4 Link MTU parameter of the protocol configuration options IE in the ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message, the UE shall pass the received Non-IP Link MTU or IPv4 Link MTU to the upper layer.

NOTE: The Non-IP Link MTU and the IPv4 Link MTU size correspond to the maximum length of user data that can be sent either in the user data container in the ESM DATA TRANSPORT message or via S1-U interface.

If the UE receives a session-AMBR and QoS rule(s), which correspond to the default EPS bearer of the PDN connectivity being activated, in the protocol configuration options IE or the extended protocol configuration options IE in the ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message, the UE stores the session-AMBR and QoS rule(s) for use during inter-system change from S1 mode to N1 mode.

Upon receipt of the ACTIVATE DEFAULT EPS BEARER CONTEXT ACCEPT message, the MME shall enter the state BEARER CONTEXT ACTIVE and stop the timer T3485, if the timer is running. If the PDN CONNECTIVITY REQUEST message included a low priority indicator set to "MS is configured for NAS signalling low priority", the MME shall store the NAS signalling low priority indication within the default EPS bearer context.

[TS 24.301, clause 8.3.6.17]

This IE shall be included in the message only if the network wishes to transmit the APN-AMBR values to the UE for possible uplink policy enforcement and at least one of the values to be transmitted exceeds the maximum value specified in the APN aggregate maximum bit rate information element in subclause 9.9.4.2.

[TS 24.301, clause 9.9.4.29]

The purpose of the extended APN aggregate maximum bit rate information element is to indicate the initial subscribed APN-AMBR with a value higher than 65280 Mbps when the UE establishes a PDN connection or to indicate the new APN-AMBR with a value higher than 65280 Mbps if it is changed by the network.

The receiving entity shall ignore the bit rate values which are included in the extended APN aggregate maximum bit rate information element and not higher than 65280 Mbps.

The extended APN aggregate maximum bit rate information element is coded as shown in figure 9.9.4.29.1 and table 9.9.4.29.1.

The extended APN aggregate maximum bit rate is a type 4 information element with a length of 8 octets.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Extended APN aggregate maximum bit rate IEI | | | | | | | | octet 1 |
| Length of extended APN aggregate maximum bit rate contents | | | | | | | | octet 2 |
| Unit for extended APN-AMBR for downlink | | | | | | | | octet 3 |
| Extended APN-AMBR for downlink | | | | | | | | octet 4 |
| Extended APN-AMBR for downlink (continued) | | | | | | | | octet 5 |
| Unit for extended APN-AMBR for uplink | | | | | | | | octet 6 |
| Extended APN-AMBR for uplink | | | | | | | | octet 7 |
| Extended APN-AMBR for uplink (continued) | | | | | | | | octet 8 |

Figure 9.9.4.29.1: Extended APN aggregate maximum bit rate information element

Table 9.9.4.29.1: Extended APN aggregate maximum bit rate information element

|  |
| --- |
| Unit for extended APN-AMBR for downlink (octet 3)  0 0 0 0 0 0 0 0 value is not used  0 0 0 0 0 0 0 1 value is not used  0 0 0 0 0 0 1 0 value is not used  0 0 0 0 0 0 1 1 value is incremented in multiples of 4 Mbps  0 0 0 0 0 1 0 0 value is incremented in multiples of 16 Mbps  0 0 0 0 0 1 0 1 value is incremented in multiples of 64 Mbps  0 0 0 0 0 1 1 0 value is incremented in multiples of 256 Mbps  0 0 0 0 0 1 1 1 value is incremented in multiples of 1 Gbps  0 0 0 0 1 0 0 0 value is incremented in multiples of 4 Gbps  0 0 0 0 1 0 0 1 value is incremented in multiples of 16 Gbps  0 0 0 0 1 0 1 0 value is incremented in multiples of 64 Gbps  0 0 0 0 1 0 1 1 value is incremented in multiples of 256 Gbps  0 0 0 0 1 1 0 0 value is incremented in multiples of 1 Tbps  0 0 0 0 1 1 0 1 value is incremented in multiples of 4 Tbps  0 0 0 0 1 1 1 0 value is incremented in multiples of 16 Tbps  0 0 0 0 1 1 1 1 value is incremented in multiples of 64 Tbps  0 0 0 1 0 0 0 0 value is incremented in multiples of 256 Tbps  0 0 0 1 0 0 0 1 value is incremented in multiples of 1 Pbps  0 0 0 1 0 0 1 0 value is incremented in multiples of 4 Pbps  0 0 0 1 0 0 1 1 value is incremented in multiples of 16 Pbps  0 0 0 1 0 1 0 0 value is incremented in multiples of 64 Pbps  0 0 0 1 0 1 0 1 value is incremented in multiples of 256 Pbps  Other values shall be interpreted as multiples of 256 Pbps in this version of the protocol.  Extended APN-AMBR for downlink (octets 4 and 5)  Octets 4 and 5 represent the binary coded value of extended APN-AMBR for downlink in units defined by octet 3  Unit for extended APN-AMBR for uplink (octet 6)  The coding is identical to that of the unit for extended APN-AMBR for downlink (octet 3)  Extended APN-AMBR for uplink (octets 7 and 8)  Octets 7 and 8 represent the binary coded value of extended APN-AMBR for uplink in units defined by octet 6. |

10.2.1.1.3 Test description

10.2.1.1.3.1 Pre-test conditions

System Simulator:

- E-UTRA Cell 1 is the PCell and NR Cell 1 is the PSCell.

UE:

None.

Preamble:

- The UE is in RRC\_IDLE state on E-UTRA Cell 1 using generic procedure parameter Connectivity (*E-UTRA/EPC)* established according to TS 38.508-1 [4].

10.2.1.1.3.2 Test procedure sequence

Table 10.2.1.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Cause the UE to request connectivity to an additional PDN (see Note 1) | - | - | - | - |
| 2 | UE transmit an *RRCConnectionRequest* message with *establishmentCause* set to ‘mo-Data’ followed by a SERVICE REQUEST message. | --> | SERVICE REQUEST | - | - |
| 3 | The SS establishes SRB2 and DRB associated with default EPS bearer context (a first PDN obtained during the attach procedure). | - | - | - | - |
| 4 | The UE transmit a PDN CONNECTIVITY REQUEST message as specified to request an additional PDN. | --> | PDN CONNECTIVITY REQUEST | - | - |
| 5 | The SS transmits an *RRCConnectionReconfiguration* message containing NR *RRCReconfiguration* message to add *NR PSCell* with SCG DRB. The *RRCConnectionReconfiguration* message contains ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message containing Extended APN-AMBR IE. | <-- | RRC: RRCConnectionReconfiguration((RRCReconfiguration)  NAS: ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST | - | - |
| 6 | The UE transmits an RRCConnectionReconfigurationComplete message to confirm the establishment of default bearer. | --> | RRC: RRCConnectionReconfigurationComplete (RRCReconfigurationComplete) | - | - |
| - | EXCEPTION: In parallel to the event described in step 7 below, if initiated by the UE the generic procedure for IP address allocation in the U-plane specified in TS 36.508 subclause 4.5A.1 takes place performing IP address allocation in the U-plane. | - | - | - | - |
| 7 | The UE transmits ACTIVATE DEFAULT EPS BEARER CONTEXT ACCEPT message. | --> | RRC: ULInformationTransfer  NAS: ACTIVATE DEFAULT EPS BEARER CONTEXT ACCEPT | 1 | P |
| Note 1: The request of connectivity to an additional PDN may be performed by MMI or AT command. | | | | | |

10.2.1.1.3.3 Specific message contents

Table 10.2.1.1.3.3-1: PDN CONNECTIVITY REQUEST (step 4, Table 10.2.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 36.508 [7], Table 4.7.3-20 | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol discriminator | ESM |  |  |
| EPS bearer identity | 0 | No EPS bearer identity assigned |  |
| Procedure transaction identity | PTI-1 | UE assigns a  particular PTI not yet used between  1 and 254 |  |
| Access point name | APN-1(New PDN name) | The requested  PDN is different  from default PDN |  |

Table 10.2.1.1.3.3-2: ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST (step 5, Table 10.2.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7.3-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol discriminator | ESM |  |  |
| EPS bearer identity | 6 |  |  |
| Procedure transaction identity | PTI-1 | SS re-uses the particular PTI defined by UE for this present additional PDN connectivity request procedure. |  |
| EPS QoS |  |  |  |
| QCI | 8 |  |  |
| Maximum bit rate for uplink | 384 kbps |  |  |
| Maximum bit rate for downlink | ‘11111110’B (8640 kbps) |  |  |
| Guaranteed bit rate for uplink | 128 kbps |  |  |
| Guaranteed bit rate for downlink | 128 kbps |  |  |
| Maximum bit rate for uplink (extended) | 0 |  |  |
| Maximum bit rate for downlink (extended) | ‘11111010’B (256 Mbps) |  |  |
| Guaranteed bit rate for uplink (extended) | 0 |  |  |
| Guaranteed bit rate for downlink (extended) | 0 |  |  |
| Maximum bit rate for uplink (extended-2) | 0 |  |  |
| Maximum bit rate for downlink (extended-2) | ‘11110110’B (10 Gbps) |  |  |
| Guaranteed bit rate for uplink (extended-2) | 0 |  |  |
| Guaranteed bit rate for downlink (extended-2) | 0 |  |  |
| APN-AMBR |  |  |  |
| APN-AMBR for downlink | ‘11111110’B (8640 kbps) |  |  |
| APN-AMBR for uplink | ‘11111110’B (8640 kbps) |  |  |
| APN-AMBR for downlink (extended) | ‘11111010’ B(256 Mbps) |  |  |
| APN-AMBR for uplink (extended) | ‘11111010’ B(256 Mbps) |  |  |
| APN-AMBR for downlink (extended-2) | ‘11111110’B (65280 Mbps) |  |  |
| APN-AMBR for uplink (extended-2) | 0 |  |  |
| Access point name | APN-1 | SS re-uses the particular APN defined by UE for this present additional PDN connectivity request procedure |  |
| Extended APN-AMBR |  |  |  |
| Unit for extended APN-AMBR for downlink | ‘00000111’B (value is incremented in multiples of 1 Gbps) |  |  |
| Extended APN-AMBR for downlink | ‘0000000010000000’ (128 Gbps) |  |  |
| Unit for extended APN-AMBR for uplink | 0 |  |  |
| Extended APN-AMBR for uplink | 0 |  |  |

#### 10.2.1.2 Dedicated EPS bearer context activation

10.2.1.2.1 Test Purpose (TP)

(1)

**with** { UE in EMM-REGISTERED state }

**ensure that** {

**when** { UE receives an ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST message, including the Extended EPS QoS IE, linked to the existing default EPS bearer }

**then** { UE transmits an ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT }

}

(2)

**with** { the UE in BEARER CONTEXT ACTIVE STATE and in EMM-CONNECTED mode }

**ensure that** {

**when** { the UE receives a MODIFY EPS BEARER CONTEXT REQUEST message including the Extended EPS QoS and Extended APN-AMBR IEs }

**then** { UE transmits a MODIFY EPS BEARER CONTEXT ACCEPT }

}

10.2.1.2.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.301, clauses 6.4.2.3, 6.4.3.1, 6.4.3.2, 6.4.3.3, 8.3.3.11, 9.9.4.29 and 9.9.4.30. Unless otherwise stated these are Rel-15 requirements.

[TS 24.301, clause 6.4.2.3]

Upon receipt of the ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST message, if the UE provided an APN for the establishment of the PDN connection, the UE shall stop timer T3396, if it is running for the APN provided by the UE. If the UE did not provide an APN for the establishment of the PDN connection and the request type was different from "emergency" and from "handover of emergency bearer services", the UE shall stop the timer T3396 associated with no APN if it is running. If the ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST message was received for an emergency PDN connection, the UE shall not stop the timer T3396 associated with no APN if it is running. For any case, the UE shall then check the received TFT before taking it into use, send an ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT message and enter the state BEARER CONTEXT ACTIVE. The ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT message shall include the EPS bearer identity.

The linked EPS bearer identity included in the ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST message indicates to the UE to which default bearer, IP address and PDN the dedicated bearer is linked.

If the ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST message contains a PTI value other than "no procedure transaction identity assigned" and "reserved" (see 3GPP TS 24.007 [12]), the UE uses the PTI to identify the UE requested bearer resource allocation procedure or the UE requested bearer resource modification procedure to which the dedicated bearer context activation is related.

[TS 24.301, clause 6.4.3.1]

The purpose of the EPS bearer context modification procedure is to modify an EPS bearer context with a specific QoS and TFT, or re-negotiate header compression configuration associated to an EPS bearer context. The EPS bearer context modification procedure is initiated by the network, but it may also be initiated as part of the UE requested bearer resource allocation procedure or the UE requested bearer resource modification procedure.

The network may also initiate the EPS bearer context modification procedure to update the APN-AMBR of the UE, for instance after an inter-system handover. See 3GPP TS 23.401 [10] annex E.

[TS 24.301, clause 6.4.3.2]

The MME shall initiate the EPS bearer context modification procedure by sending a MODIFY EPS BEARER CONTEXT REQUEST message to the UE, starting the timer T3486, and entering the state BEARER CONTEXT MODIFY PENDING (see example in figure 6.4.3.2.1).

The MME shall include an EPS bearer identity that identifies the EPS bearer context to be modified in the MODIFY EPS BEARER CONTEXT REQUEST message.

[TS 24.301, clause 6.4.3.3]

Upon receipt of the MODIFY EPS BEARER CONTEXT REQUEST message, if the UE provided an APN for the establishment of the PDN connection, the UE shall stop timer T3396, if it is running for the APN provided by the UE. If the UE did not provide an APN for the establishment of the PDN connection and the request type was different from "emergency" and from "handover of emergency bearer services", the UE shall stop the timer T3396 associated with no APN if it is running. If the MODIFY EPS BEARER CONTEXT REQUEST message was received for an emergency PDN connection, the UE shall not stop the timer T3396 associated with no APN if it is running. For any case, the UE shall then check the received TFT before taking it into use and send a MODIFY EPS BEARER CONTEXT ACCEPT message to the MME.

If the MODIFY EPS BEARER CONTEXT REQUEST message contains a PTI value other than "no procedure transaction identity assigned" and "reserved" (see 3GPP TS 24.007 [12]), the UE uses the PTI to identify the UE requested bearer resource allocation procedure or the UE requested bearer resource modification procedure to which the EPS bearer context modification is related (see subclause 6.5.3 and subclause 6.5.4).

If the MODIFY EPS BEARER CONTEXT REQUEST message contains a PTI value other than "no procedure transaction identity assigned" and "reserved" (see 3GPP TS 24.007 [12]) and the PTI is associated to a UE requested bearer resource allocation procedure or a UE requested bearer resource modification procedure, the UE shall release the traffic flow aggregate description associated to the PTI value provided.

…

Upon receipt of the MODIFY EPS BEARER CONTEXT ACCEPT message, the MME shall stop the timer T3486 and enter the state BEARER CONTEXT ACTIVE.

[TS 24.301, clause 8.3.3.11]

This IE shall be included in the message only if the network wishes to transmit the maximum and guaranteed bit rate values to the UE and at least one of the values to be transmitted exceeds the maximum value specified in the EPS quality of service information element in subclause 9.9.4.3

[TS 24.301, clause 9.9.4.29]

The purpose of the extended APN aggregate maximum bit rate information element is to indicate the initial subscribed APN-AMBR with a value higher than 65280 Mbps when the UE establishes a PDN connection or to indicate the new APN-AMBR with a value higher than 65280 Mbps if it is changed by the network.

The receiving entity shall ignore the bit rate values which are included in the extended APN aggregate maximum bit rate information element and not higher than 65280 Mbps.

The extended APN aggregate maximum bit rate information element is coded as shown in figure 9.9.4.29.1 and table 9.9.4.29.1.

The extended APN aggregate maximum bit rate is a type 4 information element with a length of 8 octets

[TS 24.301, clause 9.9.4.30]

The purpose of the Extended EPS quality of service information element is to indicate for an EPS bearer context the maximum bit rates for uplink and downlink and the guaranteed bit rates for uplink and downlink, if at least one of the bit rates has a value higher than 10 Gbps.

The Extended EPS quality of service information element is coded as shown in figure 9.9.4.30.1 and table 9.9.4.30.1. For uplink and downlink, if sending entity only has to indicate one bit rate (i.e., with a value higher than 10 Gbps), it shall encode the other bit rate (i.e., with a value smaller or equal to 10 Gbps) as "00000000". The receiving entity shall ignore the bit rate which is included in the extended quality of service information element and has a value smaller or equal to 10 Gbps.

10.2.1.2.3 Test description

10.2.1.2.3.1 Pre-test conditions

System Simulator:

- E-UTRA Cell 1 is the PCell and NR Cell 1 is the PSCell.

UE:

- None.

Preamble:

- The UE is in RRC\_IDLE state on E-UTRA Cell 1 using generic procedure parameter Connectivity (*E-UTRA/EPC*) according to TS 38.508-1 [4].

10.2.1.2.3.2 Test procedure sequence

Table 10.2.1.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1-6 | Steps 1 to 6 of generic procedure defined in clause 4.5.4 in TS 38.508-1 [4]. | - | - | - | - |
| 7 | The SS configures a dedicated EPS bearer associated with the default EPS bearer context by sending ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST including the Extended QoS IE.  (See Note 1 and Note 2). | <-- | NAS: ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST | - | - |
| 8 | Check: Does the UE transmit an ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT message as specified? | --> | ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT | 1 | P |
| 9 | The SS transmits a MODIFY EPS BEARER CONTEXT REQUEST message with Extended EPS QoS and Extended APN-AMBR IEs. This message is included in a DLInformationTransfer message. | <-- | MODIFY EPS BEARER CONTEXT REQUEST | - | - |
| 10 | Check: Does the UE transmit a MODIFY EPS BEARER CONTEXT ACCEPT message? | --> | MODIFY EPS BEARER CONTEXT ACCEPT | 2 | P |
| Note 1: The ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST message is included in a *RRCConnectionReconfiguration* message including a DRB setup for the same EPS bearer ID.  Note 2: The *RRCConnectionReconfiguration* uses the condition for DC bearerMCG and SCG | | | | | |

10.2.1.2.3.3 Specific message contents

Table 10.2.1.2.3.3-1: ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST (step 7, Table 10.2.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.5.4.3-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol discriminator | ESM |  |  |
| EPS bearer identity | 6 |  |  |
| Procedure transaction identity | '0000 0000'B | No procedure transaction identity assigned |  |
| EPS QoS |  |  |  |
| QCI | 8 |  |  |
| Maximum bit rate for uplink | ‘01101000’B (384) kbps |  |  |
| Maximum bit rate for downlink | ‘11111110’B (8640 kbps) |  |  |
| Guaranteed bit rate for uplink | ‘01001000’B (128 kbps) |  |  |
| Guaranteed bit rate for downlink | ‘01001000’B (128 kbps) |  |  |
| Maximum bit rate for uplink (extended) | 0 |  |  |
| Maximum bit rate for downlink (extended) | ‘11111010’B (256 Mbps) |  |  |
| Guaranteed bit rate for uplink (extended) | 0 |  |  |
| Guaranteed bit rate for downlink (extended) | 0 |  |  |
| Maximum bit rate for uplink (extended-2) | 0 |  |  |
| Maximum bit rate for downlink (extended-2) | ‘11110110’B (10 Gbps) |  |  |
| Guaranteed bit rate for uplink (extended-2) | 0 |  |  |
| Guaranteed bit rate for downlink (extended-2) | 0 |  |  |
| Extended EPS QoS |  |  |  |
| Unit for maximum bit rate | ‘00000111’ (value is incremented in multiples of 1 Gbps) |  |  |
| Maximum bit rate for uplink | ‘0000000000000000’B |  |  |
| Maximum bit rate for downlink | ‘0000000000001100’B (12 Gbps) |  |  |
| Unit for guaranteed bit rate | ‘00000000’B |  |  |
| Guaranteed bit rate for uplink | ‘00000000’B |  |  |
| Guaranteed bit rate for downlink | ‘00000000’B |  |  |

Table 10.2.1.2.3.3-2: MODIFY EPS BEARER CONTEXT REQUEST (step 9, Table 10.2.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 36.508 [7], Table 4.7.3-18 | | | |
| Information Element | Value/Remark | Comment | Condition |
| New EPS QoS |  |  |  |
| QCI | 8 |  |  |
| Maximum bit rate for uplink | ‘01101000’B (384 kbps) |  |  |
| Maximum bit rate for downlink | ‘11111110’B (8640 kbps) |  |  |
| Guaranteed bit rate for uplink | ‘01001000’B (128 kbps) |  |  |
| Guaranteed bit rate for downlink | ‘01001000’B (128 kbps) |  |  |
| Maximum bit rate for uplink (extended) | 0 |  |  |
| Maximum bit rate for downlink (extended) | ‘11111010’B (256 Mbps) |  |  |
| Guaranteed bit rate for uplink (extended) | 0 |  |  |
| Guaranteed bit rate for downlink (extended) | 0 |  |  |
| Maximum bit rate for uplink (extended-2) | 0 |  |  |
| Maximum bit rate for downlink (extended-2) | ‘11110110’B (10 Gbps) |  |  |
| Guaranteed bit rate for uplink (extended-2) | 0 |  |  |
| Guaranteed bit rate for downlink (extended-2) | 0 |  |  |
| APN-AMBR |  |  |  |
| APN-AMBR for downlink | ‘11111110’B (8640 kbps) |  |  |
| APN-AMBR for uplink | ‘11111110’B (8640 kbps) |  |  |
| APN-AMBR for downlink (extended) | ‘11111010’ B(256 Mbps) |  |  |
| APN-AMBR for uplink (extended) | ‘11111010’ B(256 Mbps) |  |  |
| APN-AMBR for downlink (extended-2) | ‘11111110’B (65280 Mbps) |  |  |
| APN-AMBR for uplink (extended-2) | 0 |  |  |
| Extended APN-AMBR |  |  |  |
| Unit for extended APN-AMBR for downlink | ‘00000111’B (value is incremented in multiples of 1 Gbps) |  |  |
| Extended APN-AMBR for downlink | ‘0000000010000000’ (128 Gbps) |  |  |
| Unit for extended APN-AMBR for uplink | 0 |  |  |
| Extended APN-AMBR for uplink | 0 |  |  |
| Extended EPS QoS |  |  |  |
| Unit for maximum bit rate | ‘00000111’ (value is incremented in multiples of 1 Gbps) |  |  |
| Maximum bit rate for uplink | ‘0000000000000000’B |  |  |
| Maximum bit rate for downlink | ‘0000000000001110’B |  |  |
| Unit for guaranteed bit rate | ‘00000000’B |  |  |
| Guaranteed bit rate for uplink | ‘00000000’B |  |  |
| Guaranteed bit rate for downlink | ‘00000000’B |  |  |

### 10.2.2 UE initiated procedures

#### 10.2.2.1 EPS bearer resource allocation / modification

10.2.2.1.1 Test Purpose (TP)

(1)

**with** { UE in PROCEDURE TRANSACTION INACTIVE state and in EMM-IDLE mode }

**ensure that** {

**when** { UE is requested to allocate bearer resource using Extended EPS QoS }

**then** { UE sends a BEARER RESOURCE ALLOCATION REQUEST including the Extended EPS QoS IE }

}

(2)

**with** { UE has sent the BEARER RESOURCE ALLOCATION REQUEST message }

**ensure that** {

**when** { UE receives an ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST message with the procedure transaction identity (PTI) indicated in the BEARER RESOURCE ALLOCATION REQUEST message }

**then** { UE sends an ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT message }

}

(3)

**with** { UE in PROCEDURE TRANSACTION INACTIVE state and in EMM-CONNECTED mode }

**ensure that** {

**when** { UE is requested to modify of bearer resource corresponding to the dedicated bearer using Extended EPS QoS }

**then** { UE sends a BEARER RESOURCE MODIFICATION REQUEST message including the Extended EPS QoS IE }

}

(4)

**with** { UE having sent the BEARER RESOURCE MODIFICATION REQUEST message }

**ensure that** {

**when** { UE receives an MODIFY EPS BEARER CONTEXT REQUEST message with the procedure transaction identity (PTI) indicated in the BEARER RESOURCE MODIFICATION REQUEST message }

**then** { UE sends a MODIFY EPS BEARER CONTEXT ACCEPT message }

}

10.2.2.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.301, clauses 6.4.2.3, 6.5.3.2, 6.5.3.3, 6.5.4.2, 6.5.4.3, 8.3.8, 8.3.10 and 9.9.4.30. Unless otherwise stated these are Rel-15 requirements.

[TS 24.301, clause 6.4.2.3]

The linked EPS bearer identity included in the ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST message indicates to the UE to which default bearer, IP address and PDN the dedicated bearer is linked.

If the ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST message contains a PTI value other than "no procedure transaction identity assigned" and "reserved" (see 3GPP TS 24.007 [12]), the UE uses the PTI to identify the UE requested bearer resource allocation procedure or the UE requested bearer resource modification procedure to which the dedicated bearer context activation is related.

[TS 24.301, clause 6.5.3.2]

In order to request the allocation of bearer resources for one traffic flow aggregate, the UE shall send a BEARER RESOURCE ALLOCATION REQUEST message to the MME, start timer T3480 and enter the state PROCEDURE TRANSACTION PENDING (see example in figure 6.5.3.2.1).

The UE shall include the EPS bearer identity of the default EPS bearer associated with the requested bearer resource in the Linked EPS bearer identity IE. The UE shall set the TFT operation code in the Traffic flow aggregate IE to "Create new TFT". The packet filters in the Traffic flow aggregate IE shall include at least one packet filter applicable for the uplink direction. In the Required traffic flow QoS IE, the UE shall indicate a QCI and, if the UE also includes a GBR, the additional GBR required for the traffic flow aggregate.

[TS 24.301, clause 6.5.3.3]

If the bearer resource allocation requested is accepted by the network, the MME shall initiate either a dedicated EPS bearer context activation procedure or an EPS bearer context modification procedure. Upon receipt of an ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST or MODIFY EPS BEARER CONTEXT REQUEST message with a PTI which matches the value used for the BEARER RESOURCE ALLOCATION REQUEST message, the UE shall stop timer T3480 and enter the state PROCEDURE TRANSACTION INACTIVE. The UE should ensure that the procedure transaction identity (PTI) assigned to this procedure is not released immediately. The way to achieve this is implementation dependent. While the PTI value is not released, the UE regards any received ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST or MODIFY EPS BEARER CONTEXT REQUEST message with the same PTI value as a network retransmission (see subclause 7.3.1).

If the ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST message is received, the UE shall verify that the EPS bearer identity given in the EPS bearer identity IE is not already used by any EPS bearer context. The UE shall then proceed as described in subclause 6.4.2.3 or subclause 6.4.2.4.

[TS 24.301, clause 6.5.4.2]

In order to request the modification of bearer resources for one traffic flow aggregate, the UE shall send a BEARER RESOURCE MODIFICATION REQUEST message to the MME, start timer T3481 and enter the state PROCEDURE TRANSACTION PENDING (see example in figure 6.5.4.2.1).

[TS 24.301, clause 6.5.4.3]

Upon receipt of the BEARER RESOURCE MODIFICATION REQUEST message, the MME checks whether the resources requested by the UE can be established, modified or released by verifying the EPS bearer identity given in the EPS bearer identity for packet filter IE.

If the bearer resource modification requested is accepted by the network, the MME shall initiate either a dedicated EPS bearer context activation procedure, an EPS bearer context modification procedure or an EPS bearer context deactivation procedure.

…

Upon receipt of an ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST, MODIFY EPS BEARER CONTEXT REQUEST or DEACTIVATE EPS BEARER CONTEXT REQUEST message with a PTI which matches the value used for the BEARER RESOURCE MODIFICATION REQUEST message, the UE shall stop timer T3481 and enter the state PROCEDURE TRANSACTION INACTIVE. The UE should ensure that the procedure transaction identity (PTI) assigned to this procedure is not released immediately. The way to achieve this is implementation dependent. While the PTI value is not released, the UE regards any received ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST or MODIFY EPS BEARER CONTEXT REQUEST message with the same PTI value as a network retransmission (see subclause 7.3.1).

i) If the ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST message is received, the UE shall verify that the EPS bearer identity given in the EPS bearer identity IE is not already used by any EPS bearer context. The UE shall then proceed as described in subclause 6.4.2.3 or subclause 6.4.2.4.

[TS 24.301, clause 8.3.8]

This IE shall be included in the message only if the UE wishes to transmit the maximum and guaranteed bit rate values to the network and at least one of the values to be transmitted exceeds the maximum value specified in the EPS quality of service information element in subclause 9.9.4.3.

[TS 24.301, clause 8.3.10]

This IE shall be included in the message only if the UE wishes to transmit the maximum and guaranteed bit rate values to the network and at least one of the values to be transmitted exceeds the maximum value specified in the EPS quality of service information element in subclause 9.9.4.3.

[TS 24.301, clause 9.9.4.30]

The purpose of the Extended quality of service information element is to indicate for an EPS bearer context the maximum bit rates for uplink and downlink and the guaranteed bit rates for uplink and downlink, if at least one of the bit rates has a value higher than 10 Gbps.

The Extended quality of service information element is coded as shown in figure 9.9.4.30.1 and table 9.9.4.30.1. For uplink and downlink, if the sending entity only has to indicate one bit rate (i.e., with a value higher than 10 Gbps), it shall encode the other bit rate (i.e., with a value smaller or equal to 10 Gbps) as "00000000". The receiving entity shall ignore a bit rate which is included in the extended quality of service information element and has a value smaller or equal to 10 Gbps.

The Extended quality of service is a type 4 information element with a length of 12 octets.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Extended quality of service IEI | | | | | | | | octet 1 |
| Length of Extended quality of service contents | | | | | | | | octet 2 |
| Unit for maximum bit rate | | | | | | | | octet 3 |
| Maximum bit rate for uplink | | | | | | | | octet 4 |
| Maximum bit rate for uplink (continued) | | | | | | | | octet 5 |
| Maximum bit rate for downlink | | | | | | | | octet 6 |
| Maximum bit rate for downlink (continued) | | | | | | | | octet 7 |
| Unit for guaranteed bit rate | | | | | | | | octet 8 |
| Guaranteed bit rate for uplink | | | | | | | | octet 9 |
| Guaranteed bit rate for uplink (continued) | | | | | | | | octet 10 |
| Guaranteed bit rate for downlink | | | | | | | | octet 11 |
| Guaranteed bit rate for downlink (continued) | | | | | | | | octet 12 |

Figure 9.9.4.30.1: Extended quality of service information element

Table 9.9.4.30.1: Extended quality of service information element

|  |
| --- |
| Unit for maximum bit rate (octet 3)  0 0 0 0 0 0 0 0 value is not used  0 0 0 0 0 0 0 1 value is incremented in multiples of 200 kbps  0 0 0 0 0 0 1 0 value is incremented in multiples of 1 Mbps  0 0 0 0 0 0 1 1 value is incremented in multiples of 4 Mbps  0 0 0 0 0 1 0 0 value is incremented in multiples of 16 Mbps  0 0 0 0 0 1 0 1 value is incremented in multiples of 64 Mbps  0 0 0 0 0 1 1 0 value is incremented in multiples of 256 Mbps  0 0 0 0 0 1 1 1 value is incremented in multiples of 1 Gbps  0 0 0 0 1 0 0 0 value is incremented in multiples of 4 Gbps  0 0 0 0 1 0 0 1 value is incremented in multiples of 16 Gbps  0 0 0 0 1 0 1 0 value is incremented in multiples of 64 Gbps  0 0 0 0 1 0 1 1 value is incremented in multiples of 256 Gbps  0 0 0 0 1 1 0 0 value is incremented in multiples of 1 Tbps  0 0 0 0 1 1 0 1 value is incremented in multiples of 4 Tbps  0 0 0 0 1 1 1 0 value is incremented in multiples of 16 Tbps  0 0 0 0 1 1 1 1 value is incremented in multiples of 64 Tbps  0 0 0 1 0 0 0 0 value is incremented in multiples of 256 Tbps  0 0 0 1 0 0 0 1 value is incremented in multiples of 1 Pbps  0 0 0 1 0 0 1 0 value is incremented in multiples of 4 Pbps  0 0 0 1 0 0 1 1 value is incremented in multiples of 16 Pbps  0 0 0 1 0 1 0 0 value is incremented in multiples of 64 Pbps  0 0 0 1 0 1 0 1 value is incremented in multiples of 256 Pbps  Other values shall be interpreted as multiples of 256 Pbps in this version of the protocol.  Maximum bit rate for uplink (octets 4 and 5)  Octets 4 and 5 represent the binary coded value of maximum bit rate for uplink in units defined by octet 3.  Maximum bit rate for downlink (octets 6 and 7)  Octets 6 and 7 represent the binary coded value of maximum bit rate for downlink in units defined by octet 3.  Unit for guaranteed bit rate (octet 8)  The coding is identical to that of the unit for maximum bit rate (octet 3).  Guaranteed bit rate for uplink (octets 9 and 10)  Octets 9 and 10 represent the binary coded value of guaranteed bit rate for uplink in units defined by octet 8.  Guaranteed bit rate for downlink (octets 11 and 12)  Octets 11 and 12 represent the binary coded value of guaranteed bit rate for downlink in units defined by octet 8. |

10.2.2.1.3 Test description

10.2.2.1.3.1 Pre-test conditions

System Simulator:

- E-UTRA Cell 1 and NR Cell 1.

UE:

- None.

Preamble:

- The UE is in state RRC\_IDLE using generic procedure parameter Connectivity (*E-UTRA/EPC*) established according to TS 38.508-1 [4], clause 4.5.2.

10.2.2.1.3.2 Test procedure sequence

Table 10.2.2.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Cause the UE to request bearer resource allocation of dedicated EPS bearer associated with non-IMS PDN connectivity if pc\_MULTI\_PDN=TRUE else first PDN connectivity. (Note 1). | - | - | - | - |
| 2 | The UE transmits a SERVICE REQUEST message. | --> | SERVICE REQUEST | - | - |
| 3 | The SS establishes SRB2 and the MCG DRBs associated with the default EPS bearer context activated during the preamble. | - | - | - | - |
| 4 | Check: Does the UE transmit a BEARER RESOURCE ALLOCATION REQUEST message? | --> | BEARER RESOURCE ALLOCATION REQUEST | 1 | P |
| 5 | The SS transmits an ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST message and establishes a RLC-AM SCG DRB bearer using MCG\_and\_SCG condition. | <-- | ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST | - | - |
| 6 | Check: Does the UE transmit an ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT message? | --> | ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT | 2 | P |
| 7 | Cause the UE to request bearer resource modification of dedicated EPS bearer associated with non-IMS PDN connectivity if pc\_MULTI\_PDN=TRUE else first PDN connectivity. (Note 2). | - | - | - | - |
| 8 | Check: Does the UE transmit a BEARER RESOURCE MODIFICATION REQUEST message? | --> | BEARER RESOURCE MODIFICATION REQUEST | 3 | P |
| 9 | The SS transmits an MODIFY EPS BEARER CONTEXT REQUEST message. | <-- | MODIFY EPS BEARER CONTEXT REQUEST | - | - |
| 10 | Check: Does the UE transmit an MODIFY EPS BEARER CONTEXT ACCEPT message? | --> | MODIFY EPS BEARER CONTEXT ACCEPT | 4 | P |
| Note 1: The request is assumed to be triggered by AT command +CGDSCONT, and +CGACT (activated).  Note 2: The request is assumed to be triggered by AT command +CGCMOD. | | | | | |

10.2.2.1.3.3 Specific message contents

Table 10.2.2.1.3.3-1: Message BEARER RESOURCE ALLOCATION REQUEST (step 4, Table 10.2.2.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 36.508 [7], Table 4.7.3-6B | | | |
| Information Element | Value/Remark | Comment | Condition |
| Linked EPS bearer identity | 12 |  |  |
|  | 5 |  | IMS\_PDN\_ONLY |
| EPS QoS |  |  |  |
| QCI | 1 |  |  |
| Maximum bit rate for uplink | 384 kbps |  |  |
| Maximum bit rate for downlink | ‘11111110’B (8640 kbps) |  |  |
| Guaranteed bit rate for uplink | 128 kbps |  |  |
| Guaranteed bit rate for downlink | 128 kbps |  |  |
| Maximum bit rate for uplink (extended) | 0 |  |  |
| Maximum bit rate for downlink (extended) | ‘11111010’B (256 Mbps) |  |  |
| Guaranteed bit rate for uplink (extended) | 0 |  |  |
| Guaranteed bit rate for downlink (extended) | 0 |  |  |
| Maximum bit rate for uplink (extended-2) | 0 |  |  |
| Maximum bit rate for downlink (extended-2) | ‘11110110’B (10 Gbps) |  |  |
| Guaranteed bit rate for uplink (extended-2) | 0 |  |  |
| Guaranteed bit rate for downlink (extended-2) | 0 |  |  |
| Extended EPS QoS |  |  |  |
| Unit for maximum bit rate | Any value(Note1) |  |  |
| Maximum bit rate for uplink | ‘00000000’B |  |  |
| Maximum bit rate for downlink | Any value(Note1) |  |  |
| Unit for guaranteed bit rate | ‘00000000’B |  |  |
| Guaranteed bit rate for uplink | ‘00000000’B |  |  |
| Guaranteed bit rate for downlink | ‘00000000’B |  |  |
| Note1: The product of Unit for maximum bit rate and maximum bit rate for downlink should be 12Gbps. | | | |

|  |  |
| --- | --- |
| Condition | Explanation |
| IMS\_PDN\_ONLY | IMS\_PDN only available |

Table 10.2.2.1.3.3-2: Message ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST (step 5, Table 10.2.2.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.5.4.3-1 , condition UE-INITIATED | | | |
| Information Element | Value/Remark | Comment | Condition |
| EPS bearer identity | 6 |  |  |
| EPS QoS |  |  |  |
| QCI | 1 |  |  |
| Maximum bit rate for uplink | 384 kbps |  |  |
| Maximum bit rate for downlink | ‘11111110’B (8640 kbps) |  |  |
| Guaranteed bit rate for uplink | 128 kbps |  |  |
| Guaranteed bit rate for downlink | 128 kbps |  |  |
| Maximum bit rate for uplink (extended) | 0 |  |  |
| Maximum bit rate for downlink (extended) | ‘11111010’B (256 Mbps) |  |  |
| Guaranteed bit rate for uplink (extended) | 0 |  |  |
| Guaranteed bit rate for downlink (extended) | 0 |  |  |
| Maximum bit rate for uplink (extended-2) | 0 |  |  |
| Maximum bit rate for downlink (extended-2) | ‘11110110’B (10 Gbps) |  |  |
| Guaranteed bit rate for uplink (extended-2) | 0 |  |  |
| Guaranteed bit rate for downlink (extended-2) | 0 |  |  |
| Extended EPS QoS |  |  |  |
| Unit for maximum bit rate | ‘00000111’ (value is incremented in multiples of 1 Gbps) |  |  |
| Maximum bit rate for uplink | ‘00000000’B |  |  |
| Maximum bit rate for downlink | ‘0000000000001100’ B (12 Gbps) |  |  |
| Unit for guaranteed bit rate | ‘00000000’B |  |  |
| Guaranteed bit rate for uplink | ‘00000000’B |  |  |
| Guaranteed bit rate for downlink | ‘00000000’B |  |  |

Table 10.2.2.1.3.3-3: Message BEARER RESOURCE MODIFICATION REQUEST (step 8, Table 10.2.2.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 36.508 [7], Table 4.7.3-8 | | | |
| Information Element | Value/Remark | Comment | Condition |
| EPS bearer identity for packet filter | 6 |  |  |
| Required traffic flow QoS |  |  |  |
| QCI | 1 |  |  |
| Maximum bit rate for uplink | 384 kbps |  |  |
| Maximum bit rate for downlink | ‘11111110’B (8640 kbps) |  |  |
| Guaranteed bit rate for uplink | 128 kbps |  |  |
| Guaranteed bit rate for downlink | 128 kbps |  |  |
| Maximum bit rate for uplink (extended) | 0 |  |  |
| Maximum bit rate for downlink (extended) | ‘11111010’B (256 Mbps) |  |  |
| Guaranteed bit rate for uplink (extended) | 0 |  |  |
| Guaranteed bit rate for downlink (extended) | 0 |  |  |
| Maximum bit rate for uplink (extended-2) | 0 |  |  |
| Maximum bit rate for downlink (extended-2) | ‘11110110’B (10 Gbps) |  |  |
| Guaranteed bit rate for uplink (extended-2) | 0 |  |  |
| Guaranteed bit rate for downlink (extended-2) | 0 |  |  |
| Extended EPS QoS |  |  |  |
| Unit for maximum bit rate | Any value (Note1) |  |  |
| Maximum bit rate for uplink | ‘00000000’B |  |  |
| Maximum bit rate for downlink | Any value (Note1) |  |  |
| Unit for guaranteed bit rate | ‘00000000’B |  |  |
| Guaranteed bit rate for uplink | ‘00000000’B |  |  |
| Guaranteed bit rate for downlink | ‘00000000’B |  |  |
| Note1: The product of Unit for maximum bit rate and maximum bit rate for downlink should be 16Gbps. | | | |

Table 10.2.2.1.3.3-4: Message MODIFY EPS BEARER CONTEXT REQUEST (step 7, Table 10.2.2.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 36.508 [7], Table 4.7.3-18, condition UE-INITIATED | | | |
| Information Element | Value/Remark | Comment | Condition |
| EPS bearer identity | 6 |  |  |
| Linked EPS bearer identity | 12 |  |  |
|  | 5 |  | IMS\_PDN\_ONLY |
| New EPS QoS |  |  |  |
| QCI | 1 |  |  |
| Maximum bit rate for uplink | 384 kbps |  |  |
| Maximum bit rate for downlink | ‘11111110’B (8640 kbps) |  |  |
| Guaranteed bit rate for uplink | 128 kbps |  |  |
| Guaranteed bit rate for downlink | 128 kbps |  |  |
| Maximum bit rate for uplink (extended) | 0 |  |  |
| Maximum bit rate for downlink (extended) | ‘11111010’B (256 Mbps) |  |  |
| Guaranteed bit rate for uplink (extended) | 0 |  |  |
| Guaranteed bit rate for downlink (extended) | 0 |  |  |
| Maximum bit rate for uplink (extended-2) | 0 |  |  |
| Maximum bit rate for downlink (extended-2) | ‘11110110’B (10 Gbps) |  |  |
| Guaranteed bit rate for uplink (extended-2) | 0 |  |  |
| Guaranteed bit rate for downlink (extended-2) | 0 |  |  |
| APN-AMBR |  |  |  |
| APN-AMBR for downlink | ‘11111110’B (8640 kbps) |  |  |
| APN-AMBR for uplink | ‘11111110’B (8640 kbps) |  |  |
| APN-AMBR for downlink (extended) | ‘11111010’ B(256 Mbps) |  |  |
| APN-AMBR for uplink (extended) | ‘11111010’ B(256 Mbps) |  |  |
| APN-AMBR for downlink (extended-2) | ‘11111110’B (65280 Mbps) |  |  |
| APN-AMBR for uplink (extended-2) | 0 |  |  |
| Extended APN-AMBR |  |  |  |
| Unit for extended APN-AMBR for downlink | ‘00000111’B (value is incremented in multiples of 1 Gbps) |  |  |
| Extended APN-AMBR for downlink | ‘0000000010000000’ (128 Gbps) |  |  |
| Unit for extended APN-AMBR for uplink | 0 |  |  |
| Extended APN-AMBR for uplink | 0 |  |  |
| Extended EPS QoS |  |  |  |
| Unit for maximum bit rate | ‘00000111’ (value is incremented in multiples of 1 Gbps) |  |  |
| Maximum bit rate for uplink | ‘00000000’B |  |  |
| Maximum bit rate for downlink | ‘0000000000010000’ B (16 Gbps) |  |  |
| Unit for guaranteed bit rate | ‘00000000’B |  |  |
| Guaranteed bit rate for uplink | ‘00000000’B |  |  |
| Guaranteed bit rate for downlink | ‘00000000’B |  |  |

|  |  |
| --- | --- |
| Condition | Explanation |
| IMS\_PDN\_ONLY | IMS\_PDN only available |

## 10.3 5GS Non-3GPP Access Session Management

### 10.3.1 PDU session authentication and authorization

#### 10.3.1.1 PDU session authentication and authorization / during the UE-requested PDU session procedure

10.3.1.1.1 Test Purpose (TP)

Same Test Purpose as in clause 10.1.1.1.1

10.3.1.1.2 Conformance requirements

Same conformance requirements as in clause 10.1.1.1.2

10.3.1.1.3 Test description

10.3.1.1.3.1 Pre-test conditions

System Simulator:

WLAN Cell 27

UE:

None.

Preamble:

The UE is in state 1W-A with PDU session Active state according to TS 38.508-1 [4].

10.3.1.1.3.2 Test procedure sequence

Table 10.3.1.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Cause the UE to request connectivity to an additional PDU session. (see Note 1) | - | - | - | - |
| 2 | UE transmits establishes a IPSEC SA and NAS signalling connection as per generic procedure in table 4.5A.4.2.2-1 of 38.508-1 [4]”. | - | - | - | - |
| 3 | The UE transmits a PDU SESSION ESTABLISHMENT REQUEST message to request an additional PDU session.  Note: PDU SESSION ESTABLISHMENT REQUEST is included in UL NAS transport. UL NAS transport message is included in dedicatedNAS-Message of *ULInformationTransfer* message.  DNN information is included in UL NAS transport message. | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | - | - |
| 4 | The SS transmits PDU SESSION AUTHENTICATION COMMAND including an EAP-Request message. | <-- | PDU SESSION AUTHENTICATION COMMAND |  |  |
| 5 | Check: Does the UE transmit a PDU SESSION AUTHENTICATION COMPLETE containing EAP-Response message? | --> | PDU SESSION AUTHENTICATION COMPLETE | 1 | P |
| 6 | The SS transmits PDU SESSION ESTABLISHMENT REJECT message with 5GSM cause #29 including an EAP-Failure message. | <-- | PDU SESSION ESTABLISHMENT REJECT |  |  |
| 7 | The generic procedure for SS-requested IPsec Secure tunnel disconnection, specified in subclause 4.5A.3 of TS 38.508-1 [4], takes place performing disconnection of security association. | - |  | - | - |
| 8 | Cause the UE to request connectivity to an additional PDU session. (see Note 1) | - | - | - | - |
| 9 | UE transmits establishes a IPSEC SA and NAS signalling connection as per generic procedure in table 4.5A.4.2.2-1 of 38.508-1 [4]”. | - | - | - | - |
| 10 | The UE transmits a PDU SESSION ESTABLISHMENT REQUEST message to request an additional PDU session.  Note: PDU SESSION ESTABLISHMENT REQUEST is included in UL NAS transport. UL NAS transport message is included in dedicatedNAS-Message of *ULInformationTransfer* message  DNN information is included in UL NAS transport message. | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 2 | P |
| 11 | The SS transmits PDU SESSION AUTHENTICATION COMMAND including an EAP-Request message. | <-- | PDU SESSION AUTHENTICATION COMMAND |  |  |
| 12 | Check: Does the UE transmit a PDU SESSION AUTHENTICATION COMPLETE containing EAP-Response message? | --> | PDU SESSION AUTHENTICATION COMPLETE | - | - |
| 13 | The SS establishes an IPSec child security association according to the IKEv2 specification in RFC 7296 [32] | - | - | - |  |
| 14 | The SS transmits PDU SESSION ESTABLISHMENT ACCEPT message containing an EAP-Success message. | <-- | PDU SESSION ESTABLISHMENT ACCEPT |  |  |
| 15 | SS Transmits PDU SESSION MODIFICATION COMMAND | <-- | PDU SESSION MODIFICATION COMMAND | - | - |
|  | Check: Does the UE transmit a PDU SESSION MODIFICATION COMPLETE? | --> | PDU SESSION MODIFICATION COMPLETE | 3 | P |
| - | EXCEPTION: Step 16a1 describes behaviour depending UE implementation; the "lower case letter" identifies a step sequence that take place if the UE performs a specific action. | - | - | - | - |
| 16a1 | If initiated by the UE, the generic procedure for IP address allocation in the user plane, specified in subclause 4.5.6, takes place performing IP address allocation in the user plane. | - | - | - | - |
| Note 1: The request of connectivity to an additional PDU session may be performed by MMI or AT command +CGACT. | | | | | |

10.3.1.1.3.3 Specific message contents

Table 10.3.1.1.3.3-1: Void

Table 10.3.1.1.3.3-2: Void

Table 10.3.1.1.3.3-3: PDU SESSION ESTABLISHMENT REQUEST (step 3 and 10, Table 10.3.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-1 | | | |
| Information Element | Value/remark | Comment | Condition |
|  |  |  |  |
| PDU session ID | PSI-1 | UE assigns a  particular PSI not yet used between  1 and 15 |  |
| PTI | PTI-1 | UE assigns a  particular PTI not yet used between  1 and 254 |  |

Table 10.3.1.1.3.3-4: UL NAS Transport (step 3 and 10, Table 10.3.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-10 | | | |
| Information Element | Value/remark | Comment | Condition |
|  |  |  |  |
| Payload container type | ‘0001’B | N1 SM information |  |
| PDU session ID | PSI-1 |  |  |
| Request type | ‘001’B | Initial request |  |
| S-NSSAI | Not Present |  |  |
| DNN | DNN-1 (New DNN name) | The requested  DNN is different  from default DNN. |  |

Table 10.3.1.1.3.3-5: PDU SESSION ESTABLISHMENT REJECT (step 6, Table 10.3.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-3 | | | |
| Information Element | Value/remark | Comment | Condition |
|  |  |  |  |
| PDU session ID | PSI-1 |  |  |
| PTI | PTI-1 |  |  |
| 5GSM cause | ‘00011 101’ | User authentication or authorization failed |  |

Table 10.3.1.1.3.3-6: PDU SESSION ESTABLISHMENT ACCEPT (step 14, Table 10.3.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-2 | | | |
| Information Element | Value/remark | Comment | Condition |
|  |  |  |  |
| PDU session ID | PSI-1 |  |  |
| PTI | PTI-1 |  |  |
| EAP message | Set according to TS 38.508-1 [4] Table 4.7.3.2-3 | EAP-Success |  |
| QoS flow description |  |  |  |
| QFI | ‘00 0011’B | QFI 3 |  |
| Operation code | ‘001’B | Create new QoS flow description |  |
| E bit | ‘1’B | Parameters list is included |  |
| Number of parameters | ’00 0001’B | 1 parameters |  |
| 5QI | ‘0000 1001’B | 5QI 9 |  |
| DNN | DNN-1 |  |  |

### 10.3.2 Network-requested PDU session modification

#### 10.3.2.1 Network-requested PDU session modification /Accepted/Rejected

10.3.2.1.1 Test Purpose (TP)

(1)

**with** { the UE in PDU SESSION ACTIVE state and 5GMM-CONNECTED mode }

**ensure that** {

**when** { the UE receives a PDU SESSION MODIFICATION COMMAND message include the PDU session ID which does not belong to any PDU session in PDU SESSION ACTIVE state in UE }

**then** { UE sends a PDU SESSION MODIFICATION COMMAND REJECT message and set the 5GSM cause to #43: invalid PDU session identity }

}

(2)

**with** { the UE in PDU SESSION ACTIVE state and 5GMM-CONNECTED mode }

**ensure that** {

**when** { the UE receives a PDU SESSION MODIFICATION COMMAND message include the PDU session ID which belongs to a PDU session in PDU SESSION ACTIVE state in UE }

**then** { UE sends a PDU SESSION MODIFICATION COMMAND REJECT message and set the 5GSM cause to #43: invalid PDU session identity }

}

10.3.2.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clauses 6.3.2.2, 6.3.2.4. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 6.3.2.2]

In order to initiate the network-requested PDU session modification procedure, the SMF shall create a PDU SESSION MODIFICATION COMMAND message.

If the authorized QoS rules of the PDU session is modified, the SMF shall set the authorized QoS rules IE of the PDU SESSION MODIFICATION COMMAND message to the authorized QoS rules of the PDU session. The SMF shall ensure that the number of the packet filters used in the authorized QoS rules of the PDU Session does not exceed the maximum number of packet filters supported by the UE for the PDU session. The SMF may bind service data flows for which the UE has requested traffic segregation to a dedicated QoS flow for the PDU session, if possible. Otherwise the SMF may bind the service data flows to an existing QoS flow. The SMF shall use only one dedicated QoS flow for traffic segregation. If the UE has requested traffic segregation for multiple service data flows with different QoS handling, the SMF shall bind all these service data flows to a single QoS flow. If the SMF allows traffic segregation for service data flows in a QoS rule, then the SMF shall create a new authorized QoS rule for these service data flows and shall delete packet filters corresponding to these service data flows from the other authorized QoS rules.

If the authorized QoS flow descriptions of the PDU session is modified, the SMF shall set the authorized QoS flow descriptions IE of the PDU SESSION MODIFICATION COMMAND message to the authorized QoS flow descriptions of the PDU session.

If SMF creates a new authorized QoS rule for a new QoS flow, then SMF shall include the authorized QoS flow description for that QoS flow in the authorized QoS flow descriptions IE of the PDU SESSION MODIFICATION COMMAND message, if:

a) the newly created authorized QoS rules is for a new GBR QoS flow;

b) the QFI of the new QoS flow is not the same as the 5QI of the QoS flow identified by the QFI; or

c) the new QoS flow can be mapped to an EPS bearer as specified in subclause 4.11.2 of 3GPP TS 23.502 [9].

If the session-AMBR of the PDU session is modified, the SMF shall set the selected Session-AMBR IE of the PDU SESSION MODIFICATION COMMAND message to the session-AMBR of the PDU session.

If interworking with EPS is supported for the PDU session and if the mapped EPS bearer contexts of the PDU session is modified, the SMF shall set the mapped EPS bearer contexts IE of the PDU SESSION MODIFICATION COMMAND message to the mapped EPS bearer contexts of the PDU session. If the association between a QoS flow and the mapped EPS bearer context is changed, the SMF shall set the EPS bearer identity parameter in authorized QoS flow descriptions IE of the PDU SESSION MODIFICATION COMMAND message to the new EPS bearer identity associated with the QoS flow.

If the network-requested PDU session modification procedure is triggered by a UE-requested PDU session modification procedure and the PDU SESSION MODIFICATION REQUEST message includes a 5GSM capability IE, the SMF shall:

a) if the RQoS bit is set to:

1) "Reflective QoS supported", consider that the UE supports reflective QoS for this PDU session; or

2) "Reflective QoS not supported", consider that the UE does not support reflective QoS for this PDU session; and;

b) if the MH6-PDU bit is set to:

1) "Multi-homed IPv6 PDU session supported", consider that this PDU session is supported to use multiple IPv6 prefixes; or

2) "Multi-homed IPv6 PDU session not supported", consider that this PDU session is not supported to use multiple IPv6 prefixes.

If the SMF considers that reflective QoS is supported for QoS flows belonging to this PDU session, the SMF may include the RQ timer IE set to an RQ timer value in the PDU SESSION MODIFICATION COMMAND message.

If the network-requested PDU session modification procedure is triggered by a UE-requested PDU session modification procedure, the PDU session type is "IPv4", "IPv6", "IPv4v6" or "Ethernet" and the PDU SESSION MODIFICATION REQUEST message includes a Maximum number of supported packet filters IE, the SMF shall consider this number as the maximum number of packet filters that can be supported by the UE for this PDU session. Otherwise the SMF considers that the UE supports 16 packet filters for this PDU session.

For a PDN connection established when in S1 mode, upon the first inter-system change from S1 mode to N1 mode, if the network-requested PDU session modification procedure is triggered by a UE-requested PDU session modification procedure, the SMF shall consider that the maximum data rate per UE for user-plane integrity protection supported by the UE for uplink and the maximum data rate per UE for user-plane integrity protection supported by the UE for downlink are valid for the lifetime of the PDU session.

For a PDN connection established when in S1 mode, upon the first inter-system change from S1 mode to N1 mode, if the network-requested PDU session modification procedure is triggered by a UE-requested PDU session modification procedure and the SMF determines, based on local policies or configurations in the SMF and the Always-on PDU session requested IE in the PDU SESSION MODIFICATION REQUEST message (if available), that either:

a) the requested PDU session needs to be an always-on PDU session, the SMF shall include the Always-on PDU session indication IE in the PDU SESSION MODIFICATION COMMAND message and shall set the value to "Always-on PDU session required"; or

b) the requested PDU session shall not be an always-on PDU session and:

i) if the UE included the Always-on PDU session requested IE, the SMF shall include the Always-on PDU session indication IE in the PDU SESSION MODIFICATION COMMAND message and shall set the value to "Always-on PDU session not allowed"; or

ii) if the UE did not include the Always-on PDU session requested IE, the SMF shall not include the Always-on PDU session indication IE in the PDU SESSION MODIFICATION COMMAND message.

If the value of the RQ timer is set to "deactivated" or has a value of zero, the UE considers that RQoS is not applied for this PDU session and remove the derived QoS rule(s) associated with the PDU session, if any.

If the network-requested PDU session modification procedure is triggered by a UE-requested PDU session modification procedure, the SMF shall set the PTI IE of the PDU SESSION MODIFICATION COMMAND message to the PTI of the PDU SESSION MODIFICATION REQUEST message received as part of the UE-requested PDU session modification procedure.

If the network-requested PDU session modification procedure is not triggered by a UE-requested PDU session modification procedure, the SMF shall set the PTI IE of the PDU SESSION MODIFICATION COMMAND message to "No procedure transaction identity assigned".

If the selected SSC mode of the PDU session is "SSC mode 3" and the SMF requests the relocation of SSC mode 3 PDU session anchor with multiple PDU sessions as specified in 3GPP TS 23.502 [9], the SMF shall include 5GSM cause #39 "reactivation requested" , in the PDU SESSION MODIFICATION COMMAND message, and may include the PDU session address lifetime in a PDU session address lifetime PCO parameter in the Extended protocol configuration options IE of the PDU SESSION MODIFICATION COMMAND message.

The SMF shall send the PDU SESSION MODIFICATION COMMAND message, and the SMF shall start timer T3591 (see example in figure 6.3.2.2.1).

NOTE: If the SMF requests the relocation of SSC mode 3 PDU session anchor with multiple PDU sessions as specified in 3GPP TS 23.502 [9], the reallocation requested indication indicating whether the SMF is to be reallocated or the SMF is to be reused is provided to the AMF.



Figure 6.3.2.2.1: Network-requested PDU session modification procedure

[TS 24.501, clause 6.3.2.4]

Upon receipt of a PDU SESSION MODIFICATION COMMAND message and a PDU session ID, using the NAS transport procedure as specified in subclause 5.4.5, if the UE rejects the PDU SESSION MODIFICATION COMMAND message, the UE shall create a PDU SESSION MODIFICATION COMMAND REJECT message.

If the PDU SESSION MODIFICATION COMMAND message contains the PTI value allocated in the UE-requested PDU session modification procedure, the UE shall release the PTI indicated by the PTI IE and shall stop the timer T3581.

The UE shall set the 5GSM cause IE of the PDU SESSION MODIFICATION COMMAND REJECT message to indicate the reason for rejecting the PDU session modification.

The 5GSM cause IE typically indicates one of the following 5GSM cause values:

#26 insufficient resources;

#43 invalid PDU session identity;

#44 semantic error in packet filter(s);

#45 syntactical error in packet filter(s);

#83 semantic error in the QoS operation; or

#84 syntactical error in the QoS operation.

10.3.2.1.3 Test description

10.3.2.1.3.1 Pre-test conditions

System Simulator:

WLAN Cell 27

UE:

None.

Preamble:

The UE is in state 3W-A on WLAN Cell 27 with PDU session Active state according to TS 38.508-1 [4].

10.3.2.1.3.2 Test procedure sequence

Table 10.3.2.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS transmits a PDU SESSION MODIFICATION COMMAND message with PDU session ID IE is set to a different value from the value set in PDU SESSION ESTABLISHMENT REQUEST message. This message is included in a *DLInformationTransfer* message. | <-- | PDU SESSION MODIFICATION COMMAND | - | - |
| 2 | Check: Does the UE transmit a PDU SESSION MODIFICATION COMMAND REJECT with the 5GSM cause IE indicating #43 "invalid PDU session identity"? | --> | PDU SESSION MODIFICATION COMMAND REJECT | 1 | P |
| 3 | The SS transmits a PDU SESSION MODIFICATION COMMAND message with PDU session ID IE is the value set in PDU SESSION ESTABLISHMENT REQUEST message. This message is included in a *DLInformationTransfer* message. | <-- | PDU SESSION MODIFICATION COMMAND | - | - |
| 4 | Check: Does the UE transmit a PDU SESSION MODIFICATION COMPLETE? | --> | PDU SESSION MODIFICATION COMPLETE | 2 | P |

10.3.2.1.3.3 Specific message contents

Table 10.3.2.1.3.3-1: PDU SESSION MODIFICATION COMMAND (Step 1, Table 10.3.2.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.2-9 | | | |
| Information Element | Value/Remark | Comment | Condition |
| PDU session ID | The different value from the value set in PDU SESSION ESTABLISHMENT REQUEST message in preamble |  |  |

Table 10.3.2.1.3.3-2: PDU SESSION MODIFICATION COMMAND REJECT (Step 2, Table 10.3.2.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.2-8 | | | |
| Information Element | Value/Remark | Comment | Condition |
| PDU session ID | The same value as the value set in PDU SESSION modification command message |  |  |
| 5GSM cause | ‘00101011’B | Invalid PDU session identity |  |

Table 10.3.2.1.3.3-1: PDU SESSION MODIFICATION COMMAND (Step 3, Table 10.3.2.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.2-9 | | | |
| Information Element | Value/Remark | Comment | Condition |
| PDU session ID | The value set in PDU SESSION ESTABLISHMENT REQUEST message in preamble |  |  |
| Authorized QoS rules | Reference QoS rule #3 as defined in 38.508-1 [4]Table 4.8.2.1-1. |  |  |

### 10.3.3 Network-requested PDU session Release

#### 10.3.3.1 Network-requested PDU session release / accepted/ with and without reactivation

10.3.3.1.1 Test Purpose (TP)

(1)

**with** { the UE in PDU SESSION ACTIVE state }

**ensure that** {

**when** { the UE receives a PDU SESSION RELEASE COMMAND message includes 5GSM cause #39 "reactivation requested"}

**then** { the UE re-initiates a PDU SESSION establishment procedure for the same [S-NSSAI, DNN] combination provided in PDU session establishment procedure }

}

(2)

**with** { UE is in PDU SESSION ACTIVE state }

**ensure that** {

**when** { UE receives a PDU SESSION RELEASE COMMAND message including 5GSM cause #26 "insufficient resources" and the Back-off timer value that indicates deactivated }

**then** { UE does not send a PDU SESSION ESTABLISHMENT REQUEST message until the UE is switched off or the USIM is removed }

}

10.3.3.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clauses 6.3.3.2, 6.3.3.3. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 6.3.3.2]

In order to initiate the network-requested PDU session release procedure, the SMF shall create a PDU SESSION RELEASE COMMAND message.

The SMF shall set the SM cause IE of the PDU SESSION RELEASE COMMAND message to indicate the reason for releasing the PDU session.

The SM cause IE typically indicates one of the following SM cause values:

#26 insufficient resources;

…

The SMF may include a Back-off timer value IE in the PDU SESSION RELEASE COMMAND message when the 5GSM cause value #26 "insufficient resources" is included in the PDU SESSION RELEASE COMMAND message. If the 5GSM cause value is #26 "insufficient resources" and the PDU SESSION RELEASE COMMAND message is sent to a UE configured for high priority access in selected PLMN or the request type was set to "initial emergency request" or "existing emergency PDU session" for the establishment of the PDU session, the network shall not include a Back-off timer value IE.

The SMF may include a Back-off timer value IE in the PDU SESSION RELEASE COMMAND message when the 5GSM cause value #67 "insufficient resources for specific slice and DNN" is included in the PDU SESSION RELEASE COMMAND message. If the 5GSM cause value is #67 "insufficient resources for specific slice and DNN" and the PDU SESSION RELEASE COMMAND message is sent to a UE configured for high priority access in selected PLMN or the request type was set to "initial emergency request" or "existing emergency PDU session" for the establishment of the PDU session, the network shall not include a Back-off timer value IE.

[TS 24.501, clause 6.3.3.3]

Upon receipt of a PDU SESSION RELEASE COMMAND message and a PDU session ID, using the NAS transport procedure as specified in subclause 5.4.5, the UE considers the PDU session as released and the UE shall create a PDU SESSION RELEASE COMPLETE message.

If the PDU SESSION RELEASE COMMAND message contains the PTI value allocated in the UE-requested PDU session release procedure, the UE shall stop the timer T3582. The UE should ensure that the PTI value assigned to this procedure is not released immediately.

NOTE 1: The way to achieve this is implementation dependent. For example, the UE can ensure that the PTI value assigned to this procedure is not released during the time equal to or greater than the default value of timer T3592.

While the PTI value is not released, the UE regards any received PDU SESSION RELEASE COMMAND message with the same PTI value as a network retransmission (see subclause 7.3.1).

If the PDU SESSION RELEASE COMMAND message includes 5GSM cause #39 "reactivation requested", then after completion of the network-requested PDU session release procedure, the UE should re-initiate the UE-requested PDU session establishment procedure as specified in subclause 6.4.1 for:

a) the PDU session type associated with the released PDU session;

b) the SSC mode associated with the released PDU session;

c) the DNN associated with the released PDU session; and

d) the S-NSSAI associated with (if available in roaming scenarios) a mapped S-NSSAI if provided in the UE-requested PDU session establishment procedure of the released PDU session.

If the PDU SESSION RELEASE COMMAND message includes 5GSM cause #39 "reactivation requested" and the UE provided an S-NSSAI during the PDU session establishment, the UE shall stop timer T3585 if it is running for the S-NSSAI provided by the UE. The UE should then re-initiate the UE requested PDU session establishment procedure for the same S-NSSAI. If the UE did not provide an S-NSSAI during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", the UE shall stop the timer T3585 associated with no S-NSSAI if it is running, and should re-initiate the UE requested PDU session establishment procedure without including an S-NSSAI. If the PDU SESSION RELEASE COMMAND message was received for an emergency PDU session, the UE shall not stop the timer T3585 associated with no S-NSSAI if it is running.

If the PDU SESSION RELEASE COMMAND message includes 5GSM cause #39 "reactivation requested" and the UE provided a DNN during the PDU session establishment, the UE shall stop timer T3396 if it is running for the DNN provided by the UE. The UE should then re-initiate the UE requested PDU session establishment procedure for the same DNN. If the UE did not provide a DNN during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", the UE shall stop the timer T3396 associated with no DNN if it is running, and should re-initiate the UE requested PDU session establishment procedure without including a DNN. If the PDU SESSION RELEASE COMMAND message was received for an emergency PDU session, the UE shall not stop the timer T3396 associated with no DNN if it is running.

If the PDU SESSION RELEASE COMMAND message includes 5GSM cause #39 "reactivation requested" and the UE provided an S-NSSAI and a DNN during the PDU session establishment, the UE shall stop timer T3584 if it is running for the same [S-NSSAI, DNN] combination provided by the UE. The UE should then re-initiate the UE requested PDU session establishment procedure for the same [S-NSSAI, DNN] combination. If the UE did not provide an S-NSSAI during the PDU session establishment, the UE shall stop the timer T3584 associated with [no S-NSSAI, DNN] if it is running, and should re-initiate the UE requested PDU session establishment procedure with the same DNN but without an S-NSSAI. If the UE did not provide a DNN during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", the UE shall stop the timer T3584 associated with [S-NSSAI, no DNN] if it is running, and should re-initiate the UE requested PDU session establishment procedure with the same S-NSSAI but without a DNN. If the PDU SESSION RELEASE COMMAND message was received for an emergency PDU session, the UE shall not stop the timer T3584 associated with [S-NSSAI, no DNN] if it is running. If the UE provided neither a DNN nor an S-NSSAI during the PDU session establishment and the request type was different from "initial emergency request" and different from "existing emergency PDU session", the UE shall stop the timer T3584 associated with [no S-NSSAI, no DNN] if it is running, and should re-initiate the UE requested PDU session establishment procedure without an S-NSSAI and a DNN. If the PDU SESSION RELEASE COMMAND message was received for an emergency PDU session, the UE shall not stop the timer T3584 associated with [no S-NSSAI, no DNN] if it is running.

NOTE 2: User interaction is necessary in some cases when the UE cannot re-initiate the UE-requested PDU session establishment procedure automatically.

NOTE 3: If the PDU SESSION RELEASE COMMAND message includes 5GSM cause #39 "reactivation requested" for a PDU session, the UE provided a DNN (or no DNN) and an S-NSSAI (or no S-NSSAI) when the PDU session is established, timer T3396 associated with the DNN (or no DNN, if no DNN was provided by the UE) is running, and timer T3584 associated with the DNN (or no DNN, if no DNN was provided by the UE) and the S-NSSAI (or no S-NSSAI, if no S-NSSAI was provided by the UE) is running, then the UE stops both the timer T3396 and the timer T3584.

NOTE 4: If the PDU SESSION RELEASE COMMAND message includes 5GSM cause #39 "reactivation requested" for a PDU session, the UE provided a DNN (or no DNN) and an S-NSSAI (or no S-NSSAI) when the PDU session is established, timer T3585 associated with the S-NSSAI (or no S-NSSAI, if no S-NSSAI was provided by the UE) is running, and timer T3584 associated with the DNN (or no DNN, if no DNN was provided by the UE) and the S-NSSAI (or no S-NSSAI, if no S-NSSAI was provided by the UE) is running, then the UE stops both the timer T3585 and the timer T3584.

10.3.3.1.3 Test description

10.3.3.1.3.1 Pre-test conditions

System Simulator:

- WLAN Cell 27

UE:

- None.

Preamble:

- The UE is in state 3W-A on WLAN Cell 27 according to TS 38.508-1 [4].

10.3.3.1.3.2 Test procedure sequence

Table 10.3.3.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS transmits a PDU SESSION RELEASE COMMAND including 5GSM cause #39 “reactivation requested " with PDU session ID IE is set to the same value in PDU SESSION ESTABLISHMENT REQUEST message in preamble. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION RELEASE COMMAND | - | - |
| 2 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST and the S-NSSAI and DNN in UL NAS TRANSPORT message are the same values in UL NAS TRANSPORT message in preamble? | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 1 | P |
| 3 | The SS transmits an PDU SESSION ESTABLISHMENT ACCEPT | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT |  |  |
| 4 | The SS transmits a PDU SESSION RELEASE COMMAND including 5GSM cause #26 “insufficient resources" and T3396 value (deactivated). | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION RELEASE COMMAND | - | - |
| 5 | The UE transmits a PDU SESSION RELEASE COMPLETE message. | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION RELEASE COMPLETE | - | - |
| 6 | Cause the UE to request establishment of PDU session without DNN.(Note 1) | - | - | - | - |
| 7 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST message? | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 2 | F |
| 8 | Switch off procedure in Ipsec\_SA\_Established specified in TS 38.508-1 [4] subclause 4.9.6.5 is performed. | - |  |  |  |
| 9 | Switch on UE. | - |  |  |  |
| 10 | The general procedure is completed by executing of the UE registration procedure in TS 38.508-1 [4] table 4.5.2.2-3 , '*connected without release*'. | - |  |  |  |
| 11 | Cause the UE to request establishment of PDU session without DNN.(Note 1) | - | - | - | - |
| 12 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST message? | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 3 | P |
| 13 | The SS transmits a PDU SESSION ESTABLISHMENT ACCEPT message. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |
| Note 1: The request to establish a PDU session may be performed by MMI or AT command. | | | | | |

10.3.3.1.3.3 Specific message contents

Table 10.3.3.1.3.3-1: PDU SESSION RELEASE COMMAND (Step 1, Table 10.3.3.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.2-14 | | | |
| Information Element | Value/Remark | Comment | Condition |
| PDU session ID | The same value indicated in PDU SESSION ESTABLISHMENT REQUEST message in preamble |  |  |
| 5GSM cause | ‘00100111’B | Reactivation requested |  |

Table 10.3.3.1.3.3-2: UL NAS TRANSPORT (Step 2, Table 10.3.3.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-10 | | | |
| Information Element | Value/Remark | Comment | Condition |
| S-NSSAI | The same value indicated in UL NAS TRANSPORT message in preamble |  | If present in UL NAS TRANSPORT message in preamble |
| Not present |  | If not present in UL NAS TRANSPORT message in preamble |
| DNN | The same value indicated in UL NAS TRANSPORT message in preamble |  | If present in UL NAS TRANSPORT message in preamble |
| Not present |  | If not present in UL NAS TRANSPORT message in preamble |

Table 10.3.3.1.3.3-3: PDU SESSION RELEASE COMMAND (step 4, Table 10.3.3.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.2-14 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | The same ID as the ID of PDU session which UE request in step 13 in Table 10.1.3.2.3.2-1 |  |  |
| 5GSM cause | '0001 1010'B | insufficient resources |  |
| Back-off timer value | ‘1110 0000’B | deactivated |  |

### 10.3.4 UE-requested PDU session establishment

##### 10.3.4.1 UE-requested PDU session establishment / Abnormal / T3580

10.3.4.1.1 Test Purpose (TP)

Same test purpose as in clause 10.1.4.2.1

10.3.4.1.2 Conformance requirements

Same conformance requirements as in clause 10.1.4.2.2

10.3.4.1.3 Test description

10.3.4.1.3.1 Pre-test conditions

System Simulator:

- WLAN Cell 27

UE:

- None.

Preamble:

- The UE is in state Switched OFF [State 0-A as per TS 38.508-1 [4] Table 4.4A.2-0].

10.3.4.1.3.2 Test procedure sequence

Table 10.3.4.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | UE is switched on | - | - | - | - |
| 2-10 | Steps 1-9 of Table 4.5.2.2-3 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 11 | The UE transmits a PDU SESSION ESTABLISHMENT REQUEST message to request an additional PDU session. | --> | PDU SESSION ESTABLISHMENT REQUEST | - | - |
| - | EXCEPTION: Steps 12-13 shall be repeated for 4 times | - | - | - | - |
| 12 | The SS waits 16 seconds (T3580). | - | - | - | - |
| 13 | The UE transmits a PDU SESSION ESTABLISHMENT REQUEST message to request an additional PDU session.  (Attempt counter = 5) | --> | PDU SESSION ESTABLISHMENT REQUEST | 1 | P |
| 15 | The UE transmits a PDU SESSION ESTABLISHMENT REQUEST message to request an additional PDU session. | --> | PDU SESSION ESTABLISHMENT REQUEST | 2 | F |

10.3.4.1.3.3 Specific message contents

None.

### 10.3.5 UE-requested PDU session modification

#### 10.3.5.1 UE-requested PDU session modification/Success

10.3.5.1.1 Test Purpose (TP)

(1)

**with** { UE in PDU SESSION ACTIVE state and in 5GMM-CONNECTED mode }

**ensure that** {

**when** { UE is requested to modify of PDU session }

**then** { UE sends a PDU SESSION MODIFICATION REQUEST message }

}

10.3.5.1.2 Conformance requirements

Same conformance requirements as in clause 10.1.5.1.2

10.3.5.1.3 Test description

10.3.5.1.3.1 Pre-test conditions

System Simulator:

- WLAN Cell 27.

UE:

- None.

Preamble:

- The UE is in state 3W-A onWLAN Cell 27 with PDU SESSION ACTIVE according to TS 38.508-1 [4].

10.3.5.1.3.2 Test procedure sequence

Same test procedure sequence as in clause 10.1.5.1.3.2

10.3.5.1.3.3 Specific message contents

Same specific message contents as in clause 10.1.5.1.3.3

### 10.3.6 UE-requested PDU session release

#### 10.3.6.1 UE-requested PDU session release / Abnormal / Collision with network-requested PDU session modification procedure

10.3.6.1.1 Test Purpose (TP)

(1)

**with** { the UE is in PDU SESSION ACTIVE state and has sent a PDU SESSION RELEASE REQUEST message }

**ensure that** {

**when** { UE receives a PDU SESSION MODIFICATION COMMAND message indicating a PDU session that UE wants to release }

**then** { the UE ignores the PDU SESSION MODIFICATION COMMAND message and proceed with the PDU session release procedure }

}

10.3.6.1.2 Conformance requirements

Same conformance requirements as in clause 10.1.6.1.2

10.3.6.1.3 Test description

10.3.6.1.3.1 Pre-test conditions

System Simulator:

- WLAN Cell 27.

UE:

None.

Preamble:

- The UE is in state 3W-A on WLAN Cell 27 according to TS 38.508-1 [4].

10.3.6.1.3.2 Test procedure sequence

Table 10.3.6.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Cause the UE to request establishment of PDU session to the DN.(Note 1) | - | - | - | - |
| 2 | New PDU session establishment procedure is performed as per generic procedure in clause 4.5A.2A of TS 38.508-1 [4] | - | - | - | - |
| 3 | Cause the UE to request release of PDU session established during preamble.(Note 2) | - | - | - | - |
| 4 | The UE transmits a PDU SESSION RELEASE REQUEST message. | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION RELEASE REQUEST | - | - |
| 5 | The SS transmits a PDU SESSION MODIFICATION COMMAND message. | <-- | 5GMM: DL NAS TRANSPROT  5GSM: PDU SESSION MODIFICATION COMMAND | - | - |
| 6 | The SS transmits a PDU SESSION RELEASE COMMAND message. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION RELEASE COMMAND | - | - |
| 7 | Check: Does the UE transmit PDU SESSION RELEASE COMPLETE message? | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION RELEASE COMPLETE | 1 | P |
| 8 | The SS deletes the payload associated with IPSec child security association according to the IKEv2 specification in RFC 7296 [32] | - | - | - | - |
| Note 1: The request to establish a PDU session may be performed by MMI or AT command.  Note 2: The request to release a PDU session may be performed by MMI or AT command. | | | | | |

10.3.6.1.3.3 Specific message contents

Table 10.3.6.1.3.3-1: PDU SESSION RELEASE REQUEST (step 4, Table 10.3.6.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.2-12 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | Set to the ID UE requested in step 2 in Table 10.3.6.1.3.2-1 |  |  |
| PTI | Any value from 1 to 254 |  |  |

Table 10.3.6.1.3.3-2: PDU SESSION MODIFICATION COMMAND (step 5, Table 10.3.6.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.2-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | Set to the ID UE requested in step 2 in Table 10.3.6.1.3.2-1 |  |  |
| PTI | '0000 0000'B | No procedure transaction identity assigned |  |

Table 10.3.6.1.3.3-3: PDU SESSION RELEASE COMMAND (step 6, Table 10.3.6.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.2-14 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | Set to the ID UE requested in step 2 in Table 10.3.6.1.3.2-1 |  |  |
| PTI | The value indicated in PDU SESSION RELEASE REQUEST |  |  |
| 5GSM cause | '0010 0100'B | #36 regular deactivation |  |

Table 10.3.6.1.3.3-4: PDU SESSION RELEASE COMPLETE (step 7, Table 10.3.6.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.2-15 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | Set to the ID UE requested in step 2 in Table 10.3.6.1.3.2-1 |  |  |
| PTI | The value indicated in PDU SESSION RELEASE REQUEST |  |  |

## 10.4 ATSSS session management

### 10.4.1 UE-requested MA PDU session management

#### 10.4.1.1 UE-requested MA PDU session establishment / ATSSS / Registered to same PLMNs over 3GPP and non-3GPP accesses simultaneously / Success

10.4.1.1.1 Test Purpose (TP)

(1)

**with** { the UE is registered over both 3GPP and non-3GPP accesses and SS informs the UE that it supports ATSSS feature in the 5GS network feature support information element}

**ensure that** {

**when** { UE is configured to request a new MA PDU session }

**then** { UE sends a PDU Session Establishment Request over any of the two accesses and sets the request type to "MA PDU request" in the UL NAS TRANSPORT message and sets the ATSSS-ST bits in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message according to the ATSSS functionality and steering mode that UE supports }

}

10.4.1.1.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501, clause 6.4.1.2, 5.5.3.2.2, 6.4.3.4.

[TS 24.501, clause 6.4.1.2]

If the UE is registered to a network which supports ATSSS, the UE may request to establish an MA PDU session. If the UE requests to establish an MA PDU session, the UE shall set the request type to "MA PDU request" in the UL NAS TRANSPORT message. If the UE is registered to a network which does not support ATSSS, the UE shall not request to establish an MA PDU session.

When the UE is registered over both 3GPP access and non-3GPP access in the same PLMN and the UE requests to establish a new MA PDU session, the UE may provide an S-NSSAI in the UL NAS TRANSPORT message only if the S-NSSAI is included in the allowed NSSAIs of both accesses.

NOTE 7: If the UE requested DNN corresponds to an LADN DNN, the AMF does not forward the MA PDU session information IE to the SMF but sends the message back to the UE to inform of the unhandled request (see subclause 5.4.5.2.5).

If the UE is registered to a network which supports ATSSS and the UE has already an MA PDU session established over one access, the UE may perform the UE-requested PDU session establishment procedure to establish user-plane resources over the other access for the MA PDU session as specified in subclause 4.22 of 3GPP TS 23.502 [9] and the S-NSSAI associated with the MA PDU session is included in the allowed NSSAI of the other access. If the UE establishes user-plane resources over the other access for the MA PDU session, the UE shall:

a) set the request type to "MA PDU request" in the UL NAS TRANSPORT message;

b) set the PDU session ID to the stored PDU session ID corresponding to the established MA PDU session in the PDU SESSION ESTABLISHMENT REQUEST message and in the UL NAS TRANSPORT message; and

c) set the S-NSSAI in the UL NAS TRANSPORT message to the stored S-NSSAI associated with the PDU session ID.

If the UE requests to establish a new MA PDU session or if the UE requests to establish a new PDU session and the UE allows the network to upgrade the requested PDU session to an MA PDU session:

a) if the UE supports ATSSS Low-Layer functionality with any steering mode as specified in subclause 5.32.6 of 3GPP TS 23.501 [8], the UE shall set the ATSSS-ST bits to "ATSSS Low-Layer functionality with any steering mode supported" in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message;

b) if the UE supports MPTCP functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode as specified in subclause 5.32.6 of 3GPP TS 23.501 [8], the UE shall set the ATSSS-ST bits to "MPTCP functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode supported" in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message;

c) if the UE supports MPTCP functionality with any steering mode and ATSSS-LL functionality with any steering mode as specified in subclause 5.32.6 of 3GPP TS 23.501 [8], the UE shall set the ATSSS-ST bits to "MPTCP functionality with any steering mode and ATSSS-LL functionality with any steering mode supported" in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message; and

d) if a performance measurement function in the UE can perform access performance measurements using the QoS flow of the non-default QoS rule as specified in subclause 5.32.5 of 3GPP TS 23.501 [8], the UE shall set the APMQF bit to "Access performance measurements per QoS flow supported" in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message.

If the UE requests to establish a new MA PDU session and the UE supports to establish a PDN connection as the user plane resource of an MA PDU session, the UE shall include the ATSSS request parameter in the Extended protocol configuration options IE of the PDU SESSION ESTABLISHMENT REQUEST message.

…

The UE shall transport:

a) the PDU SESSION ESTABLISHMENT REQUEST message;

b) the PDU session ID of the PDU session being established, being handed over, being transferred, or been established as an MA PDU session;

c) if the request type is set to:

1) "initial request" or "MA PDU request" and the UE determined to establish a new PDU session or an MA PDU session based on either a URSP rule including one or more S-NSSAIs in the URSP (see subclause 6.2.9) or UE local configuration, according to subclause 4.2.2 of 3GPP TS 24.526 [19]:

i) in case of a non-roaming scenario, an S-NSSAI in the allowed NSSAI which corresponds to one of the S-NSSAI(s) in the matching URSP rule, if any, or else to the S-NSSAI(s) in the UE local configuration or in the default URSP rule, if any, according to the conditions given in subclause 4.2.2 of 3GPP TS 24.526 [19]; or

ii) in case of a roaming scenario:

A) one of the mapped S-NSSAI(s) which corresponds to one of the S-NSSAI(s) in the matching URSP rule, if any, or else to the S-NSSAI(s) in the UE local configuration or in the default URSP rule, if any, according to the conditions given in subclause 4.2.2 of 3GPP TS 24.526 [19]; and

B) the S-NSSAI in the allowed NSSAI associated with the S-NSSAI in A); or

2) "existing PDU session", an S-NSSAI, which is an S-NSSAI associated with the PDU session and (if available in roaming scenarios) a mapped S-NSSAI, with exception when S-NSSAI is not provided by the network in subclause 6.1.4.2;

d) if the request type is set to:

1) "initial request" or "MA PDU request" and the UE determined to establish a new PDU session or an MA PDU session based on either a URSP rule including one or more DNNs in the URSP (see subclause 6.2.9) or UE local configuration, according to subclause 4.2.2 of 3GPP TS 24.526 [19], a DNN which corresponds to one of the DNN(s) in the matching URSP rule, if any, or else to the DNN(s) in the UE local configuration or in the default URSP rule, if any, according to the conditions given in subclause 4.2.2 of 3GPP TS 24.526 [19]; or

2) "existing PDU session", a DNN which is a DNN associated with the PDU session;

e) the request type which is set to:

1) "initial request", if the UE is not registered for emergency services and the UE requests to establish a new non-emergency PDU session;

2) "existing PDU session", if the UE is not registered for emergency services and the UE requests:

i) handover of an existing non-emergency PDU session between 3GPP access and non-3GPP access;

ii) transfer of an existing PDN connection for non-emergency bearer services in the EPS to the 5GS; or

iii) transfer of an existing PDN connection for non-emergency bearer services in an untrusted non-3GPP access connected to the EPC to the 5GS;

3) "initial emergency request", if the UE requests to establish a new emergency PDU session;

4) "existing emergency PDU session", if the UE requests:

i) handover of an existing emergency PDU session between 3GPP access and non-3GPP access;

ii) transfer of an existing PDN connection for emergency bearer services in the EPS to the 5GS; or

iii) transfer of an existing PDN connection for emergency bearer services in an untrusted non-3GPP access connected to the EPC to the 5GS; or

5) "MA PDU request", if:

i) the UE requests to establish an MA PDU session;

ii) the UE requests to establish user plane resources over other access of an MA PDU session established over one access only; or

iii) the UE performs inter-system change from S1 mode to N1 mode according to subclause 4.8.2.3.1 and requests transfer of a PDN connection which is a user plane resource of an MA PDU session; and

f) the old PDU session ID which is the PDU session ID of the existing PDU session, if the UE initiates the UE-requested PDU session establishment procedure upon receiving the PDU SESSION MODIFICATION COMMAND messages with the 5GSM cause IE set to #39 "reactivation requested";

using the NAS transport procedure as specified in subclause 5.4.5, and the UE shall start timer T3580 (see example in figure 6.4.1.2.1).

[TS 24.501, clause 6.4.1.3]

If the PDU session is an MA PDU session, the SMF shall include the ATSSS container IE in the PDU SESSION ESTABLISHMENT ACCEPT message. The SMF shall set the content of the ATSSS container IE as specified in 3GPP TS 24.193 [13B]. If the UE requests to establish user plane resources over the second access of an MA PDU session which has already been established over the first access and the parameters associated with ATSSS previously provided to the UE are not to be updated, the "ATSSS container contents" shall not be included in the ATSSS container IE in the PDU SESSION ESTABLISHMENT ACCEPT message.

If the PDU session is a single access PDU session containing the MA PDU session information IE with the value set to "MA PDU session network upgrade is allowed" and:

a) if the SMF decides to establish a single access PDU session, the SMF shall not include the ATSSS container IE in the PDU SESSION ESTABLISHMENT ACCEPT message; or

b) if the SMF decides to establish an MA PDU session, the SMF shall include the ATSSS container IE in the PDU SESSION ESTABLISHMENT ACCEPT message, which indicates to the UE that the requested single access PDU session was established as an MA PDU Session.

…

For an MA PDU session already established on a single access, upon receipt of PDU SESSION ESTABLISHMENT ACCEPT message over the other access:

a) the UE shall delete the stored authorized QoS rules;

b) if the authorized QoS flow descriptions IE is included in the PDU SESSION ESTABLISHMENT ACCEPT message, the UE shall delete the stored authorized QoS flow descriptions; and

c) if the mapped EPS bearer contexts IE is included in the PDU SESSION ESTABLISHMENT ACCEPT message, the UE shall delete the stored mapped EPS bearer contexts.

The UE shall store the authorized QoS rules, and the session-AMBR received in the PDU SESSION ESTABLISHMENT ACCEPT message for the PDU session. The UE shall also store the authorized QoS flow descriptions if it is included in the Authorized QoS flow descriptions IE of the PDU SESSION ESTABLISHMENT ACCEPT message for the PDU session.

…

10.4.1.1.3 Test description

10.4.1.1.3.1 Pre-test conditions

System Simulator:

- WLAN Cell 27 is configured according to TS 38.508-1 [4]

- NR Cell 1 is configured according to TS 38.508-1 [4], Table 4.4.2-3.

- NR Cell 1 and WLAN Cell 27 belong to the same PLMN and Both NR Cell 1 and WLAN cell 27 are set to '' Serving cell''.

UE:

- UE is registered over both 3GPP access and non-3GPP access in the same PLMN.

Preamble:

- The UE is brought to state 3W-A and state 3N-A according to TS 38.508-1 [4], Table 4.4A.2-3

10.4.1.1.3.2 Test procedure sequence

**Table 10.4.1.1.3.2-1: Main behaviour**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Cause the UE to request to establish an MA PDU session by MMI or AT command. | - | - | - | - |
| - | EXCEPTION: In parallel to the events described in steps 2-3 below the events specified in Table 10.4.1.1.3.2-2 may take place. | - | - | - | - |
| 2 | The UE transmits a PDU SESSION ESTABLISHMENT REQUEST message and sets the request type to "MA PDU request" in the UL NAS TRANSPORT message and sets the ATSSS-ST bits in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message according to the ATSSS functionality and steering mode that UE supports on NR Cell 1    Note: PDU SESSION ESTABLISHMENT REQUEST is included in UL NAS transport. UL NAS transport message is included in dedicatedNAS-Message of *ULInformationTransfer* message. | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 1 | P |
| 3 | The SS transmits an PDU SESSION ESTABLISHMENT ACCEPT on NR cell 1. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT |  |  |

Table 10.4.1.1.3.2-2: Parallel behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE transmits a PDU SESSION ESTABLISHMENT REQUEST message and sets the request type to "MA PDU request" in the UL NAS TRANSPORT message and sets the ATSSS-ST bits in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message according to the ATSSS functionality and steering mode that UE supports on WLAN Cell 27.  Note: PDU SESSION ESTABLISHMENT REQUEST is included in UL NAS transport. UL NAS transport message is included in dedicatedNAS-Message of *ULInformationTransfer* message. | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 1 | P |
| 2 | The SS transmits an PDU SESSION ESTABLISHMENT ACCEPT on WLAN Cell 27. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT |  |  |

10.4.1.1.3.3 Specific message contents

Table 10.4.1.1.3.3-1: PDU SESSION ESTABLISHMENT REQUEST (step 2, Table 10.4.1.1.3.2-1 and step 1,Table 10.4.1.1.3.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | Any value according to TS 24.501 [25] subclause 9.4 |  | MA PDU Session established on first access |
| The value used in the MA PDU Session establish procedure on first access |  | MA PDU Session established on second access |
| 5GSM capability |  |  |  |
| All octets with the exception of octet 3, bits 4 to 7 and octet4,bit 1 | Any allowed value |  |  |
| ATSSS-ST(octet 3, bits 4 to 7) | ‘1000’B’ or 0100’B or ‘1100’B | ‘1000’B represents UE supports ATSSS Low-Layer functionality with any steering mode,  ’0100’ represents UE supports MPTCP functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode ,  ‘1100’ represents UE supports MPTCP functionality with any steering mode and ATSSS-LL functionality with any steering mode |  |

Table 10.4.1.1.3.3-2: UL NAS Transport (step 2, Table 10.4.1.1.3.2-1 and step 1,Table 10.4.1.1.3.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-10 | | | |
| Information Element | Value/remark | Comment | Condition |
| Request type | ‘011’B | MA PDU request |  |
| S-NSSAI | Not Present |  |  |

Table 10.4.1.1.3.3-3: PDU SESSION ESTABLISHMENT ACCEPT (step 3, Table 10.4.1.1.3.2-1 and step 2,Table 10.4.1.1.3.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-2 | | | |
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| ATSSS container | Any allowed value according to TS 24.501 [25] subclause 9.11.4.22 |  |  |

Table 10.4.1.1.3.3-4:REGISTRATION ACCEPT (preamble, Table 10.4.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS network feature support |  |  |  |
| ATS-IND | '1'B | ATSSS supported |  |

#### 10.4.1.2 UE-requested MA PDU session establishment / ATSSS / Registered to same PLMNs over 3GPP and non-3GPP accesses asimultaneously / Success

10.4.1.2.1 Test Purpose (TP)

(1)

**with** { the UE is registered over 3GPP access and an MA PDU session has been established successfully on this access }

**ensure that** {

**when** { UE registers over non-3GPP access in the same PLMN and is configured to request PDU Session Establishment procedure over this access}

**then** { UE initiates the UE-requested PDU session establishment procedure with the same PDU session ID of 3GPP access on non-3GPP access }

}

10.4.1.2.2 Conformance requirements

Same as test case 10.4.1.1.

10.4.1.2.3 Test description

10.4.1.2.3.1 Pre-test conditions

System Simulator:

- WLAN Cell 27 is configured according to TS 38.508-1 [4]

- NR Cell 1 is configured according to TS 38.508-1 [4], Table 4.4.2-3.

- NR Cell 1 and WLAN Cell 27 belong to the same PLMN and NR Cell 1 is set to '' Serving cell'', WLAN Cell 27 is set to "non-suitable cell".

UE:

- None

Preamble:

- The UE is brought to state 3N-A on NR Cell 1 according to TS 38.508-1 [4].

10.4.1.2.3.2 Test procedure sequence

**Table 10.4.1.2.3.2-1: Main behaviour**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Cause the UE to request to establish an MA PDU session by MMI or AT command on NR Cell 1 | - | - | - | - |
| 2 | The UE transmits a PDU SESSION ESTABLISHMENT REQUEST message and sets the request type to "MA PDU request" in the UL NAS TRANSPORT message and sets the ATSSS-ST bits in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message according to the ATSSS functionality and steering mode that UE supports on NR Cell 1 | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | - | - |
| 3 | The SS transmits an PDU SESSION ESTABLISHMENT ACCEPT on NR cell 1. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |
| 4 | WLAN Cell 27 is set to “Serving celll ”. | - | - | - | - |
| 5A-5G | UE establishes an IPSEC SA and trigger 5GMM Registration procedure by executing steps 1 to 7 of Table 4.5.2.2-3 in TS38.508-1 [4]. | - | - | - | - |
| 6 | The SS transmits a REGISTRATION ACCEPT message. | <-- | 5GMM: REGISTRATION ACCEPT | - | - |
| 7 | The UE transmits a PDU SESSION ESTABLISHMENT REQUEST message and sets the request type to "MA PDU request" in the UL NAS TRANSPORT message and set the PDU session ID to the stored PDU session ID corresponding to the established MA PDU session on NR Cell 1 in the PDU SESSION ESTABLISHMENT REQUEST message and in the UL NAS TRANSPORT message | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 1 | P |
| 8 | The SS transmits an PDU SESSION ESTABLISHMENT ACCEPT on WLAN Cell 27 without including "ATSSS container contents" as the ATSSS parameters previously provided to the UE are not to be updated | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |

10.4.1.2.3.3 Specific message contents

Table 10.4.1.2.3.3-1: PDU SESSION ESTABLISHMENT REQUEST (step 2, Table 10.4.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | PSI-1 | UE assigns a  particular PSI not yet used between  1 and 15 |  |
| 5GSM capability |  |  |  |
| All octets with the exception of octet 3, bits 4 to 7 and octet4,bit 1 | Any allowed value |  |  |
| ATSSS-ST(octet 3, bits 4 to 7) | ‘1000’B’ or 0100’B or ‘1100’B | ‘1000’B represents UE supports ATSSS Low-Layer functionality with any steering mode,  ’0100’ represents UE supports MPTCP functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode ,  ‘1100’ represents UE supports MPTCP functionality with any steering mode and ATSSS-LL functionality with any steering mode |  |

Table 10.4.1.2.3.3-2: UL NAS Transport (step 2, Table 10.4.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-10 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | PSI-1 |  |  |
| Request type | ‘011’B | MA PDU request |  |
| S-NSSAI | Not Present |  |  |

Table 10.4.1.2.3.3-3: PDU SESSION ESTABLISHMENT ACCEPT (step 3, Table 10.4.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-2 | | | |
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| PDU session ID | PSI-1 |  |  |
| ATSSS container | Any allowed value according to TS 24.501 [25] subclause 9.11.4.22 |  |  |

Table 10.4.1.2.3.3-4: PDU SESSION ESTABLISHMENT REQUEST (step 8, Table 10.4.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | PSI-1 | The same ID as the ID of PDU session which UE request in step 2 in Table 10.4.1.2.3.2-1 |  |

Table 10.4.1.2.3.3-5: UL NAS Transport (step 8, Table 10.4.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-10 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | PSI-1 |  |  |
| Request type | ‘011’B | MA PDU request |  |
| S-NSSAI | Not Present |  |  |

Table 10.4.1.2.3.3-6: PDU SESSION ESTABLISHMENT ACCEPT (step 9, Table 10.4.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-2 | | | |
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| PDU session ID | PSI-1 |  |  |

Table 10.4.1.2.3.3-7:REGISTRATION ACCEPT (preamble and step 6, Table 10.4.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS network feature support |  |  |  |
| ATS-IND | '1'B | ATSSS supported |  |

#### 10.4.1.3 UE-requested MA PDU session establishment / ATSSS / Registered to different PLMNs over 3GPP and non-3GPP accesses simultaneously/ Success

10.4.1.3.1 Test Purpose (TP)

(1)

**with** { UE in registered over 3GPP and non-3GPP accesses and SS informs the UE that it supports ATSSS feature in the 5GS network feature support information element }

**ensure that** {

**when** { UE is configured to request a new MA PDU session }

**then** { UE sends a PDU Session Establishment Request over one access and after this PDU Session is established, UE sends another PDU Session Establishment Request over the other access and provides the same PDU Session ID and Request Type as "MA PDU Request" in the UL NAS Transport message }

}

10.4.1.3.2 Conformance requirements

Same Conformance requirements as in clause 10.4.1.1.2.

10.4.1.3.3 Test description

10.4.1.3.3.1 Pre-test conditions

System Simulator:

- WLAN Cell 27 is configured according to TS 38.508-1 [4]

- NR Cell 1 is configured according to TS 38.508-1 [4], Table 4.4.2-3.

- NR Cell 1 and WLAN Cell 27 belong to 2 different PLMNs and Both NR Cell 1 and WLAN cell 27 are set to '' Serving cell''.

UE:

- UE is registered over both 3GPP access and non-3GPP access in 2 different PLMNs.

Preamble:

- The UE is brought to state 3W-A and state 3N-A according to TS 38.508-1 [4], Table 4.4A.2-3

10.4.1.3.3.2 Test procedure sequence

Same Test procedure sequence as in clause10.4.1.1.3.2.

10.4.1.3.3.3 Specific message contents

Same Specific message contents as in clause 10.4.1.1.3.3.

#### 10.4.1.4 UE-requested MA PDU session establishment / ATSSS / Registered to different PLMNs over 3GPP and non-3GPP accesses asynchronously / Success

10.4.1.4.1 Test Purpose (TP)

(1)

**with** { UE is registered over 3GPP access and an MA PDU session has been established successfully on this access }

**ensure that** {

**when** { UE registers over non-3GPP access in the different PLMN }

**then** { UE sends another PDU Session Establishment Request over the other access with the same PDU session ID of 3GPP access }

}

10.4.1.4.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501, clause 6.4.1.2, 6.4.1.3, TS23.502, clause 4.22.7 and TS 24.193, clause 5.2.1.

[TS 24.501, clause 6.4.1.2]

If the UE is registered to a network which supports ATSSS, the UE may request to establish an MA PDU session. If the UE requests to establish an MA PDU session, the UE shall set the request type to "MA PDU request" in the UL NAS TRANSPORT message. If the UE is registered to a network which does not support ATSSS, the UE shall not request to establish an MA PDU session.

When the UE is registered over both 3GPP access and non-3GPP access in the same PLMN and the UE requests to establish a new MA PDU session, the UE may provide an S-NSSAI in the UL NAS TRANSPORT message only if the S-NSSAI is included in the allowed NSSAIs of both accesses.

NOTE 7: If the UE requested DNN corresponds to an LADN DNN, the AMF does not forward the MA PDU session information IE to the SMF but sends the message back to the UE to inform of the unhandled request (see subclause 5.4.5.2.5).

If the UE is registered to a network which supports ATSSS and the UE has already an MA PDU session established over one access, the UE may perform the UE-requested PDU session establishment procedure to establish user-plane resources over the other access for the MA PDU session as specified in subclause 4.22 of 3GPP TS 23.502 [9] and the S-NSSAI associated with the MA PDU session is included in the allowed NSSAI of the other access. If the UE establishes user-plane resources over the other access for the MA PDU session, the UE shall:

a) set the request type to "MA PDU request" in the UL NAS TRANSPORT message;

b) set the PDU session ID to the stored PDU session ID corresponding to the established MA PDU session in the PDU SESSION ESTABLISHMENT REQUEST message and in the UL NAS TRANSPORT message; and

c) set the S-NSSAI in the UL NAS TRANSPORT message to the stored S-NSSAI associated with the PDU session ID.

If the UE requests to establish a new MA PDU session or if the UE requests to establish a new PDU session and the UE allows the network to upgrade the requested PDU session to an MA PDU session:

a) if the UE supports ATSSS Low-Layer functionality with any steering mode as specified in subclause 5.32.6 of 3GPP TS 23.501 [8], the UE shall set the ATSSS-ST bits to "ATSSS Low-Layer functionality with any steering mode supported" in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message;

b) if the UE supports MPTCP functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode as specified in subclause 5.32.6 of 3GPP TS 23.501 [8], the UE shall set the ATSSS-ST bits to "MPTCP functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode supported" in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message;

c) if the UE supports MPTCP functionality with any steering mode and ATSSS-LL functionality with any steering mode as specified in subclause 5.32.6 of 3GPP TS 23.501 [8], the UE shall set the ATSSS-ST bits to "MPTCP functionality with any steering mode and ATSSS-LL functionality with any steering mode supported" in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message; and

d) if a performance measurement function in the UE can perform access performance measurements using the QoS flow of the non-default QoS rule as specified in subclause 5.32.5 of 3GPP TS 23.501 [8], the UE shall set the APMQF bit to "Access performance measurements per QoS flow supported" in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message.

If the UE requests to establish a new MA PDU session and the UE supports to establish a PDN connection as the user plane resource of an MA PDU session, the UE shall include the ATSSS request parameter in the Extended protocol configuration options IE of the PDU SESSION ESTABLISHMENT REQUEST message.

…

The UE shall transport:

a) the PDU SESSION ESTABLISHMENT REQUEST message;

b) the PDU session ID of the PDU session being established, being handed over, being transferred, or been established as an MA PDU session;

c) if the request type is set to:

1) "initial request" or "MA PDU request" and the UE determined to establish a new PDU session or an MA PDU session based on either a URSP rule including one or more S-NSSAIs in the URSP (see subclause 6.2.9) or UE local configuration, according to subclause 4.2.2 of 3GPP TS 24.526 [19]:

i) in case of a non-roaming scenario, an S-NSSAI in the allowed NSSAI which corresponds to one of the S-NSSAI(s) in the matching URSP rule, if any, or else to the S-NSSAI(s) in the UE local configuration or in the default URSP rule, if any, according to the conditions given in subclause 4.2.2 of 3GPP TS 24.526 [19]; or

ii) in case of a roaming scenario:

A) one of the mapped S-NSSAI(s) which corresponds to one of the S-NSSAI(s) in the matching URSP rule, if any, or else to the S-NSSAI(s) in the UE local configuration or in the default URSP rule, if any, according to the conditions given in subclause 4.2.2 of 3GPP TS 24.526 [19]; and

B) the S-NSSAI in the allowed NSSAI associated with the S-NSSAI in A); or

2) "existing PDU session", an S-NSSAI, which is an S-NSSAI associated with the PDU session and (if available in roaming scenarios) a mapped S-NSSAI, with exception when S-NSSAI is not provided by the network in subclause 6.1.4.2;

d) if the request type is set to:

1) "initial request" or "MA PDU request" and the UE determined to establish a new PDU session or an MA PDU session based on either a URSP rule including one or more DNNs in the URSP (see subclause 6.2.9) or UE local configuration, according to subclause 4.2.2 of 3GPP TS 24.526 [19], a DNN which corresponds to one of the DNN(s) in the matching URSP rule, if any, or else to the DNN(s) in the UE local configuration or in the default URSP rule, if any, according to the conditions given in subclause 4.2.2 of 3GPP TS 24.526 [19]; or

2) "existing PDU session", a DNN which is a DNN associated with the PDU session;

e) the request type which is set to:

1) "initial request", if the UE is not registered for emergency services and the UE requests to establish a new non-emergency PDU session;

2) "existing PDU session", if the UE is not registered for emergency services and the UE requests:

i) handover of an existing non-emergency PDU session between 3GPP access and non-3GPP access;

ii) transfer of an existing PDN connection for non-emergency bearer services in the EPS to the 5GS; or

iii) transfer of an existing PDN connection for non-emergency bearer services in an untrusted non-3GPP access connected to the EPC to the 5GS;

3) "initial emergency request", if the UE requests to establish a new emergency PDU session;

4) "existing emergency PDU session", if the UE requests:

i) handover of an existing emergency PDU session between 3GPP access and non-3GPP access;

ii) transfer of an existing PDN connection for emergency bearer services in the EPS to the 5GS; or

iii) transfer of an existing PDN connection for emergency bearer services in an untrusted non-3GPP access connected to the EPC to the 5GS; or

5) "MA PDU request", if:

i) the UE requests to establish an MA PDU session;

ii) the UE requests to establish user plane resources over other access of an MA PDU session established over one access only; or

iii) the UE performs inter-system change from S1 mode to N1 mode according to subclause 4.8.2.3.1 and requests transfer of a PDN connection which is a user plane resource of an MA PDU session; and

f) the old PDU session ID which is the PDU session ID of the existing PDU session, if the UE initiates the UE-requested PDU session establishment procedure upon receiving the PDU SESSION MODIFICATION COMMAND messages with the 5GSM cause IE set to #39 "reactivation requested";

using the NAS transport procedure as specified in subclause 5.4.5, and the UE shall start timer T3580 (see example in figure 6.4.1.2.1).

[TS 24.501, clause 6.4.1.3]

If the PDU session is an MA PDU session, the SMF shall include the ATSSS container IE in the PDU SESSION ESTABLISHMENT ACCEPT message. The SMF shall set the content of the ATSSS container IE as specified in 3GPP TS 24.193 [13B]. If the UE requests to establish user plane resources over the second access of an MA PDU session which has already been established over the first access and the parameters associated with ATSSS previously provided to the UE are not to be updated, the "ATSSS container contents" shall not be included in the ATSSS container IE in the PDU SESSION ESTABLISHMENT ACCEPT message.

If the PDU session is a single access PDU session containing the MA PDU session information IE with the value set to "MA PDU session network upgrade is allowed" and:

a) if the SMF decides to establish a single access PDU session, the SMF shall not include the ATSSS container IE in the PDU SESSION ESTABLISHMENT ACCEPT message; or

b) if the SMF decides to establish an MA PDU session, the SMF shall include the ATSSS container IE in the PDU SESSION ESTABLISHMENT ACCEPT message, which indicates to the UE that the requested single access PDU session was established as an MA PDU Session.

…

For an MA PDU session already established on a single access, upon receipt of PDU SESSION ESTABLISHMENT ACCEPT message over the other access:

a) the UE shall delete the stored authorized QoS rules;

b) if the authorized QoS flow descriptions IE is included in the PDU SESSION ESTABLISHMENT ACCEPT message, the UE shall delete the stored authorized QoS flow descriptions; and

c) if the mapped EPS bearer contexts IE is included in the PDU SESSION ESTABLISHMENT ACCEPT message, the UE shall delete the stored mapped EPS bearer contexts.

The UE shall store the authorized QoS rules, and the session-AMBR received in the PDU SESSION ESTABLISHMENT ACCEPT message for the PDU session. The UE shall also store the authorized QoS flow descriptions if it is included in the Authorized QoS flow descriptions IE of the PDU SESSION ESTABLISHMENT ACCEPT message for the PDU session.

…

[TS 23.502, clause 4.22.7]

If the UE has established a MA PDU Session but the user-plane resources over one access of the MA PDU Session have not been established, then:

- If the UE wants to add user-plane resources over this access, the UE shall initiate the UE Requested PDU Session Establishment procedure over this access, as specified in clause 4.3.2.2. In the UL NAS Transport message, the UE sets Request Type as "MA PDU Request" and the same PDU Session ID of the established MA PDU Session. If only one N9 tunnel is established for the Home Routed roaming case as described in clause 4.22.2.2, additional N9 tunnel is established during this UE Requested PDU Session Establishment procedure. For the roaming with home-routed architecture as defined in TS 23.501 [2] figure 4.2.10-3, an N9 tunnel or an N3 tunnel is established during this PDU Session Establishment procedure, depending on the access for which the UE is requesting user-plane resources.

- The PDU Session Establishment Accept message received by the UE may contain updated ATSSS rules for the MA PDU session.

- If the SMF receives the PDU Session Establishment request message over an access and the SMF already has SM Contexts for the access, the SMF shall not release existing SM Contexts and shall re-activate user plane resources over the access while providing the PDU Session Establishment Accept message to the UE.

If the UE has established a MA PDU Session and the user-plane resources over one access of the MA PDU Session have been established but are currently inactive (e.g. because the UE is CM-IDLE over this access), then:

- If the UE wants to re-activate the user-plane resources over this access, then the UE shall initiate the Registration or UE Triggered Service Request procedure over this access, as specified in clause 4.22.9.2.

- If the network wants to re-activate the user-plane resources over 3GPP access of the MA PDU Session, or over non-3GPP access of the MA PDU Session, the network shall initiate the Network Triggered Service Request procedure, as specified in clause 4.22.9.4.

If the UE has established a MA PDU Session and the user plane resources are activated over either one access or both accesses, then:

- If the network wants to de-activate the user-plane resources over single access, then the network shall initiate the CN-initiated deactivation of UP connection procedure over this access, as specified in clause 4.3.7.

In all cases, if the UP security protection associated with this PDU session indicates that UP security is required, the SMF shall not establish resources over the 3GPP access unless the 3GPP Access Network can enforce the required UP security protection, even if resources were previously established over non-3GPP access.

[TS 24.193, clause 5.2.1]

Activating multi-access PDU connectivity service refers to the establishment of user-plane resources on both 3GPP access and non-3GPP access:

a) if the UE is registered over both 3GPP access and non-3GPP access in the same PLMN, the UE shall initiate the UE-requested PDU session establishment procedure as specified in clause 6.4.1.2 of 3GPP TS 24.501 [6] over a selected access, either 3GPP access or non-3GPP access. Over which access to initiate this UE-requested PDU session establishment procedure is UE implementation specific. When the UE receives the PDU SESSION ESTABLISHMENT ACCEPT message including the ATSSS container IE as specified in clause 6.4.1.3 of 3GPP TS 24.501 [6], the UE shall consider that the MA PDU session has been established and the user plane resources are successfully established on the selected access. When the user plane resources are established on the access other than the selected access (e.g. received lower layer indication in 3GPP access or established user plane IPsec SA in untrusted non-3GPP access), the UE shall consider the user plane resources are established on both;

NOTE: If the UE receives the PDU SESSION ESTABLISHMENT ACCEPT message including the ATSSS container IE and determines, upon an implementation specific timer expiry, fails to receive user plane resources established on the access other than the selected access, the UE re-initiates the UE-requested PDU session establishment procedure over the access other than the selected access, in order to establish user plane resources on the access other than the selected access.

b) if the UE is registered over both 3GPP access and non-3GPP access in different PLMNs, the UE shall initiate the UE-requested PDU session establishment procedure as specified in clause 6.4.1.2 of 3GPP TS 24.501 [6] over 3GPP access and non-3GPP access sequentially. Over which access to first initiate the UE-requested PDU session establishment procedure is UE implementation specific. When the UE receives the PDU SESSION ESTABLISHMENT ACCEPT message including the ATSSS container IE as specified in clause 6.4.1.3 of 3GPP TS 24.501 [6] over the selected access, the UE shall consider that the MA PDU session has been established and the user plane resources of the MA PDU session on this access are successfully established. The UE shall then initiate the UE-requested PDU session establishment procedure with the same PDU session ID, as specified in clause 6.4.1.2 of 3GPP TS 24.501 [6] over the other access, in order to establish user plane resources on the other access for the MA PDU session. If the UE receives the PDU SESSION ESTABLISHMENT ACCEPT message as specified in clause 6.4.1.3 of 3GPP TS 24.501 [6] over the other access, the UE shall consider that the user plane resources of the MA PDU session have been established on both 3GPP access and non-3GPP access; or

c) if the UE is registered to a PLMN over only one access, either 3GPP access or non-3GPP access, the UE shall initiate the UE-requested PDU session establishment procedure as specified in clause 6.4.1.2 of 3GPP TS 24.501 [6] over this access. When the UE receives the PDU SESSION ESTABLISHMENT ACCEPT message including the ATSSS container IE as specified in clause 6.4.1.3 of 3GPP TS 24.501 [6] over the access, the UE shall consider that the MA PDU session has been established and the user plane resources of the MA PDU session on this access are successfully established. When the UE at a later point in time registers over the other access, either in the same PLMN or in a different PLMN, the UE shall initiate the UE-requested PDU session establishment procedure with the same PDU session ID as specified in clause 6.4.1.2 of 3GPP TS 24.501 [6] over the other access in order to establish user plane resources on the other access for the MA PDU session. If the UE receives the PDU SESSION ESTABLISHMENT ACCEPT message as specified in clause 6.4.1.3 of 3GPP TS 24.501 [6] over the other access, the UE shall consider that the user plane resources of the MA PDU session have been established over both 3GPP access and non-3GPP access.

If the UE is in the non-allowed area, the UE shall not initiate a PDU session establishment procedure for an MA PDU session over the 3GPP access. It may still initiate a PDU session establishment procedure for an MA PDU session over the non-3GPP access other than wireline access network, however the network shall not establish user plane resources for the 3GPP access if the UE is in the non-allowed area. The handling of non-allowed area when using wireline access is described in 3GPP TS 23.316 [4].

10.4.1.4.3 Test description

10.4.1.4.3.1 Pre-test conditions

System Simulator:

- WLAN Cell 27 is configured according to TS 38.508-1 [4]

- NR Cell 1 is configured according to TS 38.508-1 [4], Table 4.4.2-3.

- NR Cell 1 and WLAN Cell 27 belong to 2 different PLMNs, and Both NR Cell 1 is set to '' Serving cell'' and WLAN cell 27 is set to"non-suitable cell".

UE:

- None

Preamble:

- The UE is brought to state 3N-A on NR Cell 1 according to TS 38.508-1 [4].

10.4.1.4.3.2 Test procedure sequence

Table 10.4.1.4.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Cause the UE to request to establish an MA PDU session by MMI or AT command on NR Cell 1 | - | - | - | - |
| 2 | The UE transmits a PDU SESSION ESTABLISHMENT REQUEST message and sets the request type to "MA PDU request" in the UL NAS TRANSPORT message and sets the ATSSS-ST bits in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message according to the ATSSS functionality and steering mode that UE supports on NR Cell 1 | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | - | - |
| 3 | The SS transmits a PDU SESSION ESTABLISHMENT ACCEPT on NR cell 1. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |
| 4 | WLAN Cell 27 is set to “Serving celll”. | - | - | - | - |
| 5A-5I | UE establishes an IPSEC SA and trigger 5GMM Registration procedure by executing steps 1 to 9 of Table 4.5.2.2-3 in TS38.508-1 [4]. | - | - | - | - |
| 6 | The UE transmits a PDU SESSION ESTABLISHMENT REQUEST message and sets the request type to "MA PDU request" in the UL NAS TRANSPORT message and set the PDU session ID to the stored PDU session ID corresponding to the established MA PDU session on NR Cell 1 in the PDU SESSION ESTABLISHMENT REQUEST message and in the UL NAS TRANSPORT message | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 1 | P |
| 7 | The SS transmits an PDU SESSION ESTABLISHMENT ACCEPT on WLAN Cell 27 without including "ATSSS container contents" as the ATSSS parameters previously provided to the UE are not to be updated | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |

10.4.1.4.3.3 Specific message contents

Table 10.4.1.4.3.3-1: PDU SESSION ESTABLISHMENT REQUEST (step 2, Table 10.4.1.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | PSI-1 | UE assigns a  particular PSI not yet used between  1 and 15 |  |
| 5GSM capability |  |  |  |
| All octets with the exception of octet 3, bits 4 to 7 | Any allowed value |  |  |
| ATSSS-ST(octet 3, bits 4 to 7) | ‘1000’B’ or 0100’B or ‘1100’B | ‘1000’B represents UE supports ATSSS Low-Layer functionality with any steering mode,  ’0100’B represents UE supports MPTCP functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode ,  ‘1100’B represents UE supports MPTCP functionality with any steering mode and ATSSS-LL functionality with any steering mode |  |

Table 10.4.1.4.3.3-2: UL NAS Transport (step 2, Table 10.4.1.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-10 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | PSI-1 |  |  |
| Request type | ‘011’B | MA PDU request |  |
| S-NSSAI | Not Present |  |  |

Table 10.4.1.4.3.3-3: PDU SESSION ESTABLISHMENT ACCEPT (step 3, Table 10.4.1.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-2 | | | |
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| PDU session ID | PSI-1 |  |  |
| ATSSS container | Present | Any allowed value according to TS 24.501 [25] subclause 9.11.4.22 |  |

Table 10.4.1.4.3.3-4: PDU SESSION ESTABLISHMENT REQUEST (step 6, Table 10.4.1.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | PSI-1 | The same ID as the ID of PDU session which UE request in step 2 in Table 10.4.1.4.3.2-1 |  |

Table 10.4.1.4.3.3-5: UL NAS Transport (step 6, Table 10.4.1.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-10 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | PSI-1 |  |  |
| Request type | ‘011’B | MA PDU request |  |
| S-NSSAI | Not Present |  |  |

Table 10.4.1.4.3.3-6: PDU SESSION ESTABLISHMENT ACCEPT (step 7, Table 10.4.1.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-2 | | | |
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| PDU session ID | PSI-1 |  |  |

Table 10.4.1.4.3.3-7:REGISTRATION ACCEPT (preamble and step 5H, Table 10.4.1.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS network feature support |  |  |  |
| ATS-IND | '1'B | ATSSS supported |  |

#### 10.4.1.5 UE-requested MA PDU session modification / ATSSS / Success

10.4.1.5.1 Test Purpose (TP)

(1)

**with** { the UE in PDU SESSION ACTIVE state and 5GMM-CONNECTED mode }

**ensure that** {

**when** { UE requested to modify the PDU session from EPS to an MA PDU session with the Request type IE set to "MA PDU request" in the UL NAS TRANSPORT message }

**then** { UE transmits an PDU SESSION MODIFICATION COMPLETE message }

}

10.4.1.5.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501, clause 6.4.2.3,.

[TS 24.501, clause 6.4.2.3]

Upon receipt of a PDU SESSION MODIFICATION REQUEST message, if the SMF accepts the request to modify the PDU session, the SMF shall perform the network-requested PDU session modification procedure as specified in subclause 6.3.2.

If the PDU SESSION MODIFICATION REQUEST message contains a Port management information container IE, the SMF shall handle the contents of the Port management information container IE as specified in 3GPP TS 23.501 [8] and 3GPP TS 23.502 [9].

[TS 24.193, clause 5.2.5]

When an ATSSS capable UE has transferred a PDN connection from S1 mode to N1 mode in the network supporting N26 interface and the related URSP or UE local configuration does not mandate the PDU session shall be established over a single access:

a) if the UE is registered over both 3GPP access and non-3GPP access in the same PLMN, and the S-NSSAI associated with the PDU session over 3GPP access is included in the allowed NSSAI of non-3GPP access, the UE may initiate the UE-requested PDU session modification procedure by sending the PDU SESSION MODIFICATION REQUEST message including 5GSM capability IE over 3GPP access as specified in clause 6.4.2.2 of 3GPP TS 24.501 [6]. The UE may set the Request type IE to either:

1) "modification request" and include the MA PDU session information IE set to "MA PDU session network upgrade is allowed" as defined in clause 9.11.3.31A of 3GPP TS 24.501 [6]; or

2) "MA PDU request"

in the UL NAS TRANSPORT message as specified in clause 8.2.10 of 3GPP TS 24.501 [6]. When the UE receives the PDU SESSION MODIFICATION COMMAND message including the ATSSS container IE as specified in clause 6.4.2.3 of 3GPP TS 24.501 [6], the UE shall consider that the requested PDU session was converted by the network to an MA PDU session and the user plane resources are successfully established on 3GPP access. When the user plane resources are established on the non-3GPP access (e.g., received established user plane IPsec SA in untrusted non-3GPP access), the UE shall consider the user plane resources are established on both accesses;

NOTE: If the UE receives the PDU SESSION MODIFICATION COMMAND message including the ATSSS container IE and fails to receive user plane resources established on the non-3GPP access, upon an implementation specific timer expiry the UE initiates the UE-requested PDU session establishment procedure over the non-3GPP access, in order to establish user plane resources on the non-3GPP access.

b) if the UE is registered over both 3GPP access and non-3GPP access in different PLMNs, the UE may initiate the UE-requested PDU session modification procedure by sending the PDU SESSION MODIFICATION REQUEST message including 5GSM capability IE over 3GPP access as specified in clause 6.4.2.2 of 3GPP TS 24.501 [6]. The UE may set the Request type IE to either:

1) "modification request" and include the MA PDU session information IE set to "MA PDU session network upgrade is allowed" as defined in clause 9.11.3.31A of 3GPP TS 24.501 [6]; or

2) "MA PDU request"

in the UL NAS TRANSPORT message as specified in clause 8.2.10 of 3GPP TS 24.501 [6]. When the UE receives the PDU SESSION MODIFICATION COMMAND message including the ATSSS container IE as specified in clause 6.4.2.3 of 3GPP TS 24.501 [6], the UE shall consider that the requested PDU session was converted by the network to an MA PDU session and the user plane resources are successfully established on 3GPP access. The UE shall then initiate the UE-requested PDU session establishment procedure with the same PDU session ID, as specified in clause 6.4.1.2 of 3GPP TS 24.501 [6] over non-3GPP access, in order to establish user plane resources on the other access for the MA PDU session; or

c) if the UE is registered over 3GPP access only, the UE may initiate the UE-requested PDU session modification procedure by sending the PDU SESSION MODIFICATION REQUEST message including 5GSM capability IE over 3GPP access as specified in clause 6.4.2.2 of 3GPP TS 24.501 [6], The UE may set the Request type IE to either:

1) "modification request" and include the MA PDU session information IE set to "MA PDU session network upgrade is allowed" as defined in clause 9.11.3.31A of 3GPP TS 24.501 [6]; or

2) "MA PDU request"

in the UL NAS TRANSPORT message as specified in clause 8.2.10 of 3GPP TS 24.501 [6]. When the UE receives the PDU SESSION MODIFICATION COMMAND message including the ATSSS container IE as specified in clause 6.4.2.3 of 3GPP TS 24.501 [6], the UE shall consider that the requested PDU session was converted by the network to an MA PDU session and the user plane resources are successfully established on 3GPP access. When the UE at a later point in time registers over the non-3GPP access, either in the same PLMN or in a different PLMN, the UE shall initiate the UE-requested PDU session establishment procedure with the same PDU session ID as specified in clause 6.4.1.2 of 3GPP TS 24.501 [6] over non-3GPP access in order to establish user plane resources on non-3GPP access for the MA PDU session.

10.4.1.5.3 Test description

10.4.1.5.3.1 Pre-test conditions

System Simulator:

- WLAN Cell 27 is configured according to TS 38.508-1 [4]

- NR Cell 1 is configured according to TS 38.508-1 [4], Table 4.4.2-3.

- NR Cell 1 and WLAN Cell 27 belong to the same PLMN and Both NR Cell 1 and WLAN cell 27 are set to '' Serving cell''.

UE:

- UE is registered over both 3GPP access and non-3GPP access in the same PLMN.

Preamble:

- The UE is brought to state 3W-A and state 3N-A according to TS 38.508-1 [4], Table 4.4A.2-3

10.4.1.5.3.2 Test procedure sequence

Table 10.4.1.5.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **St** | **Procedure** | **Message Sequence** | | **TP** | **Verdict** |
|  |  | **U - S** | **Message** |  |  |
| 1 | Cause the UE to modify the PDU session from EPS to an MA PDU session by MMI or AT command. | - | - | - | - |
| - | EXCEPTION: In parallel to the events described in steps 2-3 below the events specified in Table 10.4.1.5.3.2-2 may take place. | - | - | - | - |
| 2 | The UE transmits a PDU SESSION MODIFICATION REQUEST message and sets the request type to "MA PDU request" in the UL NAS TRANSPORT message on NR Cell 1.  Note: PDU SESSION MODIFICATION REQUEST is included in UL NAS transport. UL NAS transport message is included in dedicatedNAS-Message of *ULInformationTransfer* message. | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION MODIFICATION REQUEST | - | - |
| 3 | The SS transmits a PDU SESSION MODIFICATION COMMAND message including the ATSSS container IE. | <-- | 5GMM: DL NAS TRANSPROT  5GSM: PDU SESSION MODIFICATION COMMAND |  |  |
| 4 | Check: Does UE transmit a PDU SESSION MODIFICATION COMPLETE message on NR cell 1? | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION MODIFICATION COMPLETE | 1 | P |

Table 10.4.1.5.3.2-2: Parallel behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **St** | **Procedure** | **Message Sequence** | | **TP** | **Verdict** |
|  |  | **U - S** | **Message** |  |  |
| 1 | The UE transmits a PDU SESSION MODIFICATION REQUEST message and sets the request type to "MA PDU request" in the UL NAS TRANSPORT message on WLAN Cell 27.  Note: PDU SESSION MODIFICATION REQUEST is included in UL NAS transport. UL NAS transport message is included in dedicatedNAS-Message of ULInformationTransfer message. | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION MODIFICATION REQUEST | - | - |
| 2 | The SS transmits a PDU SESSION MODIFICATION COMMAND message including the ATSSS container IE. | <-- | 5GMM: DL NAS TRANSPROT  5GSM: PDU SESSION MODIFICATION COMMAND | - | - |
| 3 | Check: Does UE transmit a PDU SESSION MODIFICATION COMPLETE message on WLAN Cell 27? | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION MODIFICATION COMPLETE | 1 | P |

10.4.1.5.3.3 Specific message contents

Table 10.4.1.5.3.3-1: PDU SESSION MODIFICATION REQUEST (step 2, Table 10.4.1.5.3.2-1 and step 1, Table 10.4.1.5.3.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-7 | | | |
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| 5GSM capability |  |  |  |
| All octets with the exception of octet 3, bits 4 to 7 and octet4,bit 1 | Any allowed value |  |  |
| ATSSS-ST(octet 3, bits 4 to 7) | ‘0001’B’ or ‘0010’B or ‘0011’B | ‘0001’B represents UE supports ATSSS Low-Layer functionality with any steering mode,  ’0010’ represents UE supports MPTCP functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode ,  ‘0011’ represents UE supports MPTCP functionality with any steering mode and ATSSS-LL functionality with any steering mode |  |

Table 10.4.1.5.3.3-2: UL NAS Transport (step 2, Table 10.4.1.1.5.2-1 and step 1, Table 10.4.1.5.3.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-10 | | | |
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| Request type | ‘011’B | MA PDU request |  |

Table 10.4.1.5.3.3-3: PDU SESSION MODIFICATION COMMAND (step 3, Table 10.4.1.5.3.2-1 and step 2, Table 10.4.1.5.3.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-9 | | | |
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| ATSSS container | Any allowed value according to TS 24.501 [25] subclause 9.11.4.22 |  |  |

#### 10.4.1.6 UE-requested MA PDU session modification / ATSSS / Abnormal / MA PDU session is not allowed

10.4.1.6.1 Test Purpose (TP)

(1)

**with** { the UE is in PDU SESSION ACTIVE state and requested to modify the PDU session from EPS to an MA PDU session with the Request type IE set to "MA PDU request" in the UL NAS TRANSPORT message }

**ensure that** {

**when** { the UE receives PDU SESSION MODIFICATION REJECT message with 5GSM cause IE set to "requested service option not subscribed" }

**then** { the UE shall stop timer T3581 and enter the state PROCEDURE TRANSACTION INACTIVE }

}

10.4.1.6.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501, clause 6.4.2.4.1.

[TS 24.501, clause 6.4.2.4.1]

Upon receipt of a PDU SESSION MODIFICATION REQUEST message, if the SMF does not accepts the request to modify the PDU session, the SMF shall create a PDU SESSION MODIFICATION REJECT message.

The SMF shall set the 5GSM cause IE of the PDU SESSION MODIFICATION REJECT message to indicate the reason for rejecting the PDU session modification.

The 5GSM cause IE typically indicates one of the following SM cause values:

#26 insufficient resources;

#29 user authentication or authorization failed;

#31 request rejected, unspecified;

#32 service option not supported;

#33 requested service option not subscribed;

#35 PTI already in use;

#37 5GS QoS not accepted;

#43 Invalid PDU session identity;

#44 Semantic errors in packet filter(s);

#45 Syntactical error in packet filter(s);

#46 out of LADN service area;

#59 unsupported 5QI value;

#67 insufficient resources for specific slice and DNN;

#69 insufficient resources for specific slice;

#83 Semantic error in the QoS operation;

#84 Syntactical error in the QoS operation; or

#95 – 111 protocol errors.

…

If the UE initiates UE-requested PDU session modification procedure to modify the PDU session transferred from EPS to an MA PDU session with the Request type IE set to "MA PDU request" in the UL NAS TRANSPORT message as specified in 3GPP TS 24.193 [13B] and the SMF determines, based on operator policy and subscription information, that the PDU SESSION MODIFICATION REQUEST message is to be rejected, the SMF shall include the 5GSM cause value #33 "requested service option not subscribed" in the 5GSM cause IE of the PDU SESSION MODIFICATION REJECT message.

…

The SMF shall send the PDU SESSION MODIFICATION REJECT message.

Upon receipt of a PDU SESSION MODIFICATION REJECT message and a PDU session ID, using the NAS transport procedure as specified in subclause 5.4.5, the UE shall stop timer T3581, release the allocated PTI value, and enter the state PROCEDURE TRANSACTION INACTIVE.

10.4.1.6.3 Test description

10.4.1.6.3.1 Pre-test conditions

System Simulator:

- WLAN Cell 27 is configured according to TS 38.508-1 [4].

- NR Cell 1 is configured according to TS 38.508-1 [4], Table 4.4.2-3.

- NR Cell 1 and WLAN Cell 27 belong to the same PLMN and Both NR Cell 1 and WLAN cell 27 are set to '' Serving cell''.

UE:

- UE is registered over both 3GPP access and non-3GPP access in the same PLMN.

Preamble:

- The UE is brought to state 3W-A and state 3N-A according to TS 38.508-1 [4], Table 4.4A.2-3.

10.4.1.6.3.2 Test procedure sequence

Table 10.4.1.6.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Cause the UE to pdu session modification and set the request type to "MA PDU request" in the UL NAS TRANSPORT message by MMI or AT command on NR Cell 1 | - | - | - | - |
| - | EXCEPTION: In parallel to the events described in steps 2-3 below the events specified in Table 10.4.1.6.3.2-2 may take place. | - | - | - | - |
| 2 | Check: Does the UE transmit a PDU SESSION MODIFICATION REQUEST message and sets the request type to "MA PDU request" in the UL NAS TRANSPORT message on NR Cell 1. | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION MODIFICATION REQUEST | 1 | P |
| 3 | The SS transmits a PDU SESSION MODIFICATION REJECT message with 5GSM cause #33 on NR Cell 1. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION MODIFICATION REJECT | - | - |
| 4 | Check: Does the UE transmit a PDU SESSION MODIFICATION REQUEST message within 60s on NR Cell 1. | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION MODIFICATION REQUEST | 1 | F |

Table 10.4.1.6.3.2-2: Parallel behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Check: Does the UE transmit a PDU SESSION MODIFICATION REQUEST message and sets the request type to "MA PDU request" in the UL NAS TRANSPORT message on WLAN Cell 27. | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION MODIFICATION REQUEST | - | - |
| 2 | The SS transmits a PDU SESSION MODIFICATION REJECT message with 5GSM cause #33 on WLAN Cell 27. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION MODIFICATION REJECT | - | - |
| 3 | Check: Does the UE transmit a PDU SESSION MODIFICATION REQUEST message within 60s on WLAN Cell 27. | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION MODIFICATION REQUEST | - | F |

10.4.1.6.3.3 Specific message contents

Table 10.4.1.6.3.3-1: PDU SESSION MODIFICATION REQUEST (step 2, Table 10.4.1.6.3.2-1 and step 1, Table 10.4.1.6.3.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GSM capability |  |  |  |
| All octets with the exception of octet 3, bits 4 to 7 and octet4,bit 1 | Any allowed value |  |  |
| ATSSS-ST(octet 3, bits 4 to 7) | ‘0001’B’ or 0010’B or ‘0011’B | ‘0001’B represents UE supports ATSSS Low-Layer functionality with any steering mode,  ’0010’B represents UE supports MPTCP functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode,  ‘0011’B represents UE supports MPTCP functionality with any steering mode and ATSSS-LL functionality with any steering mode |  |

Table 10.4.1.6.3.3-2: UL NAS Transport (step 2, Table 10.4.1.6.3.2-1 and step 1, Table 10.4.1.6.3.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-10 | | | |
| Information Element | Value/remark | Comment | Condition |
| Request type | ‘110’B | MA PDU request |  |

Table 10.4.1.6.3.3-3: PDU SESSION MODIFICATION REJECT (step 3, Table 10.4.1.6.3.2-1 and step 2, Table 10.4.1.6.3.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-8 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GSM cause | ‘0010 0001’B | Requested service option not subscribed |  |

### 10.4.2 Network-requested MA PDU session management

##### 10.4.2.1

##### 10.4.2.2 Network-requested MA PDU session release / ATSSS / Accepted

10.4.2.2.1 Test Purpose (TP)

(1)

**with** { UE is in PDU SESSION ACTIVE state and the MA PDU session has user-plane resources established on both 3GPP access and non-3GPP access}

**ensure that** {

**when** { UE receives the PDU SESSION RELEASE COMMAND includes the Access type IE with "Non-3GPP access" }

**then** { UE transmits PDU SESSION RELEASE COMPLETE message and the user-plane resources on non-3GPP access is released }

}

(2)

**with** { UE is in PDU SESSION ACTIVE state and the MA PDU session has user-plane resources established on 3GPP access}

**ensure that** {

**when** { UE receives the PDU SESSION RELEASE COMMAND includes the Access type IE with "3GPP access" }

**then** { UE transmits PDU SESSION RELEASE COMPLETE message and the whole MA PDU session was released }

}

10.4.2.2.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501, clause 6.3.3.1,6.3.3.3. Unless otherwise stated these are Rel-16 requirements.

[TS 24.501, clause 6.3.3.1]

The purpose of the network-requested PDU session release procedure is to enable the network to release a PDU session or the user-plane resources on a single access of an MA PDU session.

[TS 24.501, clause 6.3.3.3]

For MA PDU session, upon receipt of the PDU SESSION RELEASE COMMAND, the UE shall behave as follows:

a) if the PDU SESSION RELEASE COMMAND includes the Access type IE and the MA PDU session has user-plane resources established on both 3GPP access and non-3GPP access, the UE shall consider the user-plane resources on the access indicated in the Access type IE as released and shall create a PDU SESSION RELEASE COMPLETE message;

b) if the PDU SESSION RELEASE COMMAND includes the Access type IE and the PDU session and has user-plane resources established on only the access indicated in the Access type IE, the UE shall consider the MA PDU session as released and shall create a PDU SESSION RELEASE COMPLETE message; and

c) if the PDU SESSION RELEASE COMMAND does not include the Access type IE, the UE shall consider the MA PDU session as released and shall create a PDU SESSION RELEASE COMPLETE message.

The UE shall transport the PDU SESSION RELEASE COMPLETE message and the PDU session ID, using the NAS transport procedure as specified in subclause 5.4.5.

Upon receipt of a PDU SESSION RELEASE COMPLETE message, the SMF shall stop timer T3592 and shall consider the PDU session as released.

[TS 24.501, clause 6.3.3.6]

The following abnormal cases can be identified:

b) User-plane resources of the MA PDU session on the access indicated in the Access type IE not established.

If the PDU session is an MA PDU session and has user-plane resources established on a single access different from the access indicated in the Access type IE, the UE shall not diagnose an error, further process the release command and consider the user-plane resources of the MA PDU session on the access indicated in the Access type IE as successfully released.

10.4.2.2.3 Test description

10.4.2.2.3.1 Pre-test conditions

System Simulator:

- WLAN Cell 27 is configured according to TS 38.508-1 [4].

- NR Cell 1 is configured according to TS 38.508-1 [4], Table 4.4.2-3.

- NR Cell 1 and WLAN Cell 27 belong to the same PLMN and Both NR Cell 1 and WLAN cell 27 are set to '' Serving cell''.

UE:

- UE is registered over both 3GPP access and non-3GPP access in the same PLMN.

Preamble:

- The UE is brought to state 3W-A and state 3N-A according to TS 38.508-1 [4], Table 4.4A.2-3

10.4.2.2.3.2 Test procedure sequence

**Table 10.4.2.2.3.2-1: Main behaviour**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Cause the UE to request to establish an MA PDU session by MMI or AT command. | - | - | - | - |
| - | EXCEPTION: In parallel to the events described in steps 2-3 below the events specified in Table 10.4.2.2.3.2-2 may take place. | - | - | - | - |
| 2 | The UE transmits a PDU SESSION ESTABLISHMENT REQUEST message and sets the request type to "MA PDU request" in the UL NAS TRANSPORT message and sets the ATSSS-ST bits in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message according to the ATSSS functionality and steering mode that UE supports on NR Cell 1  Note: PDU SESSION ESTABLISHMENT REQUEST is included in UL NAS transport. UL NAS transport message is included in dedicatedNAS-Message of *ULInformationTransfer* message. | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | - | - |
| 3 | The SS transmits an PDU SESSION ESTABLISHMENT ACCEPT on NR cell 1. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT |  |  |
| 4 | The SS transmits an *RRCReconfiguration* message and a PDU SESSION RELEASE COMMAND includes the Access type IE with "Non-3GPP access". | <-- | NR RRC: *RRCReconfiguration*  5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION RELEASE COMMAND | - | - |
| - | EXCEPTION: Depending upon UE implementation, step 4A and 5 can occur in any order |  | - | - | - |
| 4A | The UE transmits a *RRCReconfigurationComplete* on WLAN Cell 27. | --> | NR RRC: *RRCReconfigurationComplete* | 1 | P |
| 5 | The UE transmits a PDU SESSION RELEASE COMPLETE message on WLAN Cell 27. | --> | NR RRC: *ULInformationTransfer*  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION RELEASE COMPLETE | 1 | P |
| 6 | The SS transmits an *RRCReconfiguration* message and a PDU SESSION RELEASE COMMAND includes the Access type IE with "3GPP access". | <-- | NR RRC: *RRCReconfiguration*  5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION RELEASE COMMAND | - | - |
| - | EXCEPTION: Depending upon UE implementation, step 6A and 7 can occur in any order | - | - | - | - |
| 6A | The UE transmits a *RRCReconfigurationComplete* on NR Cell 1. | --> | NR RRC: *RRCReconfigurationComplete* | 2 | P |
| 7 | The UE transmits a PDU SESSION RELEASE COMPLETE message on NR cell 1. | --> | NR RRC: *ULInformationTransfer*  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION RELEASE COMPLETE | 2 | P |

**Table 10.4.2.2.3.2-2: Parallel behaviour**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE transmits a PDU SESSION ESTABLISHMENT REQUEST message and sets the request type to "MA PDU request" in the UL NAS TRANSPORT message and sets the ATSSS-ST bits in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message according to the ATSSS functionality and steering mode that UE supports on WLAN Cell 27.    Note: PDU SESSION ESTABLISHMENT REQUEST is included in UL NAS transport. UL NAS transport message is included in dedicatedNAS-Message of *ULInformationTransfer* message. | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | - | - |
| 2 | The SS transmits an PDU SESSION ESTABLISHMENT ACCEPT on WLAN Cell 27. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT |  |  |

10.4.2.2.3.3 Specific message contents

Table 10.4.2.2.3.3-1: PDU SESSION ESTABLISHMENT REQUEST (step 2, Table 10.4.2.2.3.2-1 and step 1, Table 10.4.2.2.3.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | Any value according to TS 24.501 [25] subclause 9.4 |  | MA PDU Session established on first access |
| The value used in the MA PDU Session establish procedure on first access |  | MA PDU Session established on second access |
| 5GSM capability |  |  |  |
| All octets with the exception of octet 3, bits 4 to 7 and octet4,bit 1 | Any allowed value |  |  |
| ATSSS-ST(octet 3, bits 4 to 7) | ‘1000’B’ or 0100’B or ‘1100’B | ‘1000’B represents UE supports ATSSS Low-Layer functionality with any steering mode,  ’0100’ represents UE supports MPTCP functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode ,  ‘1100’ represents UE supports MPTCP functionality with any steering mode and ATSSS-LL functionality with any steering mode |  |

Table 10.4.2.2.3.3-2: UL NAS Transport (step 2, Table 10.4.2.2.3.2-1 and step 1,Table 10.4.2.2.3.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-10 | | | |
| Information Element | Value/remark | Comment | Condition |
| Request type | ‘011’B | MA PDU request |  |
| S-NSSAI | Not Present |  |  |

Table 10.4.2.2.3.3-3: PDU SESSION ESTABLISHMENT ACCEPT (step 3, Table 10.4.2.2.3.2-1 and step 2, Table 10.4.2.2.3.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-2 | | | |
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| ATSSS container | Any allowed value according to TS 24.501 [25] subclause 9.11.4.22 |  |  |

Table 10.4.2.2.3.3-4:REGISTRATION ACCEPT (preamble, Table 10.4.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS network feature support |  |  |  |
| ATS-IND | '1'B | ATSSS supported |  |

Table 10.4.2.2.3.3-5: PDU SESSION RELEASE COMMAND (step 4, 10.4.2.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.2-14 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | The same ID as the ID of PDU session which UE request in step 2 in Table 10.4.2.2.3.3-1 |  |  |
| Access type | '01'B | Non-3GPP access |  |

Table 10.4.2.2.3.3-6: PDU SESSION RELEASE COMMAND (step 6, 10.4.2.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.2-14 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | The same ID as the ID of PDU session which UE request in step 2 in Table 10.4.2.2.3.3-1 |  |  |
| Access type | '10'B | 3GPP access |  |

Table 10.4.2.2.3.3-7:REGISTRATION ACCEPT (preamble, Table 10.4.2.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS network feature support |  |  |  |
| ATS-IND | '1'B | ATSSS supported |  |

# 11 Multi-layer and Services

## 11.1 5GS / EPS Fallback

### 11.1.1 MO MMTEL voice call setup from NR RRC\_IDLE / EPS Fallback with redirection / Single registration mode with N26 interface / Success

11.1.1.1 Test Purpose (TP)

(1)

**with** { UE supporting both S1 mode and N1 mode and operating in single-registration mode and the Network having indicated "interworking without N26 interface not supported" and the UE in NR RRC\_IDLE state }

**ensure that** {

**when** { User initiates an MMTEL call and the UE completes Access control and checking in 5GMM-IDLE mode }

**then** { UE requests the establishment of an MMTEL call by transmitting an RRCSetupRequest message with establishmentCause set to 'mo-VoiceCall' and a SERVICE REQUEST message with Service type set to 'data' }

}

(2)

**with** { UE being in NR RRC\_CONNECTED state after having requested an MMTEL call establishment and the MO IMS voice session establishment has been initiated }

**ensure that** {

**when** { UE receives an RRCRelease message which includes redirectedCarrierInfo indicating redirection to E-UTRA }

**then** {UE selects the E-UTRA cell, performs a TAU procedure, and, successfully completes the MMTEL call setup in EPS }

}

11.1.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clauses 4.5.4.1, 5.6.1.2 and TS 38.331: clauses 5.3.3.2, 5.3.3.3. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 4.5.4.1]

When the UE is in 5GMM-IDLE mode, upon receiving a request from the upper layers for an access attempt, the NAS shall categorize the access attempt into access identities and an access category following subclause 4.5.2, table 4.5.2.1 and table 4.5.2.2, and subclause 4.5.3, and provide the applicable access identities and the access category to the lower layers for the purpose of access control checking. In this request to the lower layer the NAS can also provide to the lower layer the RRC establishment cause determined as specified in subclause 4.5.6 of this specification.

NOTE 1: The access barring check is performed by the lower layers.

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

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

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

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

[TS 24.501, clause 5.6.1.2]

For cases d) and e) in subclause 5.6.1.1, the Uplink data status IE shall be included in the SERVICE REQUEST message to indicate the PDU session(s) the UE has pending user data to be sent. If the UE is not a UE configured for high priority access in selected PLMN:

a) if there exists an emergency PDU session which is indicated in the Uplink data status IE the service type IE in the SERVICE REQUEST message shall be set to "emergency services"; or

b) otherwise, the service type IE in the SERVICE REQUEST message shall be set to "data".

[TS 38.331, clause 5.3.3.2]

The UE initiates the procedure when upper layers request establishment of an RRC connection while the UE is in RRC\_IDLE and it has acquired essential system information as described in 5.2.2.1.

The UE shall ensure having valid and up to date essential system information as specified in clause 5.2.2.2 before initiating this procedure.

Upon initiation of the procedure, the UE shall:

1> if the upper layers provide an Access Category and one or more Access Identities upon requesting establishment of an RRC connection:

2> perform the unified access control procedure as specified in 5.3.14 using the Access Category and Access Identities provided by upper layers;

[TS 38.331, clause 5.3.3.3]

The UE shall set the contents of *RRCSetupRequest* message as follows:

1> set the *ue-Identity* as follows:

2> if upper layers provide a 5G-S-TMSI:

3> set the ue-Identity to ng-5G-S-TMSI-Part1;

2> else:

3> draw a 39-bit random value in the range 0..239-1 and set the *ue-Identity* to this value;

NOTE 1: Upper layers provide the *5G-S-TMSI* if the UE is registered in the TA of the current cell.

1> set the *establishmentCause* in accordance with the information received from upper layers;

The UE shall submit the *RRCSetupRequest* message to lower layers for transmission.

11.1.1.3 Test Description

11.1.1.3.1 Pre-test conditions

System Simulator:

- NR Cell 1 is configured according to TS 38.508-1 [4] Table 4.4.2-3 and is connected to 5GC.

- E-UTRA Cell 1 is configured to TS 36.508 [7] Table 4.4.2-2 and is connected to EPC.

- System information for the NR Cell 1 in accordance with combination NR-6 in TS 38.508-1 [4] sub-clause 4.4.3.1.2, and, for the E-UTRA Cell 1 in accordance with system information combination 31 as defined in TS 36.508 [7], subclause 4.4.3.1.1.

- N26 interface is configured.

- Power levels are constant and as defined in Tables 11.1.1.3.1-1/2.

Table 11.1.1.3.1-1: Time instances of cell power level and parameter changes for conducted test environment

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter name | Unit | NR Cell 1 | E-UTRA Cell 1 | Remark |
| T0 | SS/PBCH SSS EPRE | dBm/SCS | -88 |  |  |
| RS EPRE | dBm/15kHz |  | -85 |  |

Table 11.1.1.3.1-2: Time instances of cell power level and parameter changes for OTA test environment

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter name | Unit | NR Cell 1 | E-UTRA Cell 1 | Remark |
| T0 | SS/PBCH SSS EPRE | dBm/SCS | -82 | - |  |
| RS EPRE | dBm/15kHz | - | -96 |

UE:

The UE is configured to use IMS preconditions

Preamble:

- With E-UTRA Cell 1 "Serving cell" and NR Cell 1 "Non-suitable "Off" cell" in accordance with TS 38.508-1 [4], Table 6.2.2.1-3, the UE is brought to state RRC\_IDLE using generic procedure parameters Connectivity (*E-UTRA/EPC*) and Unrestricted nr PDN (*On*) in accordance with the procedure described in TS 38.508-1 [4], clause 4.5.2. 4G GUTI and eKSI are assigned and security context established

- The UE is switched-off

- With E-UTRA Cell 1 "Non-suitable "Off" cell" and NR Cell 1 "Serving cell" in accordance with TS 38.508-1 [4], Table 6.2.2.1-3, the UE is brought to state 1N-A, RRC\_IDLE Connectivity (NR), in accordance with the procedure described in TS 38.508-1 [4], Table 4.5.2.2-2. 5G-GUTI and ngKSI are assigned and security context established.

11.1.1.3.2 Test procedure sequence

Table 11.1.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 0 | Void | - | - | - | - |
| 1 | Make the UE attempt an MTSI MO Speech Call (Note 1). | - | - | - | - |
| 2 | Check: Does the UE send NR RRCSetupRequest with EstablishmentCause set to ‘mo-VoiceCall’? | --> | NR RRC: RRCSetupRequest | 1 | P |
| 3 | SS transmits an NR *RRCSetup* message | <-- | NR RRC: RRCSetup | - | - |
| 4 | Check: Does the UE transmit an NR *RRCSetupComplete* message to confirm the successful completion of the connection establishment including initiation of 5GSM procedure by including the SERVICE REQUEST message with *Service Type* set to ‘*data*’? | --> | NR RRC: *RRCSetupComplete* 5GSM: SERVICE REQUEST | 1 | P |
| 4A | Set the power levels according to “T0” as per Table 11.1.1.3.1-1/2. | - | - | - | - |
| 5-8 | Steps 5-8 of expected sequence from Table 4.5.4.2-3 as defined in TS 38.508-1 [4] are performed. | - | - | - | - |
| 9-13 | Steps 1-5 of expected sequence from A.9.1 as defined in TS 34.229-5 [41] are performed for initiating an MTSI MO speech call. | - | - | - | - |
| 14 | SS transmits *RRCRelease* message indicating redirection to E-UTRA Cell 1. | <-- | NR RRC: RRCRelease | - | - |
| 15-20 | UE performs generic procedure as defined in TS 38.508-1 [4], Table 4.9.7.2.2-1 Steps 1-6 for N1 to S1 Inter mode change with condition ‘connected without release’ & ‘mapped 5G security context’. | - | - | - | - |
| 21-24 | Generic Test Procedure as defined in Steps 5-8 of TS 36.508 [7] Table 4.5A.6.3-1 is performed to establish radio bearer corresponding to IMS PDN. | - | - | - | - |
| - | EXCEPTION: Steps 25a1-25a2 describe a step sequence depending on UE implementation. | - | - | - | - |
| 25a1-25a2 | The UE may perform steps 1-2 according to TS 34.229-1 subclause C.46 to perform IMS re-registration on EUTRAN. | - | - | - | - |
| 26 | The SS configures a new RLC-UM data radio bearer with condition DRB (0,1), associated with the dedicated EPS bearer context. *RRCConnectionReconfiguration* message contains the ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST message. EPS bearer context #4 (QCI 1) according to table 6.6.2-1: Reference dedicated EPS bearer contexts. | <-- | RRC: RRCConnectionReconfiguration  NAS:  ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST | - | - |
| - | EXCEPTION: In parallel to the events described in steps 27-28 the steps specified in table 11.1.1.3.2-2 will take place. | - | - | - | - |
| 27 | The UE transmits an *RRCConnectionReconfigurationComplete* message to confirm the establishment of the new data radio bearer, associated with the dedicated EPS bearer. | --> | RRC: RRCConnectionReconfigurationComplete | - | - |
| 28 | The UE transmits an ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT message. | --> | RRC: ULInformationTransfer  NAS:ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT | - | - |
| 29 | UE is triggered by MMI to release the call. | - | - | - | - |
| 30-33 | Follow the Test Steps 2-5 as defined in TS 34.229-1 [35] subclause C.32 for Generic test procedure for MO release of IMS call followed by EPS Bearer Deactivation. | - | - | - | - |
| 34 | SS transmits *RRCConnectionRelease* message indicating redirection to NR Cell 1. | <-- | RRC: RRCConnectionRelease | - | - |
| 35 | Generic Test procedure for Tracking area updating / Inter-system change from S1 mode to N1 mode in 5GMM/EMM-IDLE mode with *connected without release* is present as mentioned in TS 38.508-1 [4] Table 4.9.9.2.2-1 is performed with condition ‘’Mapped EPS security context. | - | - | - | - |
| 36-37 | IF UE performed IMS re-registration over E-UTRAN in Steps 25a1-25a2,  THEN the UE may perform IMS re-registration on NR Cell1 as per Annex A.12 of TS 34.229-5 [41] | - | - | - | - |
| 37A | The SS transmits *RRCRelease.* | <-- | NR RRC: RRCRelease | - | - |
| 38 | The test procedure as described in Table 4.9.6.1-1: Switch off procedure in RRC\_IDLE take place. | - | - | - | - |
| Note 1: UE is configured such that Access Control check passes for MO MMTEL Voice call. | | | | | |

Table 11.1.1.3.2-2: Parallel behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1-5 | Steps 1 to 5 of the Generic test procedure for setting up MTSI MO speech call - EPS fallback according TS 34.229-5 [41] subclause A.9.2 take place. | - | - | - | - |
| 6 | Step 6 of the Generic test procedure for setting up MTSI MO speech call - EPS fallback according TS 34.229-5 [41] subclause A.9.2 takes place. | - | - | 2 | P |

11.1.1.3.3 Specific message contents

Table 11.1.1.3.3-1: RRCSetupRequest (step 2, table 11.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.6.1-23 | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCSetupRequest ::= SEQUENCE { |  |  |  |
| rrcSetupRequest SEQUENCE { |  |  |  |
| establishmentCause | mo-VoiceCall |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.1.1.3.3-2: SERVICE REQUEST (step 4, table 11.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-16 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Service type | ‘0001’B | data |  |
| Uplink data status | Present | PSI bit corresponding to IMS PDN needs to be set |  |

Table 11.1.1.3.3-3: RRCRelease (step 14, table 11.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.6.1-16 | | | |
| Information Element | Value/Remark | Comment | Condition |
| RRCRelease ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcRelease SEQUENCE { |  |  |  |
| redirectedCarrierInfo CHOICE { |  |  |  |
| eutra SEQUENCE { |  |  |  |
| eutraFrequency | Downlink EARFCN of EUTRA cell 1 |  |  |
| cnType | epc |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.1.1.3.3-4: RRCConnectionRelease (step 34, table 11.1.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 36.508 [7] Table 4.6.1-15 | | | |
| Information Element | Value/Remark | Comment | Condition |
| RRCConnectionRelease ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| c1 CHOICE { |  |  |  |
| rrcConnectionRelease-r8 SEQUENCE { |  |  |  |
| redirectedCarrierInfo SEQUENCE { |  |  |  |
| nr-r15:::= SEQUENCE { |  |  |  |
| carrierFreq-r15 | Downlink NR SSB ARFCN of cell NR Cell 1 |  | TS 38.508-1 [4] cl.6.2.3.1 |
| subcarrierSpacingSSB-r15 |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

### 11.1.1a MO MMTEL enhanced voice service call setup from NR RRC\_IDLE / EPS Fallback with redirection / Single registration mode with N26 interface / Success

11.1.1a.1 Test Purpose (TP)

(1)

**with** { UE supporting both S1 mode and N1 mode and configured to use preconditions and configured to use the EVS default configuration and the UE is in NR RRC\_IDLE state }

**ensure that** {

**when** { UE is being made to initiate a voice call }

**then** { UE requests the establishment of a voice call by transmitting an RRCSetupRequest message with establishmentCause set to 'mo-VoiceCall' and a SERVICE REQUEST message with Service type set to 'data' }

}

(2)

**with** { UE being in NR RRC\_CONNECTED state after having requested a voice call establishment and the MO IMS voice session establishment has been initiated }

**ensure that** {

**when** { UE receives an RRCRelease message which includes redirectedCarrierInfo indicating redirection to E-UTRA }

**then** {UE selects the E-UTRA cell, performs a TAU procedure, and, successfully completes the voice call setup in EPS using EVS}

}

11.1.1a.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 38.331 clause 5.3.3.3, TS 24.501 clause 5.6.1.2 and TS 26.114 clause 5.2.1.1.

[TS 38.331, clause 5.3.3.3]

The UE shall set the contents of *RRCSetupRequest* message as follows:

...

1> set the *establishmentCause* in accordance with the information received from upper layers;

The UE shall submit the *RRCSetupRequest* message to lower layers for transmission.

[TS 24.501, clause 5.6.1.2]

For cases d) and e) in subclause 5.6.1.1, the Uplink data status IE shall be included in the SERVICE REQUEST message to indicate the PDU session(s) the UE has pending user data to be sent. If the UE is not a UE configured for high priority access in selected PLMN:

...

b) otherwise, the service type IE in the SERVICE REQUEST message shall be set to "data".

[TS 26.114, clause 5.2.1.1]

MTSI clients in terminals offering speech communication shall support narrowband, wideband and super-wideband communication.

…

MTSI clients in terminals offering super-wideband or fullband speech communication shall support:

- EVS codec …

11.1.1a.3 Test Description

11.1.1a.3.1 Pre-test conditions

System Simulator:

- NR Cell 1, E-UTRA Cell 1.

- System information for the NR Cell 1 in accordance with combination NR-6 in TS 38.508-1 [4] sub-clause 4.4.3.1.2, and, for the E-UTRA Cell 1 in accordance with system information combination 31 as defined in TS 36.508 [7], subclause 4.4.3.1.1.

- Power levels are constant and as defined in Tables 11.1.1a.3.1-1/2.

Table 11.1.1a.3.1-1: Time instances of cell power level and parameter changes for FR1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter name | Unit | NR Cell 1 | E-UTRA Cell 1 | Remark |
| T0 | SS/PBCH SSS EPRE | dBm/SCS | -88 |  |  |
| RS EPRE | dBm/15kHz |  | -85 |  |

Table 11.1.1a.3.1-2: Time instances of cell power level and parameter changes for FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter name | Unit | NR Cell 1 | E-UTRA Cell 1 | Remark |
| T0 | SS/PBCH SSS EPRE | dBm/SCS | -82 | - |  |
| RS EPRE | dBm/15kHz | - | -85 |

UE:

- The UE contains either ISIM and USIM applications or only USIM application on UICC.

- The UE is configured to register for IMS after switch on.

- The UE is configured to use preconditions.

Preamble:

- With E-UTRA Cell 1 "Serving cell" and NR Cell 1 "Non-suitable "Off" cell" in accordance with TS 38.508-1 [4], Table 6.2.2.1-3, the UE is brought to state RRC\_IDLE using generic procedure parameters Connectivity (*E-UTRA/EPC*) and Unrestricted nr PDN (*On*) in accordance with the procedure described in TS 38.508-1 [4], clause 4.5.2. 4G GUTI and eKSI are assigned and security context established.

- the UE is switched-off.

- With E-UTRA Cell 1 "Non-suitable "Off" cell" and NR Cell 1 "Serving cell" in accordance with TS 38.508-1 [4], Table 6.2.2.1-3, the UE is brought to state 1N-A, RRC\_IDLE Connectivity (*NR/5GC*), in accordance with the procedure described in TS 38.508-1 [4], Table 4.5.2.2-2. 5G-GUTI and ngKSI are assigned and security context established.

11.1.1a.3.2 Test procedure sequence

Table 11.1.1a.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Make the UE attempt an IMS voice call. | - | - | - | - |
| 2 | Check: Does the UE send NR RRCSetupRequest with EstablishmentCause set to ‘mo-VoiceCall’? | --> | NR RRC: RRCSetupRequest | 1 | P |
| 3 | SS transmits an NR *RRCSetup* message | <-- | NR RRC: RRCSetup | - | - |
| 4 | Check: Does the UE transmit an NR *RRCSetupComplete* message to confirm the successful completion of the connection establishment including initiation of 5GSM procedure by including the SERVICE REQUEST message with *Service Type* set to ‘*data*’? | --> | NR RRC: *RRCSetupComplete* 5GSM: SERVICE REQUEST | 1 | P |
| 5 | Set the power levels according to “T0” as per Table 11.1.1a.3.1-1/2. | - | - | - | - |
| 6-9 | Steps 5-8 of expected sequence from Table 4.5.4.2-3 as defined in TS 38.508-1 [4] are performed. | - | - | - | - |
| 10-14 | Steps 1-5 of expected sequence from A.4.1a as defined in TS 34.229-5 [41] are performed for initiating an MTSI MO speech call. | - | - | - | - |
| 15 | SS transmits *RRCRelease* message indicating redirection to E-UTRA Cell 1. | <-- | NR RRC: RRCRelease | - | - |
| 16-21 | UE performs generic procedure as defined in TS 38.508-1 [4], Table 4.9.7.2.2-1 Steps 1-6 for N1 to S1 Inter mode change with condition ‘connected without release’ & ‘mapped 5G security context’. | - | - | - | - |
| 22-25 | Generic Test Procedure as defined in Steps 5-8 of TS 36.508 [7] Table 4.5A.6.3-1 is performed to establish radio bearer corresponding to IMS PDN. | - | - | - | - |
| 26 | The SS configures a new RLC-UM data radio bearer with condition DRB (0,1), associated with the dedicated EPS bearer context. *RRCConnectionReconfiguration* message contains the ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST message. EPS bearer context #4 (QCI 1) according to table 6.6.2-1: Reference dedicated EPS bearer contexts. | <-- | RRC: RRCConnectionReconfiguration  NAS:  ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST | - | - |
| - | EXCEPTION: In parallel to the events described in steps 27-28 the steps specified in table 11.1.1.3.2-2 will take place. | - | - | - | - |
| 27 | The UE transmits an *RRCConnectionReconfigurationComplete* message to confirm the establishment of the new data radio bearer, associated with the dedicated EPS bearer. | --> | RRC: RRCConnectionReconfigurationComplete | - | - |
| 28 | The UE transmits an ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT message. | --> | RRC: ULInformationTransfer  NAS:ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT | - | - |
| 29 | UE is triggered by MMI to release the call. | - | - | - | - |
| 30-33 | Follow the Test Steps 2-5 as defined in TS 34.229-1 [35] subclause C.32 for Generic test procedure for MO release of IMS call followed by EPS Bearer Deactivation. | - | - | - | - |
| 34 | SS transmits *RRCConnectionRelease* message indicating redirection to NR Cell 1. | <-- | RRC: RRCConnectionRelease | - | - |
| 35 | Generic Test procedure for Tracking area updating / Inter-system change from S1 mode to N1 mode in 5GMM/EMM-IDLE mode with *connected without release* is present as mentioned in TS 38.508-1 [4] Table 4.9.9.2.2-1 is performed with condition ‘’Mapped EPS security context. | - | - | - | - |
| 36 | The SS transmits *RRCRelease.* | <-- | NR RRC: RRCRelease | - | - |
| 37 | Void | - | - | - | - |
| 38 | The test procedure as described in Table 4.9.6.1-1: Switch off procedure in RRC\_IDLE take place | - | - | - | - |

Table 11.1.1a.3.2-2: Parallel behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1-6 | Steps 6-11 of expected sequence from A.4.1a as defined in TS 34.229-5 [41] are performed for initiating an MTSI MO speech call. | - | - | - | - |
| 7 | Step 12 of expected sequence from A.4.1a as defined in TS 34.229-5 [41] is performed for initiating an MTSI MO speech call. | - | - | 2 | P |

11.1.1a.3.3 Specific message contents

Table 11.1.1a.3.3-1: RRCSetupRequest (step 2, table 11.1.1a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.6.1-23 | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCSetupRequest ::= SEQUENCE { |  |  |  |
| rrcSetupRequest SEQUENCE { |  |  |  |
| establishmentCause | mo-VoiceCall |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.1.1a.3.3-2: SERVICE REQUEST (step 4, table 11.1.1a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-16 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Service type | ‘0001’B | data |  |
| Uplink data status | Present | PSI bit corresponding to IMS PDN needs to be set |  |

Table 11.1.1a.3.3-3: RRCRelease (step 15, table 11.1.1a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.6.1-16 | | | |
| Information Element | Value/Remark | Comment | Condition |
| RRCRelease ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcRelease SEQUENCE { |  |  |  |
| redirectedCarrierInfo CHOICE { |  |  |  |
| eutra SEQUENCE { |  |  |  |
| eutraFrequency | Downlink EARFCN of EUTRA cell 1 |  |  |
| cnType | epc |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.1.1a.3.3-4: RRCConnectionRelease (step 34, table 11.1.1a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 36.508 [7] Table 4.6.1-15 | | | |
| Information Element | Value/Remark | Comment | Condition |
| RRCConnectionRelease ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| c1 CHOICE { |  |  |  |
| rrcConnectionRelease-r8 SEQUENCE { |  |  |  |
| redirectedCarrierInfo SEQUENCE { |  |  |  |
| nr-r15 SEQUENCE { |  |  |  |
| carrierFreq-r15 | Downlink NR SSB ARFCN of cell NR Cell 1 |  | TS 38.508-1 [4] cl.6.2.3.1 |
| subcarrierSpacingSSB-r15 |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

### 11.1.2 MO MMTEL voice call setup from NR RRC\_IDLE / EPS Fallback with redirection / Single registration mode without N26 interface / Success

11.1.2.1 Test Purpose (TP)

(1)

**with** {UE supporting both S1 mode and N1 mode and operating in single-registration mode, and, the Network has indicated "interworking without N26 interface supported", and, the UE is in NR RRC\_IDLE state}

**ensure that** {

**when** {User initiates a MMTEL call and the UE completes Access control and checking in 5GMM-IDLE mode}

**then** {UE requests the establishment of a MMTEL call by transmitting an RRCSetupRequest message with establishmentCause set to 'mo-VoiceCall', and, a SERVICE REQUEST message with Service type set to 'data'}

}

(2)

**with** {the UE is NR RRC\_CONNECTED state after having requested a MMTEL call establishment and the MO IMS voice session establishment has been initiated}

**ensure that** {

**when** {the UE receives a RRCRelease message which includes redirectedCarrierInfo indicating redirection to eutra}

**then** {the UE selects the E-UTRA cell, performs an ATTACH or a TAU procedure, and, successfully completes the MO MMTEL call setup in EPS}

}

11.1.2.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS23.502, clauses 4.11.2.2, 4.13.6.1; TS 24.501, clauses 4.5.4.1, 4.8.2.3; TS 38.331, clause5.3.11. Unless otherwise stated these are Rel-15 requirements.

[TS 23.502, clause 4.11.2.2]

The following procedure is used by UEs in single-registration or dual registration mode on mobility from 5GS to EPS.

In the case of network sharing the UE selects the target PLMN ID according to clause 5.18.3 of TS 23.501 [2].



Figure 4.11.2.2-1: Mobility procedure from 5GS to EPS without N26 interface

The UE operating in single-registration mode can start the procedure from Step 1 or Step 5. The UE operating in dual-registration mode starts the procedure from Step 5.

NOTE 1: The network has indicated the "Interworking without N26" to the UE. To support IP address preservation, the UE in single-registration mode starts the procedure from Step 5. If the UE in single-registration mode starts the procedure from Step 1, the IP address preservation is not provided.

0. UE is registered in 5GS and established PDU sessions. The FQDN for the S5/S8 interface of the PGW-C+SMF is also stored in the UDM by the PGW-C+SMF during PDU Session setup in addition to what is specified in clause 4.3.2.2.1 and clause 4.3.2.2.2.

NOTE 2: At 5GS to EPS mobility, the MME use the FQDN for the S5/S8 interface of the PGW-C+SMF to find the PGW-C+SMF, and when UE moves back from EPS to 5GS, the AMF uses FQDN for the S5/S8 interface of the PGW-C+SMF to find the PGW-C+SMF.

1. Step 1 as in clause 5.3.3.1 (Tracking Area Update) in TS 23.401 [13].

2. Step 2 as in clause 5.3.3.1 (Tracking Area Update) in TS 23.401 [13] with the following modifications:

The UE shall provide a EPS-GUTI that is mapped from the 5G-GUTI following the mapping rules specified in TS 23.501 [2]. The UE indicates that it is moving from 5GC.

3. Step 3 as in clause 5.3.3.1 (Tracking Area Update) in TS 23.401 [13].

4. If the MME determined that the old node is an AMF based on UE's GUTI mapped from 5G-GUTI and the MME is configured to support 5GS-EPS interworking without N26 procedure, the MME sends a TAU Reject to the UE.

5. Step 1 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13] with the modifications captured in clause 4.11.2.4.1.

6. Step 2 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13].

7. Steps 4-7 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13], with the modifications captured in clause 4.11.2.4.1.

8. Step 8 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13], with the modifications captured in clause 4.11.2.4.1.

9. Step 11 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13], with the following modifications:

The subscription profile the MME receives from HSS+UDM includes per DNN/APN at most one PGW-C+SMF FQDN as described in in clause 5.17.2.1 in TS 23.501 [2].

10. Steps 12-24 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13], with the modifications as described in clause 4.11.2.4.1.

11. Step 25 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13].

12. Step 26 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13].

13. If the UE has remaining PDU Sessions in 5GS which it wants to transfer to EPS and maintain the same IP address/prefix, the UE performs the UE requested PDN Connectivity Procedure as specified in TS 23.401 [13] clause 5.10.2 and sets the Request Type to "handover" in Step 1 of the procedure with modification captured in clause 4.11.2.4.2. UE provides an APN and the PDU Session ID corresponding to the PDU Session it wants to transfer to EPS. The UE provides the PDU Session ID in PCO as described in clause 4.11.1.1.

UEs in single-registration mode performs this step for each PDU Session immediately after completing the E-UTRAN Initial Attach procedure. UEs in dual-registration mode may perform this step any time after the completing of E-UTRAN Initial Attach procedure. Also, UEs in dual-registration mode may perform this step only for a subset of PDU Sessions.

The MME determines the PGW-C+SMF address for the Create Session Request based on the APN received from the UE and the subscription profile received from the HSS+UDM in Step 9 or when the HSS+UDM notifies the MME for the new PGW-C+SMF ID in the updated subscription profile.

The PGW-C+SMF uses the PDU Session ID to correlate the transferred PDN connection with the PDU Session in 5GC.

As a result of the procedure the PGW-U+UPF starts routing DL data packets to the Serving GW for the default and any dedicated EPS bearers established for this PDN connection.

14. The PGW-C+SMF initiates release of the PDU Session(s) in 5GS transferred to EPS as specified in clause 4.3.4.2 with the following clarification:

In step 2, the PGW-C+SMF shall not release IP address/prefix(es) allocated for the PDU Session.

If UP connection of the PDU Session is not active, step 3b is not executed, thus the steps triggered by step 3b are not executed;

If UP connection of the PDU Session is active, the SMF invokes the Namf\_Communication\_N1N2MessageTransfer service operation without including N1 SM container (PDU Session Release Command).

[TS 23.502, clause 4.13.6.1]

Figure 4.13.6.1-1 describes the EPS fallback procedure for IMS voice.

When the UE is served by the 5G System, the UE has one or more ongoing PDU Sessions each including one or more QoS Flows. The serving PLMN AMF has sent an indication towards the UE during the Registration procedure that IMS voice over PS session is supported, see clause 5.16.3.10 in TS 23.501 [2] and the UE has registered in the IMS. If N26 is not supported, the serving PLMN AMF sends an indication towards the UE during the Registration procedure that interworking without N26 is supported, see clause 5.17.2.3.1 in TS 23.501 [2].



Figure 4.13.6.1-1: EPS Fallback for IMS voice

1. UE camps on NG-RAN in the 5GS and an MO or MT IMS voice session establishment has been initiated.

2. Network initiated PDU Session modification to setup QoS flow for voice reaches the NG-RAN (see N2 PDU Session Request in clause 4.3.3).

3. NG-RAN is configured to support EPS fallback for IMS voice and decides to trigger fallback to EPS, taking into account UE capabilities, indication from AMF that "Redirection for EPS fallback for voice is possible" (received as part of initial context setup as defined in TS 38.413 [10]), network configuration (e.g. N26 availability configuration) and radio conditions. If NG-RAN decides not to trigger fallback to EPS, then the procedure stops here and following steps are not executed.

NG-RAN may initiate measurement report solicitation from the UE including E-UTRAN as target.

NOTE 1: If AMF has indicated that "Redirection for EPS fallback for voice is not possible", then AN Release via inter-system redirection to EPS is not performed in step 5.

4. NG-RAN responds indicating rejection of the PDU Session modification to setup QoS flow for IMS voice received in step 2 by PDU Session Response message towards the PGW-C+SMF (or H-SMF+P-GW-C via V-SMF, in case of roaming scenario) via AMF with an indication that mobility due to fallback for IMS voice is ongoing. The PGW-C+SMF maintains the PCC rule(s) associated with the QoS Flow(s).

5. NG-RAN initiates either handover (see clause 4.11.1.2.1), or AN Release via inter-system redirection to EPS (see clause 4.2.6 and clause 4.11.1.3.2), taking into account UE capabilities. The PGW-C+SMF reports change of the RAT type if subscribed by PCF as specified in clause 4.11.1.2.1, or clause 4.11.1.3.2.6. When the UE is connected to EPS, either 6a or 6b is executed

6a. In the case of 5GS to EPS handover, see clause 4.11.1.2.1, and in the case of inter-system redirection to EPS with N26 interface, see clause 4.11.1.3.2. In either case the UE initiates TAU procedure; or

6b. In the case of inter-system redirection to EPS without N26 interface, see clause 4.11.2.2. If the UE supports Request Type flag "handover" for PDN connectivity request during the attach procedure as described in clause 5.3.2.1 of TS 23.401 [13] and has received the indication that interworking without N26 is supported, then the UE initiates Attach with PDN connectivity request with request type "handover".

In inter-system redirection, the UE uses the emergency indication in the RRC message as specified in clause 6.2.2 of TS 36.331 [16] and E-UTRAN provides the emergency indication to MME during Tracking Area Update or Attach procedure. For the handover procedure see clause 4.11.1.2.1, step 1.

7. After completion of the mobility procedure to EPS or as part of the 5GS to EPS handover procedure (see clause 4.11.1.2.1), the SMF/PGW re-initiates the setup of the dedicated bearer for IMS voice, mapping the 5G QoS to EPC QoS parameters. The PGW-C+SMF behaves as specified in clause 4.9.1.3.1. The PGW-C+SMF reports about Successful Resource Allocation and Access Network Information if subscribed by PCF.

8. The IMS voice session establishment is continued.

At least for the duration of the voice call in EPS the E-UTRAN is configured to not trigger any handover to 5GS.

[TS 24.501, clause 4.5.4.1]

When the UE is in 5GMM-IDLE mode, upon receiving a request from the upper layers for an access attempt, the NAS shall categorize the access attempt into access identities and an access category following subclause 4.5.2, table 4.5.2.1 and table 4.5.2.2, and subclause 4.5.3, and provide the applicable access identities and the access category to the lower layers for the purpose of access control checking. In this request to the lower layer the NAS can also provide to the lower layer the RRC establishment cause determined as specified in subclause 4.5.6 of this specification.

NOTE 1: The access barring check is performed by the lower layers.

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

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

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

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

If the lower layers indicate that the access attempt is barred, the NAS shall not initiate the procedure to send the initial NAS message for the access attempt. Additionally:

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

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

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

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

b) if the event which triggered the access attempt was an MO-SMSoIP-attempt-started indication:

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

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

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

NOTE 4: Barring timers, on a per access category basis, are run by the lower layers. At expiry of barring timers, the indication of alleviation of access barring is indicated to the NAS on a per access category basis.

[TS 24.501, clause 4.8.2.3]

At inter-system change from N1 mode to S1 mode in EMM-IDLE mode when:（ PDU SEESION ACTIVE）

a) the UE supports non-IP PDN type and at least one PDU session is active; or

b) the UE does not support non-IP PDN type and at least one PDU session of IPv4, IPv6 or IPv4v6 PDU session type is active,

the UE shall proceed as follows:

a) if the UE supports sending an ATTACH REQUEST message containing a PDN CONNECTIVITY REQUEST message with request type set to "handover" to transfer a PDU session from N1 mode to S1 mode and the UE has received an "interworking without N26 interface supported" indication from the network, the UE shall:

1) enter substates EMM-DEREGISTERED.NORMAL-SERVICE and 5GMM-REGISTERED.NO-CELL-AVAILABLE;

2) map the PDU session(s) which the UE intends to transfer to EPS to the default EPS bearer context of the corresponding PDN connection(s) as specified in subclause 6.1.4.2; and

3) initiate an EPS attach procedure and include a PDN CONNECTIVITY REQUEST message with request type set to "handover" in the ATTACH REQUEST message to activate a default EPS bearer context for one of the active PDU sessions which the UE intends to transfer to EPS.

After successful completion of the EPS attach procedure, the UE shall reset the registration attempt counter and the attach attempt counter (see 3GPP TS 24.301 [15]) and attempt to activate each of the other default EPS bearer contexts, if any, by initiating a stand-alone PDN connectivity procedure with request type set to "handover" in the PDN CONNECTIVITY REQUEST message; and

b) otherwise, enter substates EMM-REGISTERED.NORMAL-SERVICE and 5GMM-REGISTERED.NO-CELL-AVAILABLE and initiate a tracking area update procedure (see 3GPP TS 24.301 [15]).

At inter-system change from N1 mode to S1 mode in EMM-IDLE mode when:（NO PDU SESSION）

a) the UE supports non-IP PDN type and no PDU session is active; or

b) the UE does not support non-IP PDN type and no PDU session of IPv4, IPv6 or IPv4v6 PDU session type is active,

the UE shall enter substates EMM-DEREGISTERED.NORMAL-SERVICE and 5GMM-DEREGISTERED.NO-CELL-AVAILABLE, and initiate an attach procedure.

At inter-system change from S1 mode to N1 mode in 5GMM-IDLE mode, the UE shall:

a) enter substate 5GMM-REGISTERED.NORMAL-SERVICE and substate EMM-REGISTERED.NO-CELL-AVAILABLE;

b) map the default EPS bearer context(s) of the PDN connection(s) which the UE intends to transfer to 5GS, if any, to the corresponding PDU session(s) as specified in subclause 6.1.4.2; and

c) initiate the registration procedure for mobility and periodic registration update indicating "mobility registration updating" in the 5GS registration type IE of the REGISTRATION REQUEST message (see subclause 5.5.1.3).

After having successfully registered in N1 mode the UE shall reset the registration attempt counter and the attach attempt counter (see 3GPP TS 24.301 [15]) and:

a) if the UE supports the PDU session establishment procedure with request type set to "existing PDU session" to transfer a PDN connection from S1 mode to N1 mode and the UE has received an "interworking without N26 interface supported" indication from the network, attempt to transfer the PDN connection(s) which the UE intends to transfer to 5GS, if any, from S1 mode to N1 mode by initiating the PDU session establishment procedure with request type set to "existing PDU session"; and

b) otherwise, establish PDU session(s) corresponding to the PDN connection(s) which the UE intends to transfer to 5GS, if any, by initiating the PDU session establishment procedure with request type set to "initial request".

See subclause 5.1.4.3 for coordination between 5GMM and EMM and subclause 6.1.4.2 for coordination between 5GSM and ESM.

[TS 38.331, clause 5.3.11]

UE shall:

1> reset MAC;

1> if T302 is running:

2> stop timer T302;

2> perform the actions as specified in 5.3.14.4;

1> stop all timers that are running except T320 and T325;

1> discard the UE Inactive AS context;

1> set the variable *pendingRnaUpdate* to *false*, if that is set to *true*;

1> discard the KgNB, the KRRCenc key, the KRRCint, the KUPint key and the KUPenc key, if any;

1> release all radio resources, including release of the RLC entity, the MAC configuration and the associated PDCP entity and SDAP for all established RBs;

1> indicate the release of the RRC connection to upper layers together with the release cause;

1> enter RRC\_IDLE and perform cell selection as specified in TS 38.304 [20], except if going to RRC\_IDLE was triggered by selecting an inter-RAT cell while T311 was running;

1> if going to RRC\_IDLE was triggered by reception of the *RRCRelease* message including a *waitTime*:

2> start timer T302 with the value set to the *waitTime*;

2> inform the upper layer that access barring is applicable for all access categories except categories '0' and '2'.

11.1.2.3 Test description

11.1.2.3.1 Pre-test conditions

System Simulator:

- 2 cells

- NR Cell 1 as defined in TS 38.508-1 [4] Table 4.4.2-3. System information combination NR-6 as defined in TS 38.508-1 [4], sub-clause 4.4.3.1.2.

- E-UTRA Cell 1 as defined in TS 36.508 [7] Table 4.4.2-2. System information combination 31 as defined in TS 36.508 [7], sub-clause 4.4.3.1.1.

- Power levels are constant and as defined in Tables 11.1.2.3.1-1/2.

Table 11.1.2.3.1-1: Time instances of cell power level and parameter changes for conducted test environment

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter name | Unit | NR Cell 1 | E-UTRA Cell 1 | Remark |
| T0 | SS/PBCH SSS EPRE | dBm/SCS | -88 | - |  |
| RS EPRE | dBm/15kHz | - | -91 |

Table 11.1.2.3.1-2: Time instances of cell power level and parameter changes for OTA test environment

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter name | Unit | NR Cell 1 | E-UTRA Cell 1 | Remark |
| T0 | SS/PBCH SSS EPRE | dBm/SCS | -82 | - |  |
| RS EPRE | dBm/15kHz | - | -91 |

UE:

- None

Preamble:

- With E-UTRA Cell 1 "Serving cell" and NR Cell 1 "Non-suitable "Off" cell" in accordance with TS 38.508-1 [4], Table 6.2.2.1-3, the UE is brought to state RRC\_IDLE using generic procedure parameters Connectivity (*E-UTRA/EPC*) and Unrestricted nr PDN (*On*) in accordance with the procedure described in TS 38.508-1 [4], clause 4.5.2. 4G GUTI and eKSI are assigned and security context established

- The UE is switched-off

- With E-UTRA Cell 1 "Non-suitable "Off" cell" and NR Cell 1 "Serving cell" in accordance with TS 38.508-1 [4], Table 6.2.2.1-3, the UE is brought to state 1N-A, RRC\_IDLE Connectivity (NR), in accordance with the procedure described in TS 38.508-1 [4], with one IMS PDU session on NR Cell 1, Table 4.5.2.2-2. 5G-GUTI and ngKSI are assigned and security context established.

11.1.2.3.2 Test procedure sequence

Table 11.1.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U – S | Message |  |  |
| 1 | Void | - | - | - | - |
| - | EXCEPTION: Unless otherwise stated the following messages are exchanged on NR Cell 1. | - | - | - | - |
| 2 | User initiates a MMTEL call. | - | - | - | - |
| 3 | Check: Does the UE transmit an *RRCSetupRequest* message with *EstablishmentCause* set to ‘*mo-VoiceCall*’? | --> | NR RRC: RRCSetupRequest | 1 | P |
| 4 | The SS transmits an *RRCSetup* message. | <-- | NR RRC: *RRCSetup* | - | - |
| 5 | Check: Does the UE transmit an *RRCSetupComplete* message and a SERVICE REQUEST message with *Service Type* set to ‘*data*’? | --> | NR RRC: RRCSetupComplete  5GMM: SERVICE REQUEST | 1 | P |
| 5AA | Set the power levels according to “T0” as per Table 11.1.2.3.1-1/2. | - | - | - | - |
| 5A | Void | - | - | - | - |
| 5B | Void | - | - | - | - |
| 5C-5F | Steps 5-8 of expected sequence from Table 4.5.4.2-3 as defined in TS 38.508-1 [4] are performed. | - | - | - | - |
| 5G-5K | Steps 1-5 of expected sequence from A.9.1 as defined in TS 34.229-5 [41] are performed for initiating an MTSI MO speech call. | - | - | - | - |
| 6 | The SS transmits an *RRCRelease* message indicating redirection to E-UTRA Cell 1. | <-- | NR RRC: RRCRelease | - | - |
| - | EXCEPTION: Unless otherwise stated the following messages are exchange on E-UTRA Cell 1. | - | - | - | - |
| 7 | The UE transmits an *RRCConnectionRequest* message on the cell specified in the test case. | --> | RRC: RRCConnectionRequest | - | - |
| 8 | SS transmits an *RRCConnectionSetup* message. | <-- | RRC: RRCConnectionSetup | - |  |
| - | EXCEPTION: Steps 8a1 to 8b18 describe behaviour that depends on the UE implementation; the "lower case letter" identifies a step sequence that take place depending on the UE implementation. | - | - | - | - |
| 8a1 | If the UE tries to preserve the IP address of the PDN connection then check does the UE transmit an ATTACH REQUEST message? | --> | RRC: RRCConnectionSetupComplete NAS: ATTACH REQUEST | 2 | P |
| 8b1 | Else check: does the UE transmit a TRACKING AREA UPDATE REQUEST message? | --> | RRC: *RRCConnectionSetupComplete* NAS: TRACKING AREA UPDATE REQUEST | 2 | P |
| 8b2 | The SS transmits a TRACKING AREA UPDATE REJECT message to UE. | <-- | RRC: DLInformationTransfer  NAS: TRACKING AREA UPDATE REQUEST REJECT | - | - |
| 8b3 | The UE transmits an ATTACH REQUEST message. | --> | RRC: ULInformationTransfer  NAS: ATTACH REQUEST | - | - |
| 9-20 | Steps 5 to 16 of the generic test procedure for UE registration (TS 36.508 [7] Table 4.5.2.3-1) | - | - | - | - |
| - | EXCEPTION: In parallel to the events described in steps 24A to 29 the steps specified in Table 11.1.2.3.2-2 may take place to transfer other PDU sessions to EPS.  NOTE: The total number of PDN connections to be established are less than or equal to the PDU sessions established on 5G with the same parameters as the PDU sessions established in 5G. | - | - | - | - |
| - | EXCEPTION: In parallel to the events described in steps 24A to 29 the UE may perform IMS re-registration on EUTRAN as defined in TS 34.229-1 [35] subclause C.46 | - | - | - | - |
| 21a1 – 21a3 | Void | - | - | - | - |
| 21b1 – 21b3 | Void | - | - | - | - |
| 22-24 | Void | - | - | - | - |
| 24A | The SS configures a new RLC-UM data radio bearer with condition DRB (0,1), associated with the dedicated EPS bearer context. *RRCConnectionReconfiguration* message contains the ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST message. EPS bearer context #4 (QCI 1) according to table 6.6.2-1: Reference dedicated EPS bearer contexts. | <-- | RRC: RRCConnectionReconfiguration  NAS:  ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST | - | - |
| - | EXCEPTION: In parallel to the events described in steps 24B-24C the steps specified in table 11.1.2.3.2-3 will take place. | - | - | - | - |
| 24B | The UE transmits an *RRCConnectionReconfigurationComplete* message to confirm the establishment of the new data radio bearer, associated with the dedicated EPS bearer. | --> | RRC: RRCConnectionReconfigurationComplete | - | - |
| 24C | The UE transmits an ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT message. | --> | RRC: ULInformationTransfer  NAS:ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT | - | - |
| 25-28 | Void | - | - | - | - |
| 29 | The SS waits 1 second. | - | - | - | - |
| 30 | Release IMS Call as specified in the generic procedure in TS 34.229-1 [35] subclause C.32. | - | - | - | - |

Table 11.1.2.3.2-2: Parallel behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Check: Does the UE transmit a PDN CONNECTIVITY REQUEST message to request an additional PDN. | --> | RRC: ULInformationTransfer  NAS: PDN CONNECTIVITY REQUEST | 1 | P |
| 2 | The SS configures a new data radio bearer, associated with the additional default EPS bearer context. *RRCConnectionReconfiguration* message contains the ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message. | <-- | RRC: RRCConnectionReconfiguration  NAS:  ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST |  |  |
| 3 | The UE transmits an *RRCConnectionReconfigurationComplete* message to confirm the establishment of additional default bearer. | --> | RRC: RRCConnectionReconfigurationComplete |  |  |
| - | EXCEPTION: In parallel to the event described in step 4 below, if initiated by the UE the generic procedure for IP address allocation in the U-plane specified in TS 36.508 [7] subclause 4.5A.1 takes place performing IP address allocation in the U-plane. | - | - |  |  |
| 4 | The UE transmits an ACTIVATE DEFAULT EPS BEARER CONTEXT ACCEPT message. | --> | RRC: ULInformationTransfer  NAS: ACTIVATE DEFAULT EPS BEARER CONTEXT ACCEPT |  |  |

Table 11.1.2.3.2-3: Parallel behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1-5 | Steps 1 to 5 of the Generic test procedure for setting up MTSI MO speech call - EPS fallback according TS 34.229-5 [41] subclause A.9.2 take place. | - | - | - | - |
| 6 | Step 6 of the Generic test procedure for setting up MTSI MO speech call - EPS fallback according TS 34.229-5 [41] subclause A.9.2 takes place. | - | - | 2 | P |

11.1.2.3.3 Specific message contents

Table 11.1.2.3.3-0: REGISTRATION ACCEPT (preamble; step 14, TS 38.508-1 [4], Table 4.5.2.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| Extended protocol discriminator | ‘0111 1110’B | 5GS mobility management messages |  |
| Security header type | ’0000’B | Plain 5GS NAS message, not security protected |  |
| Spare half octet | '0000'B |  |  |
| 5GS network feature support | ‘0100 0001 0000 0000’B | Interworking without N26 interface supported |  |

Table 11.1.2.3.3-1: RRCSetupRequest (step 3, table 11.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.6.1-23 | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCSetupRequest ::= SEQUENCE { |  |  |  |
| rrcSetupRequest SEQUENCE { |  |  |  |
| establishmentCause | Mo-Voicecall |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.1.2.3.3-2: SERVICE REQUEST (step 5, table 11.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-16 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Service type | ‘0001’B | data |  |
| Uplink data status | Present | PSI bit corresponding to IMS PDN needs to be set |  |

Table 11.1.2.3.3-3: RRCRelease (step 6, table 11.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.6.1-16 | | | |
| Information Element | Value/Remark | Comment | Condition |
| RRCRelease ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcRelease SEQUENCE { |  |  |  |
| redirectedCarrierInfo CHOICE { |  |  |  |
| eutra.SEQUENCE{ |  |  |  |
| eutraFrequency | Downlink EARFCN of E-UTRA cell 1 |  |  |
| cnType | epc |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.1.2.3.3-3A: ATTACH REQUEST (step 8a1, table 11.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7.2-4. | | | |
| Information Element | Value/Remark | Comment | Condition |
| NAS key set identifier | KSIASME that was created when the UE last registered to EPC E-UTRA |  |  |
| EPS mobile identity | GUTI, assigned by E-UTRA Cell 1 at the initial registration when the UE entered S1 |  |  |
| Last visited registered TAI | The TAI the last visited E-UTRA Cell belonged to, if any. Not included if the UE does not have last stored EPC TAI. |  |  |
| Old GUTI type | "Native GUTI" |  |  |
| ESM message container | PDN CONNECTIVITY REQUEST message to active PDU sessions which the UE intends to transfer to EPS. |  |  |

Table 11.1.2.3.3-3B: PDN CONNECTIVITY REQUEST (Table 11.1.2.3.3-3A)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7.3-20 | | | |
| Information Element | Value/remark | Comment | Condition |
| EPS bearer identity | 0 | No EPS bearer identity assigned, for coding see Table 9.11.4.8.1 in TS 24.501 [22] |  |
| Procedure transaction identity | Any value from 1 to 254 |  |  |
| PDN connectivity request message identity | '1101 0000'B | PDN connectivity request |  |
| Request type | '010'B | Handover |  |
| PDN type | Any value between '001'B, '010'B, '011'B and '100'B | The allowed values are respectively IPv4, IPv6, IPv4v6 and "unused but interpreted as IPv6 by the network" |  |
| Protocol configuration options | PDU session ID of 5GS PDU session |  |  |

Table 11.1.2.3.3-4: TRACKING AREA UPDATE REQUEST (step 8b1, table 11.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7.2-27 with condition NR. | | | |
| Information Element | Value/Remark | Comment | Condition |
| "Active" flag | 0001 | Bearer Establishment requested |  |
| EPS bearer context status | Present | EBI corresponding to active PDU Sessions need to be set to 1 |  |
| NAS key set identifier | KSIASME that was created when the UE last registered to EPC E-UTRA |  |  |
| Old GUTI | GUTI, mapped from the 5G-GUTI assigned at the initial registration when the UE entered N1 |  |  |
| Last visited registered TAI | The TAI the last visited E-UTRA Cell belonged to, if any. Not included if the UE does not have last stored EPC TAI. |  |  |
| Old GUTI type | "Native GUTI" |  |  |
| UE status | "UE is in 5GMM-REGISTERED state" |  |  |

Table 11.1.2.3.3-5: TRACKING AREA UPDATE REJECT (step 8b2, table 11.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7.2-26. | | | |
| Information Element | Value/Remark | Comment | Condition |
| EMM cause | ‘0000 1001’B | #9 "UE identity cannot be derived by the network" |  |

Table 11.1.2.3.3-6: ATTACH REQUEST (step 8b3, table 11.1.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7.2-4. | | | |
| Information Element | Value/Remark | Comment | Condition |
| IMSI | IMSI of the UE |  |  |

Table 11.1.2.3.3-7: PDN CONNECTIVITY REQUEST (step 1, table 11.1.2.3.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7.3-20 | | | |
| Information Element | Value/remark | Comment | Condition |
| EPS bearer identity | 0 | No EPS bearer identity assigned, for coding see Table 9.11.4.8.1 in TS 24.501 [22] |  |
| Procedure transaction identity | Any value from 1 to 254 |  |  |
| PDN connectivity request message identity | '1101 0000'B | PDN connectivity request |  |
| Request type | '010'B | Handover |  |
| PDN type | Any value between '001'B, '010'B, '011'B and '100'B | The allowed values are respectively IPv4, IPv6, IPv4v6 and "unused but interpreted as IPv6 by the network" |  |
| Protocol configuration options | PDU session ID of 5GS PDU session |  |  |

Table 11.1.2.3.3-8: ATTACH ACCEPT (preamble, step 18; step 14, TS 36.508 [7], Table 4.5.2.3-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 36.508 [7] Table 4.7.2-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| EPS network feature support | '0000 0011 0100 1000'B | - IMS voice over PS session in S1 mode supported  - emergency bearer services in S1 mode supported  - ePCO supported  - Interworking without N26 interface supported |  |

Table 11.1.2.3.3-9: ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST (preamble, step 18; step 14, TS 36.508 [7], Table 4.5.2.3-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7] Table 4.7.3-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol configuration options |  |  |  |
| Container ID n+2 | Not present | Session-AMBR are not present |  |
| Container ID n+3 | Not present | QoS rules are not present |  |
| Container ID n+4 | Not present | Qos flow descriptions are not present |  |

### 11.1.3 MO MMTEL voice call setup from NR RRC\_CONNECTED / EPS Fallback with handover / Single registration mode with N26 interface / Success

11.1.3.1 Test Purpose (TP)

(1)

***with*** { UE supporting both S1 mode and N1 mode and operating in single-registration mode, and, the Network has indicated "interworking without N26 interface not supported", **and**, the UE is in NR RRC\_CONNECTED state }

***ensure that*** {

***when*** { User initiates a MMTEL call, the MO IMS voice session establishment has been initiated and the UE receives a *MobilityFromNRCommand* message which includes *targetRAT-Type* set to *eutra* }

***then*** { UE performs a handover to the E-UTRA including a TAU procedure, ***and***, the UE successfully completes the MO MMTEL call in EPS }

}

11.1.3.2 Conformance requirements

References: The conformance requirements covered in the present test case are specified in: TS 23.502, clauses 4.13.6.1, TS 24.501, clauses 4.8.2.2, 5.5.1.2.2, 5.5.1.2.4, 5.1.4.2 and 6.1.4.1, TS 38.331, clause 5.4.3.3 and 5.4.3.4. Unless otherwise stated these are Rel-15 requirements.

[TS 23.502, clause 4.13.6.1]

Figure 4.13.6.1-1 describes the EPS fallback procedure for IMS voice.

When the UE is served by the 5G System, the UE has one or more ongoing PDU Sessions each including one or more QoS Flows. The serving PLMN AMF has sent an indication towards the UE during the Registration procedure that IMS voice over PS session is supported, see clause 5.16.3.10 in TS 23.501 [2] and the UE has registered in the IMS. If N26 is not supported, the serving PLMN AMF sends an indication towards the UE during the Registration procedure that interworking without N26 is supported, see clause 5.17.2.3.1 in TS 23.501 [2].



Figure 4.13.6.1-1: EPS Fallback for IMS voice

1. UE camps on NG-RAN in the 5GS and an MO or MT IMS voice session establishment has been initiated.

2. Network initiated PDU Session modification to setup QoS flow for voice reaches the NG-RAN (see N2 PDU Session Request in clause 4.3.3).

3. NG-RAN is configured to support EPS fallback for IMS voice and decides to trigger fallback to EPS, taking into account UE capabilities, indication from AMF that "Redirection for EPS fallback for voice is possible" (received as part of initial context setup as defined in TS 38.413 [10]), network configuration (e.g. N26 availability configuration) and radio conditions. If NG-RAN decides not to trigger fallback to EPS, then the procedure stops here and following steps are not executed.

NG-RAN may initiate measurement report solicitation from the UE including E-UTRAN as target.

NOTE 1: If AMF has indicated that "Redirection for EPS fallback for voice is not possible", then AN Release via inter-system redirection to EPS is not performed in step 5.

4. NG-RAN responds indicating rejection of the PDU Session modification to setup QoS flow for IMS voice received in step 2 by PDU Session Response message towards the PGW-C+SMF (or H-SMF+P-GW-C via V-SMF, in case of roaming scenario) via AMF with an indication that mobility due to fallback for IMS voice is ongoing. The PGW-C+SMF maintains the PCC rule(s) associated with the QoS Flow(s).

5. NG-RAN initiates either handover (see clause 4.11.1.2.1), or AN Release via inter-system redirection to EPS (see clause 4.2.6 and clause 4.11.1.3.2), taking into account UE capabilities. The PGW-C+SMF reports change of the RAT type if subscribed by PCF as specified in clause 4.11.1.2.1, or clause 4.11.1.3.2.6. When the UE is connected to EPS, either 6a or 6b is executed

6a. In the case of 5GS to EPS handover, see clause 4.11.1.2.1, and in the case of inter-system redirection to EPS with N26 interface, see clause 4.11.1.3.2. In either case the UE initiates TAU procedure; or

6b. In the case of inter-system redirection to EPS without N26 interface, see clause 4.11.2.2. If the UE supports Request Type flag "handover" for PDN connectivity request during the attach procedure as described in clause 5.3.2.1 of TS 23.401 [13] and has received the indication that interworking without N26 is supported, then the UE initiates Attach with PDN connectivity request with request type "handover".

In inter-system redirection, the UE uses the emergency indication in the RRC message as specified in clause 6.2.2 of TS 36.331 [16] and E-UTRAN provides the emergency indication to MME during Tracking Area Update or Attach procedure. For the handover procedure see clause 4.11.1.2.1, step 1.

7. After completion of the mobility procedure to EPS or as part of the 5GS to EPS handover procedure (see clause 4.11.1.2.1), the SMF/PGW re-initiates the setup of the dedicated bearer for IMS voice, mapping the 5G QoS to EPC QoS parameters. The PGW-C+SMF behaves as specified in clause 4.9.1.3.1. The PGW-C+SMF reports about Successful Resource Allocation and Access Network Information if subscribed by PCF.

8. The IMS voice session establishment is continued.

At least for the duration of the voice call in EPS the E-UTRAN is configured to not trigger any handover to 5GS.

[TS 24.501, clause 4.8.2.2]

See subclause 5.1.4.2 for coordination between 5GMM and EMM and subclause 6.1.4.1 for coordination between 5GSM and ESM.

[TS 24.501, clause 5.5.1.2.2]

If the UE supports S1 mode, the UE shall:

- set the S1 mode bit to "S1 mode supported" in the 5GMM capability IE of the REGISTRATION REQUEST message;

- include the S1 UE network capability IE in the REGISTRATION REQUEST message; and

- if the UE supports sending an ATTACH REQUEST message containing a PDN CONNECTIVITY REQUEST message with request type set to "handover" to transfer a PDU session from N1 mode to S1 mode, set the HO attach bit to "attach request message containing PDN connectivity request with request type set to handover to transfer PDU session from N1 mode to S1 mode supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

[TS 24.501, clause 5.5.1.2.4]

If the UE included S1 mode supported indication in the REGISTRATION REQUEST message, the AMF supporting interworking with EPS shall set the IWK N26 bit to either:

a) "interworking without N26 interface not supported" if the AMF supports N26 interface ; or

b) "interworking without N26 interface supported" if the AMF does not support N26 interface

in the 5GS network feature support IE in the REGISTRATION ACCEPT message.

The UE supporting S1 mode shall operate in the mode for interworking with EPS as follows:

a) if the IWK N26 bit in the 5GS network feature support IE is set to "interworking without N26 interface not supported", the UE shall operate in single-registration mode;

b) if the IWK N26 bit in the 5GS network feature support IE is set to "interworking without N26 interface supported" and the UE supports dual-registration mode, the UE may operate in dual-registration mode; or

NOTE 3: The registration mode used by the UE is implementation dependent.

c) if the IWK N26 bit in the 5GS network feature support IE is set to "interworking without N26 interface supported" and the UE only supports single-registration mode, the UE shall operate in single-registration mode.

The UE shall treat the received interworking without N26 interface indicator for interworking with EPS as valid in the entire PLMN and its equivalent PLMN(s).

The network informs the UE about the support of specific features, such as IMS voice over PS session, emergency services or emergency services fallback, in the 5GS network feature support information element. In a UE with IMS voice over PS session capability, the IMS voice over PS session indicator, the Emergency services support indicator, and the Emergency services fallback indicator shall be provided to the upper layers. The upper layers take the IMS voice over PS session indicator into account when selecting the access domain for voice sessions or calls. When initiating an emergency call, the upper layers also take the IMS voice over PS session indicator, the Emergency services support indicator, and the Emergency services fallback indicator into account for the access domain selection.

[TS 24.501, clause 5.1.4.2]

At inter-system change from N1 mode to S1 mode when there is at least one active PDU session for which interworking with EPS is supported as specified in subclause 6.1.4.1, the UE shall enter substates EMM-REGISTERED.NORMAL-SERVICE and 5GMM-REGISTERED.NO-CELL-AVAILABLE and initiate a tracking area updating procedure (see 3GPP TS 24.301 [15]).

[TS 24.501, clause 6.1.4.1]

Upon inter-system change from N1 mode to S1 mode, the UE shall create the default EPS bearer context and the dedicated EPS bearer context(s) based on the parameters of the mapped EPS bearer contexts or the associations between QoS flow and mapped EPS bearer in the PDU session, if available. The EPS bearer identity assigned for the QoS flow of the default QoS rule becomes the EPS bearer identity of the default bearer in the corresponding PDN connection. If there is no EPS bearer identity assigned to the QoS flow of the default QoS rule, the UE shall release locally the PDU session. If there is no EPS bearer identity assigned to the QoS flow(s) which is not associated with the default QoS rule, the UE shall locally delete the QoS rules and the QoS flow level QoS parameters associated with the QoS flow(s). The UE uses the parameters from each PDU session for which interworking with EPS is supported to create corresponding default EPS bearer context and optionally dedicated EPS bearer context(s) as follows:

a) the PDU session type of the PDU session shall be mapped to the PDN type of the default EPS bearer context as follows:

1) the PDN type shall be set to "non-IP" if the PDU session type is "Ethernet" or "Unstructured";

2) the PDN type shall be set to "IPv4" if the PDU session type is "IPv4";

3) the PDN type shall be set to "IPv6" if the PDU session type is "IPv6"; and

4) the PDN type shall be set to "IPv4v6" if the PDU session type is "IPv4v6";

b) the PDU address of the PDU session shall be mapped to the PDN address of the default EPS bearer context as follows:

1) the PDN address of the default EPS bearer context is set to the PDU address of the PDU session, if the PDU session type is "IPv4", "IPv6" or "IPv4v6"; and

2) the PDN address of the default EPS bearer context is set to zero, if the PDU session type is "Ethernet" or "Unstructured";

c) the DNN of the PDU session shall be mapped to the APN of the default EPS bearer context;

d) the APN-AMBR and extended APN-AMBR received in the parameters of the default EPS bearer context of the mapped EPS bearer contexts shall be mapped to the APN-AMBR and extended APN-AMBR of the default EPS bearer context;

e) for each PDU session in state PDU SESSION ACTIVE, PDU SESSION MODIFICATION PENDING or PDU SESSION INACTIVE PENDING the UE shall set the state of the mapped EPS bearer context(s) to BEARER CONTEXT ACTIVE; and

f) for any other PDU session the UE shall set the state of the mapped EPS bearer context(s) to BEARER CONTEXT INACTIVE.

Additionally, for each mapped EPS bearer context or the association between QoS flow and mapped EPS bearer in the PDU session:

a) the EPS bearer identity shall be set to the EPS bearer identity received in the mapped EPS bearer context, or the EPS bearer identity associated with the QoS flow;

b) the EPS QoS parameters shall be set to the mapped EPS QoS parameters of the EPS bearer received in the mapped EPS bearer context, or the EPS QoS parameters associated with the QoS flow;

c) the extended EPS QoS parameters shall be set to the mapped extended EPS QoS parameters of the EPS bearer received in the mapped EPS bearer context, or the extended EPS QoS parameters associated with the QoS flow; and

d) the traffic flow template shall be set to the mapped traffic flow template of the EPS bearer received in the mapped EPS bearer context, or the stored traffic flow template associated with the QoS flow, if available.

After inter-system change from N1 mode to S1 mode, the UE shall associate the PDU session identity, the S-NSSAI, and the session-AMBR with the default EPS bearer context, and for each EPS bearer context mapped from one or more QoS flows, associate the QoS rule(s) for the QoS flow(s) and the QoS flow description(s) for the QoS flow(s) with the EPS bearer context.

After inter-system change from N1 mode to S1 mode, the UE and the SMF shall maintain the PDU session type of the PDU session until the PDN connection corresponding to the PDU session is released if the UE supports non-IP PDN type and the PDU session type is "Ethernet" or "Unstructured".

After inter-system change from N1 mode to S1 mode, the UE and the SMF shall maintain the always-on PDU session indication.

After inter-system change from N1 mode to S1 mode, the UE and the SMF shall maintain the maximum number of supported packet filters until the PDN connection corresponding to the PDU session is released.

[TS 38.331, clause 5.4.3.3]

The UE shall:

1> if T390 is running:

2> stop timer T390 for all access categories;

2> perform the actions as specified in 5.3.14.4;

1> if the *targetRAT-Type* is set to *eutra*:

2> consider inter-RAT mobility as initiated towards E-UTRA;

2> forward the *nas-SecurityParamFromNR* to the upper layers, if included;

1> access the target cell indicated in the inter-RAT message in accordance with the specifications of the target RAT.

[TS 38.331, clause 5.4.3.4]

Upon successfully completing the handover, at the source side the UE shall:

1> reset MAC;

1> stop all timers that are running;

1> release ran-NotificationAreaInfo, if stored;

1> release the AS security context including the KRRCenc key, the KRRCint key, the KUPint key and the KUPenc key, if stored;

1> release all radio resources, including release of the RLC entity and the MAC configuration;

1> if the E-UTRA *RRCConnectionReconfiguration* message included in the received *MobilityFromNRCommand* does not include *fullConfig*:

2> maintain source RAT configuration of PDCP and SDAP for applicable RBs which is used for target RAT RBs;

1> else:

2> release the associated PDCP entity and SDAP entity for all established RBs;

1> indicate the release of the RRC connection to upper layers together with the release cause 'other'.

11.1.3.3 Test Description

11.1.3.3.1 Pre-test conditions

System Simulator:

- 2 cells

- NR Cell 1 as defined in TS 38.508-1 [4] Table 4.4.2-3. System information combination NR-6 as defined in TS 38.508-1 [4], sub-clause 4.4.3.1.2.

- E-UTRA Cell 1 as defined in TS 36.508 [7] Table 4.4.2-2. System information combination 31 as defined in TS 36.508 [7], sub-clause 4.4.3.1.1.

- N26 interface is configured.

- Power levels are constant and as defined in Tables 11.1.3.3.1-1/2.

Table 11.1.3.3.1-1: Time instances of cell power level and parameter changes for conducted test environment

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter name | Unit | NR Cell 1 | E-UTRA Cell 1 | Remark |
| T0 | SS/PBCH SSS EPRE | dBm/SCS | -88 | - |  |
| RS EPRE | dBm/15kHz | - | -91 |

Table 11.1.3.3.1-2: Time instances of cell power level and parameter changes for OTA test environment

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter name | Unit | NR Cell 1 | E-UTRA Cell 1 | Remark |
| T0 | SS/PBCH SSS EPRE | dBm/SCS | -82 | - |  |
| RS EPRE | dBm/15kHz | - | -91 |

UE:

- The UE is configured to not use IMS preconditions.

Preamble:

- With E-UTRA Cell 1 "Serving cell" and NR Cell 1 "Non-suitable "Off" cell" in accordance with TS 38.508-1 [4], Table 6.2.2.1-3, the UE is brought to state RRC\_IDLE using generic procedure parameters Connectivity (*E* *-UTRA/EPC*) and Unrestricted nr PDN (*On*) in accordance with the procedure described in TS 38.508-1 [4], clause 4.5.2. 4G GUTI and eKSI are assigned and security context established.

- The UE is switched-off.

- With E-UTRA Cell 1 "Non-suitable "Off" cell" and NR Cell 1 "Serving cell" in accordance with TS 38.508-1 [4], Table 6.2.2.1-3, the UE is brought to state 1N-A, RRC\_IDLE Connectivity (NR) with at least one IMS PDU session on NR Cell 1, in accordance with the procedure described in TS 38.508-1 [4], Table 4.5.2.2-2. 5G-GUTI and ngKSI are assigned.

11.1.3.3.2 Test procedure sequence

Table 11.1.3.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Void | - | - | - | - |
| - | The following messages are to be observed on NR Cell 1 unless explicitly stated otherwise. | - | - | - | - |
| 2 | The SS transmits a *Paging* message. | <-- | NR RRC: *Paging* | - | - |
| 3 | The UE transmits an *RRCSetupRequest* message. | --> | NR RRC: RRCSetupRequest | - | - |
| 4-9 | Steps 3 to 8 of the NR RRC\_CONNECTED procedure in TS 38.508-1 [4] Table 4.5.4.2-3 are executed to successfully complete the service request procedure. | - | - | - | - |
| 9A | Set the power levels according to “T0” as per Table 11.1.3.3.1-1/2. | - | - | - | - |
| 10a1 | Void | - | - | - | - |
| 11 | Make the UE attempt an MTSI MO Speech Call. | - | - | - | - |
| 12-16 | Steps 1-5 of the MTSI MO speech call for 5GS procedure according to Annex A.9.1 of TS 34.229-5 [41] take place. | - | - | - | - |
| 17 | The SS transmits a *MobilityFromNRCommand* message which includes targetRAT-Type set to eutra according to 38.508-1 [4] Table 4.6.1-8. | <-- | NR RRC: MobilityFromNRCommand | - | - |
| - | The following messages are to be observed on E-UTRA Cell 1 unless explicitly stated otherwise. | - | - | - | - |
| 18 | Check: Does the UE transmit an RRCConnectionReconfigurationComplete message to confirm the successful completion of handover? | --> | RRC: RRCConnectionReconfigurationComplete | 1 | P |
| 19 | The UE transmits an *ULInformationTransfer* message on the cell specified in the test case. This message includes a TRACKING AREA UPDATE REQUEST message. | --> | RRC: ULInformationTransfer  NAS: TRACKING AREA UPDATE REQUEST | 1 | P |
| 20-23 | Steps 4a1-6 of the generic test procedure in TS 38.508-1 [4] Table 4.9.7.2.2-1 for N1 to S1 Inter mode change with condition ‘connected without release’ & ‘mapped 5G security context’ are performed to make sure successfully camped on E-UTRAN cell upon mobility from NR. | - | - | - | - |
| 24 | The SS configures a new RLC-UM data radio bearer with condition DRB (0,1), associated with the dedicated EPS bearer context. *RRCConnectionReconfiguration* message contains the ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST message. EPS bearer context #4 (QCI 1) according to TS 36.508 [7] Table 6.6.2-1: Reference dedicated EPS bearer contexts.  Reference dedicated EPS bearer contexts is to establish the dedicated EPS bearer context on IMS PDN. | <-- | RRC: RRCConnectionReconfiguration  NAS: ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST | - | - |
| - | EXCEPTION: In parallel to the events described in steps 25-28 below, the steps specified in table 11.1.3.3.2-2 will take place. | - | - | - | - |
| 25 | The UE transmits an RRCConnectionReconfigurationComplete message. | --> | RRC: RRCConnectionReconfigurationComplete | - | - |
| 26 | The UE transmits an *ULInformationTransfer* message including the ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT message. | --> | RRC: ULInformationTransfer  NAS: ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT | - | - |
| 27 | The SS waits 1 second for call duration. | - | - | - | - |
| 28a1 | Void | - | - | - | - |
| 29 | Release IMS Call as specified in the generic procedure in TS 34.229-1 [35] subclause C.32. | - | - | - | - |

Table 11.1.3.3.2-2: Parallel behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| - | EXCEPTION: Steps 1a1 to 1b7 describe behaviour that depends on the UE capability; the "lower case letter" identifies a step sequence that take place if a capability is supported | - | - | - | - |
| 1a1-a2 | The UE performs IMS re-registration on EUTRAN as per steps 1-2 as defined in TS 34.229-1 [35] C.46. | - | - | - | - |
| 1a3-1a6A | Steps 1-5 clause A.9.2 “EPS Fallback for Voice Call / steps after fallback / 5GS” of TS 34.229-5 [41] take place. | - | - | - | - |
| 1a7 | Check: Does the UE perform step 6 of the generic procedure “EPS Fallback for Voice Call / steps after fallback / 5GS” as defined in Appendix A.9.2 of TS 34.229-5 [41] | --> | SIP: ACK | 1 | P |

11.1.3.3.3 Specific message contents

Table 11.1.3.3.3-1: REGISTRATION REQUEST (preamble, Table 11.1.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM capability |  |  |  |
| S1 mode | '1'B | S1 mode supported |  |
| S1 UE network capability | Present but contents not checked |  |  |

Table 11.1.3.3.3-2:REGISTRATION ACCEPT (preamble, Table 11.1.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS network feature support |  |  |  |
| IMS- VoPS-3GPP | '1'B | IMS voice over PS session supported over 3GPP access |  |
| IWK N26 | '0'B | Interworking without N26 interface not supported |  |

Table 11.1.3.3.3-3:PDU SESSION ESTABLISHMENT ACCEPT (preamble for PDU Session for PS data, Table 11.1.3.3.2-1)

|  |
| --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.2-2, condition Interworking\_with\_EPS |

Table 11.1.3.3.3-4:PDU SESSION ESTABLISHMENT ACCEPT (preamble for IMS PDU Session, Table 11.1.3.3.2-1)

|  |
| --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.2-2, condition Interworking\_with\_EPS, IMS\_DNN\_ Requested |

Table 11.1.3.3.3-5: Void

Table 11.1.3.3.3-6: MobilityFromNRCommand (step 17, Table 11.1.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.6.1-8 | | | |
| Information Element | Value/remark | Comment | Condition |
| MobilityFromNRCommand::= SEQUENCE { |  |  |  |
| rrc-TransactionIdentifier | RRC-TransactionIdentifier |  |  |
| criticalExtensions CHOICE { |  |  |  |
| mobilityFromNRCommand SEQUENCE { |  |  |  |
| targetRAT-Type | eutra |  |  |
| targetRAT-MessageContainer | RRCConnectionReconfig duration |  |  |
| nas-SecurityParamFromNR | 8 LSB of the downlink NAS COUNT |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.1.3.3.3-7: RRCConnectionReconfiguration (Table 11.1.3.3.3-6)

|  |
| --- |
| Derivation path: TS 36.508 [7], Table 4.6.1-8 with condition HO-TO-EUTRA(n,0) |

Table 11.1.3.3.3-8: MobilityControlInfo (Table 11.1.3.3.3-7)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 36.508 [7], Table 4.6.5-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| MobilityControlInfo ::= SEQUENCE { |  |  |  |
| targetPhysCellId | PhysicalCellIdentity of E-UTRA Cell 1 |  |  |
| carrierFreq SEQUENCE { |  |  |  |
| dl-CarrierFreq | Same downlink EARFCN as used for E-UTRA Cell 1 |  |  |
| } |  |  |  |
| carrierFreq | Not present |  | Band > 64 |
| carrierBandwidth SEQUENCE { |  |  |  |
| dl-Bandwidth | Downlink system bandwidth under test. |  |  |
| ul-Bandwidth | Uplink Bandwidth under test. |  | FDD |
| ul-Bandwidth | Not present |  | TDD |
| } |  |  |  |
| additionalSpectrumEmission | 1 |  | HO-to-EUTRA |
| carrierFreq-v9e0 SEQUENCE { |  |  | Band > 64 |
| dl-CarrierFreq-v9e0 | Same downlink EARFCN as used for E-UTRA Cell 1 |  |  |
| } |  |  |  |
| } |  |  |  |

|  |  |
| --- | --- |
| Condition | Explanation |
| FDD | FDD cell environment |
| TDD | TDD cell environment |
| Band > 64 | If band > 64 is selected |

Table 11.1.3.3.3-9:TRACKING AREA UPDATE REQUEST (step 19, Table 11.1.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1[4] Table 4.9.7.2.3-1. | | | |
| Information Element | Value/remark | Comment | Condition |
| EPS update type |  |  |  |
| "Active" flag | AnyValue |  |  |
| EPS bearer context status | Not checked | EBI corresponding to active PDU Sessions need to be set to 1 |  |

### 11.1.3a MO MMTEL enhanced voice service call setup from NR RRC\_CONNECTED / EPS Fallback with handover / Single registration mode with N26 interface / Success

11.1.3a.1 Test Purpose (TP)

(1)

**with** { UE supporting both S1 mode and N1 mode and configured to use preconditions and configured to use the EVS default configuration and the UE is in NR RRC\_CONNECTED state }

**ensure that** {

**when** { User initiates a MMTEL call, the MO IMS voice call has been initiated and the UE receives a *MobilityFromNRCommand* message which includes *targetRAT-Type* set to *eutra* an RRCRelease message which includes redirectedCarrierInfo indicating redirection to E-UTRA }

**then** { UE performs a handover to the E-UTRA including a TAU procedure, and, successfully completes the voice call setup in EPS using EVS}

}

11.1.3a.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 38.331 clause 5.4.3.3, 5.4.3.4 and TS 26.114 clause 5.2.1.1.

[TS 38.331, clause 5.4.3.3]

The UE shall:

1> if T390 is running:

2> stop timer T390 for all access categories;

2> perform the actions as specified in 5.3.14.4;

1> if the *targetRAT-Type* is set to *eutra*:

2> consider inter-RAT mobility as initiated towards E-UTRA;

2> forward the *nas-SecurityParamFromNR* to the upper layers, if included;

1> access the target cell indicated in the inter-RAT message in accordance with the specifications of the target RAT.

[TS 38.331, clause 5.4.3.4]

Upon successfully completing the handover, at the source side the UE shall:

1> reset MAC;

1> stop all timers that are running;

1> release ran-NotificationAreaInfo, if stored;

1> release the AS security context including the KRRCenc key, the KRRCint key, the KUPint key and the KUPenc key, if stored;

1> release all radio resources, including release of the RLC entity and the MAC configuration;

1> if the E-UTRA *RRCConnectionReconfiguration* message included in the received *MobilityFromNRCommand* does not include *fullConfig*:

2> maintain source RAT configuration of PDCP and SDAP for applicable RBs which is used for target RAT RBs;

1> else:

2> release the associated PDCP entity and SDAP entity for all established RBs;

1> indicate the release of the RRC connection to upper layers together with the release cause 'other'.

[TS 26.114, clause 5.2.1.1]

MTSI clients in terminals offering speech communication shall support narrowband, wideband and super-wideband communication.

…

MTSI clients in terminals offering super-wideband or fullband speech communication shall support:

- EVS codec …

11.1.3a.3 Test Description

11.1.3a.3.1 Pre-test conditions

System Simulator:

- NR Cell 1, E-UTRA Cell 1.

- System information for the NR Cell 1 in accordance with combination NR-6 in TS 38.508-1 [4] sub-clause 4.4.3.1.2, and, for the E-UTRA Cell 1 in accordance with system information combination 31 as defined in TS 36.508 [7], subclause 4.4.3.1.1.

- Power levels are constant and as defined in Tables 11.1.3a.3.1-1/2.

Table 11.1.3a.3.1-1: Time instances of cell power level and parameter changes for FR1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter name | Unit | NR Cell 1 | E-UTRA Cell 1 | Remark |
| T0 | SS/PBCH SSS EPRE | dBm/SCS | -88 |  |  |
| RS EPRE | dBm/15kHz |  | -85 |  |

Table 11.1.3a.3.1-2: Time instances of cell power level and parameter changes for FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter name | Unit | NR Cell 1 | E-UTRA Cell 1 | Remark |
| T0 | SS/PBCH SSS EPRE | dBm/SCS | -82 | - |  |
| RS EPRE | dBm/15kHz | - | -85 |

UE:

- The UE is configured to use preconditions.

Preamble:

- With E-UTRA Cell 1 "Serving cell" and NR Cell 1 "Non-suitable "Off" cell" in accordance with TS 38.508-1 [4], Table 6.2.2.1-3, the UE is brought to state RRC\_IDLE using generic procedure parameters Connectivity (*E-UTRA/EPC*) and Unrestricted nr PDN (*On*) in accordance with the procedure described in TS 38.508-1 [4], clause 4.5.2. 4G GUTI and eKSI are assigned and security context established.

- the UE is switched-off.

- With E-UTRA Cell 1 "Non-suitable "Off" cell" and NR Cell 1 "Serving cell" in accordance with TS 38.508-1 [4], Table 6.2.2.1-3, the UE is brought to state 1N-A, RRC\_IDLE Connectivity (*NR*), in accordance with the procedure described in TS 38.508-1 [4], Table 4.5.2.2-2. 5G-GUTI and ngKSI are assigned and security context established.

11.1.3a.3.2 Test procedure sequence

Table 11.1.3a.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| - | The following messages are to be observed on NR Cell 1 unless explicitly stated otherwise. | - | - | - | - |
| 1 | The SS transmits a *Paging* message. | <-- | NR RRC: *Paging* | - | - |
| 2 | The UE transmits an *RRCSetupRequest* message. | --> | NR RRC: RRCSetupRequest | - | - |
| 3-7 | Steps 3 to 8 of the NR RRC\_CONNECTED procedure in TS 38.508-1 [4] Table 4.5.4.2-3 are executed to successfully complete the service request procedure. | - | - | - | - |
| 8 | Set the power levels according to “T0” as per Table 11.1.3a.3.1-1/2. | - | - | - | - |
| 9 | Make the UE attempt an IMS voice call. | - | - | - | - |
| 10-14 | Steps 1-5 of expected sequence from A.4.1a as defined in TS 34.229-5 [41] are performed for initiating an MTSI MO speech call. | - | - | - | - |
| 15 | The SS transmits a *MobilityFromNRCommand* message which includes targetRAT-Type set to eutra according to 38.508-1 [4] Table 4.6.1-8. | <-- | NR RRC: MobilityFromNRCommand | - | - |
| - | The following messages are to be observed on E-UTRA Cell 1 unless explicitly stated otherwise. | - | - | - | - |
| 16 | Check: Does the UE transmit an RRCConnectionReconfigurationComplete message to confirm the successful completion of handover? | --> | RRC: RRCConnectionReconfigurationComplete | 1 | P |
| 17 | The UE transmits an *ULInformationTransfer* message on the cell specified in the test case. This message includes a TRACKING AREA UPDATE REQUEST message. | --> | RRC: ULInformationTransfer  NAS: TRACKING AREA UPDATE REQUEST | 1 | P |
| 18-21 | Steps 4a1-6 of the generic test procedure in TS 38.508-1 [4] Table 4.9.7.2.2-1 for N1 to S1 Inter mode change with condition ‘connected without release’ & ‘mapped 5G security context’ are performed to make sure successfully camped on E-UTRAN cell upon mobility from NR. | - | - | - | - |
| 22 | The SS configures a new RLC-UM data radio bearer with condition DRB (0,1), associated with the dedicated EPS bearer context. RRCConnectionReconfiguration message contains the ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST message. EPS bearer context #4 (QCI 1) according to TS 36.508 [7] Table 6.6.2-1: Reference dedicated EPS bearer contexts.  Reference dedicated EPS bearer contexts is to establish the dedicated EPS bearer context on IMS PDN. | <-- | RRC: RRCConnectionReconfiguration  NAS: ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST | - | - |
| - | EXCEPTION: In parallel to the events described in steps 23-24 the steps specified in table 11.1.3a.3.2-2 will take place. | - | - | - | - |
| 23 | The UE transmits an RRCConnectionReconfigurationComplete message. | --> | RRC: RRCConnectionReconfigurationComplete | - | - |
| 24 | The UE transmits an ULInformationTransfer message including the ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT message. | --> | RRC: ULInformationTransfer  NAS: ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT | - | - |
| 24A | The SS waits 1 second for call duration. | - | - | - | - |
| 25 | Release IMS Call as specified in the generic procedure in TS 34.229-1 [35] subclause C.32. | - | - | - | - |

Table 11.1.3a.3.2-2: Parallel behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1-6 | Steps 6-11 of expected sequence from A.4.1a as defined in TS 34.229-5 [41] are performed for initiating an MTSI MO speech call. | - | - | - | - |
| 7 | Step 12 of expected sequence from A.4.1a as defined in TS 34.229-5 [41] is performed for initiating an MTSI MO speech call. | - | - | 1 | P |

11.1.3a.3.3 Specific message contents

Table 11.1.3a.3.3-1: REGISTRATION REQUEST (preamble, Table 11.1.3a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM capability |  |  |  |
| S1 mode | '1'B | S1 mode supported |  |
| S1 UE network capability | Present but contents not checked |  |  |

Table 11.1.3a.3.3-2:REGISTRATION ACCEPT (preamble, Table 11.1.3a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS network feature support |  |  |  |
| IMS- VoPS-3GPP | '1'B | IMS voice over PS session supported over 3GPP access |  |
| IWK N26 | '0'B | Interworking without N26 interface not supported |  |

Table 11.1.3a.3.3-3:PDU SESSION ESTABLISHMENT ACCEPT (preamble for PDU Session for PS data, Table 11.1.3a.3.2-1)

|  |
| --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.2-2, condition Interworking\_with\_EPS |

Table 11.1.3a.3.3-4:PDU SESSION ESTABLISHMENT ACCEPT (preamble for IMS PDU Session, Table 11.1.3a.3.2-1)

|  |
| --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.2-2, condition Interworking\_with\_EPS, IMS\_DNN\_ Requested |

Table 11.1.3a.3.3-5: MobilityFromNRCommand (step 15, Table 11.1.3a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.6.1-8 | | | |
| Information Element | Value/remark | Comment | Condition |
| MobilityFromNRCommand::= SEQUENCE { |  |  |  |
| rrc-TransactionIdentifier | RRC-TransactionIdentifier |  |  |
| criticalExtensions CHOICE { |  |  |  |
| mobilityFromNRCommand SEQUENCE { |  |  |  |
| targetRAT-Type | eutra |  |  |
| targetRAT-MessageContainer | RRCConnectionReconfig duration |  |  |
| nas-SecurityParamFromNR | 8 LSB of the downlink NAS COUNT |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.1.3a.3.3-6: RRCConnectionReconfiguration (Table 11.1.3a.3.3-5)

|  |
| --- |
| Derivation path: TS 36.508 [7], Table 4.6.1-8 with condition HO-TO-EUTRA(n,0) |

Table 11.1.3a.3.3-7: MobilityControlInfo (Table 11.1.3a.3.3-6)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 36.508 [7], Table 4.6.5-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| MobilityControlInfo ::= SEQUENCE { |  |  |  |
| targetPhysCellId | PhysicalCellIdentity of E-UTRA Cell 1 |  |  |
| carrierFreq SEQUENCE { |  |  |  |
| dl-CarrierFreq | Same downlink EARFCN as used for E-UTRA Cell 1 |  |  |
| } |  |  |  |
| carrierFreq | Not present |  | Band > 64 |
| carrierBandwidth SEQUENCE { |  |  |  |
| dl-Bandwidth | Downlink system bandwidth under test. |  |  |
| ul-Bandwidth | Uplink Bandwidth under test. |  | FDD |
| ul-Bandwidth | Not present |  | TDD |
| } |  |  |  |
| additionalSpectrumEmission | 1 |  | HO-to-EUTRA |
| carrierFreq-v9e0 SEQUENCE { |  |  | Band > 64 |
| dl-CarrierFreq-v9e0 | Same downlink EARFCN as used for E-UTRA Cell 1 |  |  |
| } |  |  |  |
| } |  |  |  |

|  |  |
| --- | --- |
| Condition | Explanation |
| FDD | FDD cell environment |
| TDD | TDD cell environment |
| Band > 64 | If band > 64 is selected |

Table 11.1.3a.3.3-8:TRACKING AREA UPDATE REQUEST (step 17, Table 11.1.3a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.9.7.2.3-1. | | | |
| Information Element | Value/remark | Comment | Condition |
| EPS update type |  |  |  |
| "Active" flag | AnyValue |  |  |
| EPS bearer context status | Not checked | EBI corresponding to active PDU Sessions need to be set to 1 |  |

### 11.1.4 MO MMTEL voice call setup from NR RRC\_CONNECTED / EPS Fallback with redirection / Single registration mode with N26 interface / E-UTRAN cell selection using cell status barred / Success

11.1.4.1 Test Purpose (TP)

(1)

***with*** { UE supporting both S1 mode and N1 mode and operating in single-registration mode, and, the Network has indicated "interworking without N26 interface not supported", **and**, the UE in NR RRC\_CONNECTED state }

***ensure that*** {

***when*** { User initiates a MMTEL call, the MO IMS voice session establishment has been initiated and the UE receives a *RRCRelease* message which includes *redirectedCarrierInfo* indicating redirection to *eutra*, and, an E-UTRA cell on the frequency indicated by *redirectedCarrierInfo* is found with cell status "barred" and another E-UTRA cell is found on another frequency with cell status "notBarred" }

***then*** { UE selects the E-UTRA cell with cell status "notBarred", performs a TAU procedure, ***and***, the UE successfully completes the MO MMTEL call in EPS }

}

11.1.4.2 Conformance requirements

References: The conformance requirements covered in the present test case are specified in: TS 23.502, clauses 4.13.6.1 and 4.11.1.3.2, TS 24.501, clauses 4.8.2.2, 5.1.4.2 and 6.1.4.1, TS 38.331, clauses 5.3.3.2, 5.3.3.3, 5.3.8.3 and 5.3.11; TS 38.304, clause 5.2.6, TS 36.304 clause 5.3.1. Unless otherwise stated these are Rel-15 requirements.

[TS 23.502, clause 4.13.6.1]

Figure 4.13.6.1-1 describes the EPS fallback procedure for IMS voice.

When the UE is served by the 5G System, the UE has one or more ongoing PDU Sessions each including one or more QoS Flows. The serving PLMN AMF has sent an indication towards the UE during the Registration procedure that IMS voice over PS session is supported, see clause 5.16.3.10 in TS 23.501 [2] and the UE has registered in the IMS. If N26 is not supported, the serving PLMN AMF sends an indication towards the UE during the Registration procedure that interworking without N26 is supported, see clause 5.17.2.3.1 in TS 23.501 [2].



Figure 4.13.6.1-1: EPS Fallback for IMS voice

1. UE camps on NG-RAN in the 5GS and an MO or MT IMS voice session establishment has been initiated.

2. Network initiated PDU Session modification to setup QoS flow for voice reaches the NG-RAN (see N2 PDU Session Request in clause 4.3.3).

3. NG-RAN is configured to support EPS fallback for IMS voice and decides to trigger fallback to EPS, taking into account UE capabilities, indication from AMF that "Redirection for EPS fallback for voice is possible" (received as part of initial context setup as defined in TS 38.413 [10]), network configuration (e.g. N26 availability configuration) and radio conditions. If NG-RAN decides not to trigger fallback to EPS, then the procedure stops here and following steps are not executed.

NG-RAN may initiate measurement report solicitation from the UE including E-UTRAN as target.

NOTE 1: If AMF has indicated that "Redirection for EPS fallback for voice is not possible", then AN Release via inter-system redirection to EPS is not performed in step 5.

4. NG-RAN responds indicating rejection of the PDU Session modification to setup QoS flow for IMS voice received in step 2 by PDU Session Response message towards the PGW-C+SMF (or H-SMF+P-GW-C via V-SMF, in case of roaming scenario) via AMF with an indication that mobility due to fallback for IMS voice is ongoing. The PGW-C+SMF maintains the PCC rule(s) associated with the QoS Flow(s).

5. NG-RAN initiates either handover (see clause 4.11.1.2.1), or AN Release via inter-system redirection to EPS (see clause 4.2.6 and clause 4.11.1.3.2), taking into account UE capabilities. The PGW-C+SMF reports change of the RAT type if subscribed by PCF as specified in clause 4.11.1.2.1, or clause 4.11.1.3.2.6. When the UE is connected to EPS, either 6a or 6b is executed

6a. In the case of 5GS to EPS handover, see clause 4.11.1.2.1, and in the case of inter-system redirection to EPS with N26 interface, see clause 4.11.1.3.2. In either case the UE initiates TAU procedure; or

6b. In the case of inter-system redirection to EPS without N26 interface, see clause 4.11.2.2. If the UE supports Request Type flag "handover" for PDN connectivity request during the attach procedure as described in clause 5.3.2.1 of TS 23.401 [13] and has received the indication that interworking without N26 is supported, then the UE initiates Attach with PDN connectivity request with request type "handover".

In inter-system redirection, the UE uses the emergency indication in the RRC message as specified in clause 6.2.2 of TS 36.331 [16] and E-UTRAN provides the emergency indication to MME during Tracking Area Update or Attach procedure. For the handover procedure see clause 4.11.1.2.1, step 1.

7. After completion of the mobility procedure to EPS or as part of the 5GS to EPS handover procedure (see clause 4.11.1.2.1), the SMF/PGW re-initiates the setup of the dedicated bearer for IMS voice, mapping the 5G QoS to EPC QoS parameters. The PGW-C+SMF behaves as specified in clause 4.9.1.3.1. The PGW-C+SMF reports about Successful Resource Allocation and Access Network Information if subscribed by PCF.

8. The IMS voice session establishment is continued.

At least for the duration of the voice call in EPS the E-UTRAN is configured to not trigger any handover to 5GS.

[TS 23.502, clause 4.11.1.3.2]

Clause 4.11.1.3.2 covers the case of idle mode mobility from 5GC to EPC. UE performs Tracking Area Update procedure in E-UTRA/EPS when it moves from NG-RAN/5GS to E-UTRA/EPS coverage area.

The procedure involves a Tracking Area Update to EPC and setup of default EPS bearer and dedicated bearers in EPC in steps 1-11 and re-activation, if required.



Figure 4.11.1.3.2-1: 5GS to EPS Idle mode mobility using N26 interface

The TAU procedure in TS 23.401 [13] is used with the following 5GS interaction:

1. Step 1 from clause 5.3.3.1 (Tracking Area Update procedure with Serving GW change) in TS 23.401 [13].

2. Step 2 from clause 5.3.3.1 (Tracking Area Update procedure with Serving GW change) in TS 23.401 [13] with the modification captured in clause 4.11.1.5.3.

3-4. Steps 3-4 from clause 5.3.3.1 (Tracking Area Update procedure with Serving GW change) in TS 23.401 [13].

5a. The AMF verifies the integrity of the TAU request message and requests the PGW-C+SMF to provide SM Context by using Nsmf\_PDUSession\_ContextRequest that also includes the mapped EPS Bearer Contexts. The AMF provides the target MME capability to SMF in the request to allow the SMF to determine whether to include EPS Bearer context for non-IP PDN Type or not. This step is performed with all the PGW-C+SMFs corresponding to PDU Sessions of the UE which are associated with 3GPP access and have EBI(s) allocated to them. In this step, if the AMF correctly validates the UE, then the AMF starts a timer.

NOTE 1: The AMF knows the MME capability to support non-IP PDN type or not through local configuration.

5b. For Non-roaming or roaming with local breakout scenario, if CN Tunnel Info is allocated by the PGW-U+UPF, the SMF sends N4 Session Modification Request to PGW-U+UPF to establish the tunnel for each EPS bearers, and PGW-U+UPF provides the PGW-U Tunnel Info for each EPS bearers to PGW-C+SMF.

NOTE2: In home routed roaming case, the CN Tunnel Info for each EPS bearer has been prepared by the PGW-C+SMF and provided to the V-SMF as specified in clause 4.11.1.4.1.

5c. SMF returns mapped EPS bearer contexts, which includes PGW-C control plane tunnel information of the PDN connection corresponding to the PDU session, EBI for each EPS bearer, PGW-U tunnel information for each EPS bearer, and EPS QoS parameters for each EPS bearer. For PDU Sessions with PDU Session Type Ethernet or Unstructured, the SMF provides SM Context for non-IP PDN Type.

6. The AMF responds with a Context Response message carrying mapped MM context (including mapped security context), Return preferred and SM EPS UE Context (default and dedicated GBR bearers) to the MME. If the verification of the integrity protection fails, the AMF returns an appropriate error cause. Return preferred is an optional indication by the AMF of a preferred return of the UE to the 5GS PLMN at a later access change to a 5GS shared network. The AMF may start an implementation specific (guard) timer for the UE context.

7 - 14. Steps 6-12 from clause 5.3.3.1 (Tracking Area Update procedure with Serving GW change) in TS 23.401 [13] are performed with following addition and modification:

In the step 10, If the QoS Flow associated with the default QoS rule has an EPS Bearer ID assigned, the PGW-C+SMF keeps the PDU Session (PDN connection) and for the remaining QoS Flows that do not have EPS bearer ID(s) assigned, the PGW-C+SMF deletes the PCC rule(s) associated with those QoS Flows and informs the PCF about the removed PCC rule(s).

In the step 11, the PGW-C+SMF requests the PGW-U+UPF to establish the tunnel for each EPS bearer by providing SGW-U Tunnel Info, and PGW-U Tunnel Info if the PGW-U Tunnel Info is allocated by the PGW-C+SMF.

In step 10, the PGW-C+SMF may need to report some subscribed event to the PCF by performing an SMF initiated SM Policy Association Modification procedure as defined in clause 4.16.5.

Step 9a from clause 5.3.3.1 (Tracking Area Update procedure with Serving GW change) in TS 23.401 [13] with the modification captured in clause 4.11.1.5.3

15a. The HSS+UDM invokes Nudm\_UECM\_DeregistrationNotification to notify the AMF associated with 3GPP access with reason as 5GS to EPS Mobility. If the timer started in step 6 is not running, the old AMF removes the UE context. Otherwise, the AMF may remove UE context when the timer expires. The AMF request the release of the PDU Session which is associated with 3GPP access, not expected to be transferred to EPC, i.e. no EBI(s) allocated to them, and corresponding to the PGW-C+SMF which is not contacted by AMF for SM context at step 5a. The AMF requests the release of the SM context in the V-SMF only, for Home Routed PDU Session with EBIs allocated. The 5GC may also keep UE context to allow the use of native security parameters when UE moves back from EPS to 5GS later.

Registration associated with the non-3GPP access in the AMF is not removed (i.e. an AMF that was serving the UE over both 3GPP and non-3GPP accesses does not consider the UE as deregistered over non 3GPP access and will remain registered and subscribed to subscription data updates in UDM).

When the UE decides to deregister over non-3GPP access or the old AMF decides not to maintain a UE registration for non-3GPP access anymore, the old AMF then deregisters from UDM by sending a Nudm\_UECM\_Deregistration service operation, unsubscribes from Subscription Data updates by sending an Nudm\_SDM\_Unsubscribe service operation to UDM and releases all the AMF and AN resources related to the UE.

16 - 18. Steps 17-21 from clause 5.3.3.1 (Tracking Area Update procedure with Serving GW change) in TS 23.401 [13] with the following modification:

The MME may provide the eNodeB with a PLMN list in the Handover Restriction List taking into account the last used 5GS PLMN ID and the Return preferred indication. The Handover Restriction List contains a list of PLMN IDs as specified by TS 23.251 [35] clause 5.2a for eNodeB functions.

The MME may not release the signalling connection with the UE based on the indication received in the step 1 that the UE is moving from 5GC.

19. [conditional] Step 19 from clause 4.11.1.2.1 applies.

[TS 24.501, clause 4.8.2.2]

See subclause 5.1.4.2 for coordination between 5GMM and EMM and subclause 6.1.4.1 for coordination between 5GSM and ESM.

[TS 24.501, clause 5.1.4.2]

At inter-system change from N1 mode to S1 mode when there is at least one active PDU session for which interworking with EPS is supported as specified in subclause 6.1.4.1, the UE shall enter substates EMM-REGISTERED.NORMAL-SERVICE and 5GMM-REGISTERED.NO-CELL-AVAILABLE and initiate a tracking area updating procedure (see 3GPP TS 24.301 [15]).

[TS 24.501, clause 6.1.4.1]

Upon inter-system change from N1 mode to S1 mode, the UE shall create the default EPS bearer context and the dedicated EPS bearer context(s) based on the parameters of the mapped EPS bearer contexts or the associations between QoS flow and mapped EPS bearer in the PDU session, if available. The EPS bearer identity assigned for the QoS flow of the default QoS rule becomes the EPS bearer identity of the default bearer in the corresponding PDN connection. If there is no EPS bearer identity assigned to the QoS flow of the default QoS rule, the UE shall release locally the PDU session. If there is no EPS bearer identity assigned to the QoS flow(s) which is not associated with the default QoS rule, the UE shall locally delete the QoS rules and the QoS flow level QoS parameters associated with the QoS flow(s). The UE uses the parameters from each PDU session for which interworking with EPS is supported to create corresponding default EPS bearer context and optionally dedicated EPS bearer context(s) as follows:

a) the PDU session type of the PDU session shall be mapped to the PDN type of the default EPS bearer context as follows:

1) the PDN type shall be set to "non-IP" if the PDU session type is "Ethernet" or "Unstructured";

2) the PDN type shall be set to "IPv4" if the PDU session type is "IPv4";

3) the PDN type shall be set to "IPv6" if the PDU session type is "IPv6"; and

4) the PDN type shall be set to "IPv4v6" if the PDU session type is "IPv4v6";

b) the PDU address of the PDU session shall be mapped to the PDN address of the default EPS bearer context as follows:

1) the PDN address of the default EPS bearer context is set to the PDU address of the PDU session, if the PDU session type is "IPv4", "IPv6" or "IPv4v6"; and

2) the PDN address of the default EPS bearer context is set to zero, if the PDU session type is "Ethernet" or "Unstructured";

c) the DNN of the PDU session shall be mapped to the APN of the default EPS bearer context;

d) the APN-AMBR and extended APN-AMBR received in the parameters of the default EPS bearer context of the mapped EPS bearer contexts shall be mapped to the APN-AMBR and extended APN-AMBR of the default EPS bearer context;

e) for each PDU session in state PDU SESSION ACTIVE, PDU SESSION MODIFICATION PENDING or PDU SESSION INACTIVE PENDING the UE shall set the state of the mapped EPS bearer context(s) to BEARER CONTEXT ACTIVE; and

f) for any other PDU session the UE shall set the state of the mapped EPS bearer context(s) to BEARER CONTEXT INACTIVE.

Additionally, for each mapped EPS bearer context or the association between QoS flow and mapped EPS bearer in the PDU session:

a) the EPS bearer identity shall be set to the EPS bearer identity received in the mapped EPS bearer context, or the EPS bearer identity associated with the QoS flow;

b) the EPS QoS parameters shall be set to the mapped EPS QoS parameters of the EPS bearer received in the mapped EPS bearer context, or the EPS QoS parameters associated with the QoS flow;

c) the extended EPS QoS parameters shall be set to the mapped extended EPS QoS parameters of the EPS bearer received in the mapped EPS bearer context, or the extended EPS QoS parameters associated with the QoS flow; and

d) the traffic flow template shall be set to the mapped traffic flow template of the EPS bearer received in the mapped EPS bearer context, or the stored traffic flow template associated with the QoS flow, if available.

After inter-system change from N1 mode to S1 mode, the UE shall associate the PDU session identity, the S-NSSAI, and the session-AMBR with the default EPS bearer context, and for each EPS bearer context mapped from one or more QoS flows, associate the QoS rule(s) for the QoS flow(s) and the QoS flow description(s) for the QoS flow(s) with the EPS bearer context.

After inter-system change from N1 mode to S1 mode, the UE and the SMF shall maintain the PDU session type of the PDU session until the PDN connection corresponding to the PDU session is released if the UE supports non-IP PDN type and the PDU session type is "Ethernet" or "Unstructured".

After inter-system change from N1 mode to S1 mode, the UE and the SMF shall maintain the always-on PDU session indication.

After inter-system change from N1 mode to S1 mode, the UE and the SMF shall maintain the maximum number of supported packet filters until the PDN connection corresponding to the PDU session is released.

[TS 38.331, clause 5.3.3.2]

Upon initiation of the procedure, the UE shall:

1> if the upper layers provide an Access Category and one or more Access Identities upon requesting establishment of an RRC connection:

2> perform the unified access control procedure as specified in 5.3.14 using the Access Category and Access Identities provided by upper layers;

3> if the access attempt is barred, the procedure ends;

1> apply the default L1 parameter values as specified in corresponding physical layer specifications except for the parameters for which values are provided in *SIB1*;

1> apply the default MAC Cell Group configuration as specified in 9.2.2;

1> apply the CCCH configuration as specified in 9.1.1.2;

1> apply the timeAlignmentTimerCommon included in SIB1;

1> start timer T300;

1> initiate transmission of the *RRCSetupRequest* message in accordance with 5.3.3.3;

[TS 38.331, clause 5.3.3.3]

The UE shall set the contents of *RRCSetupRequest* message as follows:

1> set the *ue-Identity* as follows:

2> if upper layers provide a 5G-S-TMSI:

3> set the ue-Identity to ng-5G-S-TMSI-Part1;

2> else:

3> draw a 39-bit random value in the range 0..239-1 and set the *ue-Identity* to this value;

NOTE 1: Upper layers provide the *5G-S-TMSI* if the UE is registered in the TA of the current cell.

1> set the *establishmentCause* in accordance with the information received from upper layers;

The UE shall submit the *RRCSetupRequest* message to lower layers for transmission.

The UE shall continue cell re-selection related measurements as well as cell re-selection evaluation. If the conditions for cell re-selection are fulfilled, the UE shall perform cell re-selection as specified in 5.3.3.6.

[TS 38.331, clause 5.3.8.3]

The UE shall:

…

1> if the *RRCRelease* message includes *redirectedCarrierInfo* indicating redirection to *eutra*:

2> if *cnType* is included:

3> after the cell selection, indicate the available CN Type(s) and the received *cnType* to upper layers;

NOTE 1: Handling the case if the E-UTRA cell selected after the redirection does not support the core network type specified by the *cnType,* is up to UE implementation.

2> if voiceFallbackIndication is included:

3> consider the RRC connection release was for EPS fallback for IMS voice (see TS 23.502 [43]);

[TS 38.331, clause 5.3.11]

The UE shall:

…

1> else:

2> if T302 is running:

3> stop timer T302;

3> perform the actions as specified in 5.3.14.4;

[TS 38.304, clause 5.2.6]

At reception of *RRCRelease* message to transition the UE to RRC\_IDLE or RRC\_INACTIVE, UE shall attempt to camp on a suitable cell according to *redirectedCarrierInfo* if included in the *RRCRelease* message. If the UE cannot find a suitable cell, the UE is allowed to camp on any suitable cell of the indicated RAT. If the *RRCRelease* message does not contain the *redirectedCarrierInfo,* UE shall attempt to select a suitable cell on an NR carrier. If no suitable cell is found according to the above, the UE shall perform cell selection using stored information in order to find a suitable cell to camp on.

When returning to RRC\_IDLE state after UE moved to RRC\_CONNECTED state from *camped on any cell* state, UE shall attempt to camp on an acceptable cell according to *redirectedCarrierInfo*, if included in the *RRCRelease* message. If the UE cannot find an acceptable cell, the UE is allowed to camp on any acceptable cell of the indicated RAT. If the *RRCRelease* message does not contain *redirectedCarrierInfo* UE shall attempt to select an acceptable cell on an NR frequency. If no acceptable cell is found according to the above, the UE not in SNPN Access Mode shall continue to search for an acceptable cell of any PLMN in state *any cell selection*.

[TS 36.304, clause 5.3.1]

Cell status and cell reservations are indicated in the *SystemInformationBlockType1* message (or *SystemInformationBlockType1-BR* message or *SystemInformationBlockType1-NB* message) TS 36.331 [3] by means of the following fields:

- *cellBarred* (IE type: "barred" or "not barred")   
This field indicates if the cell is barred for connectivity to EPC.  
This field is ignored by the UEs supporting *crs-IntfMitig* while *crs-IntfMitigEnabled* is included in SIB1.   
This field is ignored by the BL UEs or UEs in CE supporting *ce-CRS-IntfMitig* while *crs-IntfMigitNumPRBs* is included in SIB1-BR.  
In case of multiple EPC PLMNs indicated in SIB1/SIB1-BR, this field is common for all EPC PLMNs

NOTE: For IAB node, it ignores the *cellBarred*, *cellReservedForOperatorUse* and *cellReservedForOtherUse* as defined in TS 36.331 [3].

…

The following description for handling of barred and reserved cells is per CN type. If the UE supports more than one CN type, the UE shall only exclude a cell as candidate for selection/reselection if it is excluded for both CN types.

NOTE: Fields cellBarred-CRS and cellReservedForOperatorUse-CRS are not indicated in SystemInformationBlockType1-NB

When cell status is indicated as "not barred" and "not reserved" for operator use,

- All UEs shall treat this cell as candidate during the cell selection and cell reselection procedures.

When cell status is indicated as "not barred" and "reserved" for operator use for any PLMN,

- UEs assigned to Access Class 11 or 15 operating in their HPLMN/EHPLMN shall treat this cell as candidate during the cell selection and reselection procedures if the field *cellReservedForOperatorUse* for that PLMN set to "reserved".

- UEs assigned to an Access Class in the range of 0 to 9, 12 to 14 shall behave as if the cell status is "barred" in case the cell is "reserved for operator use" for the registered PLMN or the selected PLMN.

NOTE: ACs 11, 15 are only valid for use in the HPLMN/ EHPLMN; ACs 12, 13, 14 are only valid for use in the home country TS 22.011 [4].

When cell status "barred" is indicated or to be treated as if the cell status is "barred",

- The UE is not permitted to select/reselect this cell, not even for emergency calls.

- The UE shall consider other cells for cell selection/reselection according to the following rule:

11.1.4.3 Test Description

11.1.4.3.1 Pre-test conditions

System Simulator:

- NR Cell 1 is configured according to TS 38.508-1 [4] Table 4.4.2-3 and is connected to 5GC.

- E-UTRA Cell 1 and E-UTRA Cell 3 are configured to TS 36.508 [7] Table 4.4.2-2 and are connected to EPC.

- System information on the NR Cell 1 in accordance with combination NR-6 in TS 38.508-1 [4] sub-clause 4.4.3.1.2, and, for the E-UTRA Cell 1 and Cell 3 in accordance with combination 31 as defined in TS 36.508 [7], subclause 4.4.3.1.1.

- N26 interface is configured.

- Power levels are constant and as defined in Tables 11.1.4.3.1-1/2.

Table 11.1.4.3.1-1: Time instances of cell power level and parameter changes for conducted test environment

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Parameter name | Unit | NR Cell 1 | E-UTRA Cell 1 | E-UTRA Cell 3 | Remark |
| T0 | SS/PBCH SSS EPRE | dBm/SCS | -88 | - | - |  |
| RS EPRE | dBm/15kHz | - | -97 | -85 |  |

Table 11.1.4.3.1-2: Time instances of cell power level and parameter changes for OTA test environment

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Parameter name | Unit | NR Cell 1 | E-UTRA Cell 1 | E-UTRA Cell 3 | Remark |
| T0 | SS/PBCH SSS EPRE | dBm/SCS | -82 | - | - |  |
| RS EPRE | dBm/15kHz | - | -96 | -96 |

UE:

- The UE is configured to use IMS preconditions

Preamble:

- With E-UTRA Cell 1 "Serving cell" and NR Cell 1 "Non-suitable "Off" cell" in accordance with TS 38.508-1 [4], Table 6.2.2.1-3, the UE is brought to state RRC\_IDLE using generic procedure parameters Connectivity (*E-UTRA*) and Unrestricted nr PDN (*On*) in accordance with the procedure described in TS 38.508-1 [4], clause 4.5.2. 4G GUTI and eKSI are assigned and security context established.

- The UE is switched-off.

- With E-UTRA Cell 1 "Non-suitable "Off" cell" and NR Cell 1 "Serving cell" in accordance with TS 38.508-1 [4], Table 6.2.2.1-3, the UE is brought to state 1N-A, RRC\_IDLE Connectivity (NR) with at least one IMS PDU session on NR Cell 1, in accordance with the procedure described in TS 38.508-1 [4], Table 4.5.2.2-2. 5G-GUTI and ngKSI are assigned.

11.1.4.3.2 Test procedure sequence

Table 11.1.4.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Void | - | - | - | - |
| - | The following messages are to be observed on NR Cell 1 unless explicitly stated otherwise. | - | - | - | - |
| 2 | The SS transmits a *Paging* message. | <-- | NR RRC: *Paging* | - | - |
| 3 | The UE transmits an *RRCSetupRequest* message. | --> | NR RRC: RRCSetupRequest | - | - |
| 4-9 | Steps 3 to 8 of the NR RRC\_CONNECTED procedure in TS 38.508-1 [4] Table 4.5.4.2-3 are executed to successfully complete the service request procedure. | - | - | - | - |
| 9A | Set the power levels according to “T0” as per Table 11.1.4.3.1-1/2. | - | - | - | - |
| 10a1 | Void | - | - | - | - |
| 11 | Make the UE attempt an IMS speech call. | - | - | - | - |
| 12-16 | Steps 1-5 of generic procedure “EPS Fallback for Voice Call / steps before fallback / 5GS” as defined in Appendix A.9.1 of TS 34.229-5 [41] take place. | - | - | - | - |
| 17 | The SS transmits an *RRCRelease* message | <-- | NR RRC:RRCRelease | - | - |
| - | The following messages are to be observed on E-UTRA Cell 1 unless explicitly stated otherwise. | - | - | - | - |
| 18 | Generic test procedure in TS 38.508-1 [4] Table 4.9.7.2.2-1 Steps 1-6 is performed without '*connected without release*' on E-UTRAN cell upon mobility from NR. | - | - | - | - |
| 18A-18D | Generic Test Procedure as defined in Steps 5-8 of TS 36.508 [7] Table 4.5A.6.3-1 is performed to establish radio bearer corresponding to IMS PDN. | - | - | - | - |
| 19 | The SS configures a new RLC-UM data radio bearer with condition DRB (0,1), associated with the dedicated EPS bearer context. *RRCConnectionReconfiguration* message contains the ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST message. EPS bearer context #4 (QCI 1) according to TS 36.508 [7] Table 6.6.2-1: Reference dedicated EPS bearer contexts.  Reference dedicated EPS bearer contexts is to establish the dedicated EPS bearer context on IMS PDN. | <-- | RRC: RRCConnectionReconfiguration  NAS: ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST | - | - |
| - | EXCEPTION: In parallel to the events described in steps 20-22 below, the steps specified in table 11.1.4.3.2-2 will take place. | - | - | - | - |
| 20 | The UE transmits an RRCConnectionReconfigurationComplete message. | --> | RRC: RRCConnectionReconfigurationComplete | - | - |
| 21 | The UE transmits an *ULInformationTransfer* message including the ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT message. | --> | RRC: ULInformationTransfer  NAS: ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT | - | - |
| 22 | The SS waits 1 second for call duration. | - | - | - | - |
| 23a1 | Void | - | - | - | - |
| 24 | Release IMS Call as specified in the generic procedure in TS 34.229-1 [35] subclause C.32. | - | - | - | - |

Table 11.1.4.3.2-2: Parallel behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| - | EXCEPTION: Steps 1a1 to 1b7 describe behaviour that depends on the UE capability; the "lower case letter" identifies a step sequence that take place if a capability is supported | - | - | - | - |
| 1a1-1a2 | The UE performs IMS re-registration on EUTRAN as per steps 1-2 as defined in TS 34.229-1 [35] C.46. | - | - | - | - |
| 1a3-1a6A | Steps 1-5 of the generic procedure “EPS Fallback for Voice Call / steps after fallback / 5GS” as defined in Appendix A.9.2 of TS 34.229-5 [41] take place. | - | - | - | - |
| 1a7 | Check: Does the UE perform step 6 of the generic procedure “EPS Fallback for Voice Call / steps after fallback / 5GS” as defined in Appendix A.9.2 of TS 34.229-5 [41] | --> | SIP: ACK | 1 | P |

11.1.4.3.3 Specific message contents

Table 11.1.4.3.3-1: REGISTRATION REQUEST (preamble, Table 11.1.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM capability |  |  |  |
| S1 mode | '1'B | S1 mode supported |  |
| S1 UE network capability | Present but contents not checked |  |  |

Table 11.1.4.3.3-2:REGISTRATION ACCEPT (preamble, Table 11.1.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS network feature support |  |  |  |
| IMS- VoPS-3GPP | '1'B | IMS voice over PS session supported over 3GPP access |  |
| IWK N26 | '0'B | Interworking without N26 interface not supported |  |

Table 11.1.4.3.3-3:PDU SESSION ESTABLISHMENT ACCEPT (preamble for PDU Session for PS data, Table 11.1.4.3.2-1)

|  |
| --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.2-2, condition Interworking\_with\_EPS |

Table 11.1.4.3.3-4:PDU SESSION ESTABLISHMENT ACCEPT (preamble for IMS PDU Session, Table 11.1.4.3.2-1)

|  |
| --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.2-2, condition Interworking\_with\_EPS, IMS\_DNN\_ Requested |

Table 11.1.4.3.3-5: Void

Table 11.1.4.3.3-6: RRCRelease message (step 17, table 11.1.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.6.1-16 | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCRelease ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcRelease SEQUENCE { |  |  |  |
| redirectedCarrierInfo CHOICE { |  |  |  |
| eutra SEQUENCE { |  |  |  |
| eutraFrequency | Cell 3’s EARFCN |  |  |
| cnType | epc |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.1.4.3.3-7: SystemInformationBlockType1 of E-UTRA Cell 3 (Preamble and all steps, Table 11.1.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7] Table 4.4.3.2-3 | | | |
| Information Element | Value/remark | Comment | Condition |
| SystemInformationBlockType1 ::= SEQUENCE { |  |  |  |
| cellAccessRelatedInfo SEQUENCE { |  |  |  |
| cellBarred | barred |  |  |
| } |  |  |  |
| } |  |  |  |

### 11.1.5 MO MMTEL voice call setup from NR RRC\_CONNECTED / EPS Fallback with redirection / Single registration mode without N26 interface / E-UTRAN cell selection using cell status reservation / Success

11.1.5.1 Test Purpose (TP)

(1)

**with** {UE supporting both S1 mode and N1 mode and operating in single-registration mode, and, the Network has indicated "interworking without N26 interface supported", and, the UE is in in NR RRC\_CONNECTED state }

**ensure that** {

**when** {User initiates a MMTEL call, the MO IMS voice session establishment has been initiated and the UE receives a RRCRelease message which includes redirectedCarrierInfo indicating redirection to eutra, and, an E-UTRA cell on the frequency indicated by *redirectedCarrierInfo* is found with cell status "reserved for operator use" and another E-UTRA cell is found on another frequency which is not "reserved for operator use" both cells belonging to the UE's HPLMN}

**then** { UE selects the E-UTRA cell respecting the UE Access Class, performs an ATTACH or a TAU procedure, and the UE successfully completes the MO MMTEL call in EPS}

}

11.1.5.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS23.502, clauses 4.11.2.2, 4.13.6.1; TS 24.501, clause 6.1.4.2; TS 38.331, clause 5.3.11, TS 38.304, clause 5.2.6. Unless otherwise stated these are Rel-15 requirements.

[TS 23.502, clause 4.11.2.2]

The following procedure is used by UEs in single-registration or dual registration mode on mobility from 5GS to EPS.

In the case of network sharing the UE selects the target PLMN ID according to clause 5.18.3 of TS 23.501 [2].



Figure 4.11.2.2-1: Mobility procedure from 5GS to EPS without N26 interface

The UE operating in single-registration mode can start the procedure from Step 1 or Step 5. The UE operating in dual-registration mode starts the procedure from Step 5.

NOTE 1: The network has indicated the " Interworking without N26" to the UE. To support IP address preservation, the UE in single-registration mode starts the procedure from Step 5. If the UE in single-registration mode starts the procedure from Step 1, the IP address preservation is not provided.

0. UE is registered in 5GS and established PDU sessions. The FQDN for the S5/S8 interface of the PGW-C+SMF is also stored in the UDM by the PGW-C+SMF during PDU Session setup in addition to what is specified in clause 4.3.2.2.1 and clause 4.3.2.2.2.

NOTE 2: At 5GS to EPS mobility, the MME use the FQDN for the S5/S8 interface of the PGW-C+SMF to find the PGW-C+SMF, and when UE moves back from EPS to 5GS, the AMF uses FQDN for the S5/S8 interface of the PGW-C+SMF to find the PGW-C+SMF.

1. Step 1 as in clause 5.3.3.1 (Tracking Area Update) in TS 23.401 [13].

2. Step 2 as in clause 5.3.3.1 (Tracking Area Update) in TS 23.401 [13] with the following modifications:

The UE shall provide a EPS-GUTI that is mapped from the 5G-GUTI following the mapping rules specified in TS 23.501 [2]. The UE indicates that it is moving from 5GC.

3. Step 3 as in clause 5.3.3.1 (Tracking Area Update) in TS 23.401 [13].

4. If the MME determined that the old node is an AMF based on UE's GUTI mapped from 5G-GUTI and the MME is configured to support 5GS-EPS interworking without N26 procedure, the MME sends a TAU Reject to the UE.

5. Step 1 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13] with the modifications captured in clause 4.11.2.4.1.

6. Step 2 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13].

7. Steps 4-7 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13], with the modifications captured in clause 4.11.2.4.1.

8. Step 8 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13], with the modifications captured in clause 4.11.2.4.1.

9. Step 11 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13], with the following modifications:

The subscription profile the MME receives from HSS+UDM includes per DNN/APN at most one PGW-C+SMF FQDN as described in in clause 5.17.2.1 in TS 23.501 [2].

10. Steps 12-24 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13], with the modifications as described in clause 4.11.2.4.1.

11. Step 25 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13].

12. Step 26 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13].

13. If the UE has remaining PDU Sessions in 5GS which it wants to transfer to EPS and maintain the same IP address/prefix, the UE performs the UE requested PDN Connectivity Procedure as specified in TS 23.401 [13] clause 5.10.2 and sets the Request Type to "handover" in Step 1 of the procedure with modification captured in clause 4.11.2.4.2. UE provides an APN and the PDU Session ID corresponding to the PDU Session it wants to transfer to EPS. The UE provides the PDU Session ID in PCO as described in clause 4.11.1.1.

UEs in single-registration mode performs this step for each PDU Session immediately after completing the E-UTRAN Initial Attach procedure. UEs in dual-registration mode may perform this step any time after the completing of E-UTRAN Initial Attach procedure. Also, UEs in dual-registration mode may perform this step only for a subset of PDU Sessions.

The MME determines the PGW-C+SMF address for the Create Session Request based on the APN received from the UE and the subscription profile received from the HSS+UDM in Step 9 or when the HSS+UDM notifies the MME for the new PGW-C+SMF ID in the updated subscription profile.

The PGW-C+SMF uses the PDU Session ID to correlate the transferred PDN connection with the PDU Session in 5GC.

As a result of the procedure the PGW-U+UPF starts routing DL data packets to the Serving GW for the default and any dedicated EPS bearers established for this PDN connection.

14. The PGW-C+SMF initiates release of the PDU Session(s) in 5GS transferred to EPS as specified in clause 4.3.4.2 with the following clarification:

In step 2, the PGW-C+SMF shall not release IP address/prefix(es) allocated for the PDU Session.

If UP connection of the PDU Session is not active, step 3b is not executed, thus the steps triggered by step 3b are not executed;

If UP connection of the PDU Session is active, the SMF invokes the Namf\_Communication\_N1N2MessageTransfer service operation without including N1 SM container (PDU Session Release Command).

[TS 23.502, clause 4.13.6.1]

Figure 4.13.6.1-1 describes the EPS fallback procedure for IMS voice.

When the UE is served by the 5G System, the UE has one or more ongoing PDU Sessions each including one or more QoS Flows. The serving PLMN AMF has sent an indication towards the UE during the Registration procedure that IMS voice over PS session is supported, see clause 5.16.3.10 in TS 23.501 [2] and the UE has registered in the IMS. If N26 is not supported, the serving PLMN AMF sends an indication towards the UE during the Registration procedure that interworking without N26 is supported, see clause 5.17.2.3.1 in TS 23.501 [2].



Figure 4.13.6.1-1: EPS Fallback for IMS voice

1. UE camps on NG-RAN in the 5GS and an MO or MT IMS voice session establishment has been initiated.

2. Network initiated PDU Session modification to setup QoS flow for voice reaches the NG-RAN (see N2 PDU Session Request in clause 4.3.3).

3. NG-RAN is configured to support EPS fallback for IMS voice and decides to trigger fallback to EPS, taking into account UE capabilities, indication from AMF that "Redirection for EPS fallback for voice is possible" (received as part of initial context setup as defined in TS 38.413 [10]), network configuration (e.g. N26 availability configuration) and radio conditions. If NG-RAN decides not to trigger fallback to EPS, then the procedure stops here and following steps are not executed.

NG-RAN may initiate measurement report solicitation from the UE including E-UTRAN as target.

NOTE 1: If AMF has indicated that "Redirection for EPS fallback for voice is not possible", then AN Release via inter-system redirection to EPS is not performed in step 5.

4. NG-RAN responds indicating rejection of the PDU Session modification to setup QoS flow for IMS voice received in step 2 by PDU Session Response message towards the PGW-C+SMF (or H-SMF+P-GW-C via V-SMF, in case of roaming scenario) via AMF with an indication that mobility due to fallback for IMS voice is ongoing. The PGW-C+SMF maintains the PCC rule(s) associated with the QoS Flow(s).

5. NG-RAN initiates either handover (see clause 4.11.1.2.1), or AN Release via inter-system redirection to EPS (see clause 4.2.6 and clause 4.11.1.3.2), taking into account UE capabilities. The PGW-C+SMF reports change of the RAT type if subscribed by PCF as specified in clause 4.11.1.2.1, or clause 4.11.1.3.2.6. When the UE is connected to EPS, either 6a or 6b is executed

6a. In the case of 5GS to EPS handover, see clause 4.11.1.2.1, and in the case of inter-system redirection to EPS with N26 interface, see clause 4.11.1.3.2. In either case the UE initiates TAU procedure; or

6b. In the case of inter-system redirection to EPS without N26 interface, see clause 4.11.2.2. If the UE supports Request Type flag "handover" for PDN connectivity request during the attach procedure as described in clause 5.3.2.1 of TS 23.401 [13] and has received the indication that interworking without N26 is supported, then the UE initiates Attach with PDN connectivity request with request type "handover".

In inter-system redirection, the UE uses the emergency indication in the RRC message as specified in clause 6.2.2 of TS 36.331 [16] and E-UTRAN provides the emergency indication to MME during Tracking Area Update or Attach procedure. For the handover procedure see clause 4.11.1.2.1, step 1.

7. After completion of the mobility procedure to EPS or as part of the 5GS to EPS handover procedure (see clause 4.11.1.2.1), the SMF/PGW re-initiates the setup of the dedicated bearer for IMS voice, mapping the 5G QoS to EPC QoS parameters. The PGW-C+SMF behaves as specified in clause 4.9.1.3.1. The PGW-C+SMF reports about Successful Resource Allocation and Access Network Information if subscribed by PCF.

8. The IMS voice session establishment is continued.

At least for the duration of the voice call in EPS the E-UTRAN is configured to not trigger any handover to 5GS.

[TS 24.501, clause 6.1.4.2]

When the network does not support N26 interface, the SMF does not provide the UE with the mapped EPS bearer context for a PDU session.

NOTE 1: Since the SMF does not provide the UE with the mapped EPS bearer context for a PDU session, the UE does not know whether interworking with EPS is supported for a PDU session before attempting to transfer the PDU session from N1 mode to S1 mode.

NOTE 2: It is up to UE implementation to decide which PDU session(s) to be attempted to transfer from N1 mode to S1 mode, e.g. based on UE policy or user preference.

Upon inter-system change from N1 mode to S1 mode in EMM-IDLE mode, the UE shall use the parameters from each PDU session which the UE intends to transfer to EPS to create the contents of a PDN CONNECTIVITY REQUEST message as follows:

a) if the PDU session is an emergency PDU session, the request type shall be set to "handover of emergency bearer services". Otherwise the request type shall be set to "handover";

b) the PDU session type of the PDU session shall be mapped to the PDN type of the default EPS bearer context as follows:

1) the PDN type shall be set to "non-IP" if the PDU session type is "Ethernet" or "Unstructured";

2) the PDN type shall be set to "IPv4" if the PDU session type is "IPv4";

3) the PDN type shall be set to "IPv6" if the PDU session type is "IPv6"; and

4) the PDN type shall be set to "IPv4v6" if the PDU session type is "IPv4v6";

c) the DNN of the PDU session shall be mapped to the APN of the default EPS bearer context; and

d) the PDU session ID parameter in the PCO IE shall be set to the PDU session identity of the PDU session.

After inter-system change from N1 mode to S1 mode, the UE shall associate the PDU session identity with the default EPS bearer context.

Upon successful completion of an EPS attach procedure after inter-system change from N1 mode to S1 mode (see 3GPP TS 24.301 [15]), the UE shall delete any UE derived QoS rules.

The UE shall locally release the PDU session(s) and QoS flow(s) associated with the 3GPP access which have not been transferred to EPS.

…

[TS 38.331, clause 5.3.11]

UE shall:

1> reset MAC;

1> if T302 is running:

2> stop timer T302;

2> perform the actions as specified in 5.3.14.4;

1> stop all timers that are running except T320 and T325;

1> discard the UE Inactive AS context;

1> set the variable *pendingRnaUpdate* to *false*, if that is set to *true*;

1> discard the KgNB, the KRRCenc key, the KRRCint, the KUPint key and the KUPenc key, if any;

1> release all radio resources, including release of the RLC entity, the MAC configuration and the associated PDCP entity and SDAP for all established RBs;

1> indicate the release of the RRC connection to upper layers together with the release cause;

1> enter RRC\_IDLE and perform cell selection as specified in TS 38.304 [20], except if going to RRC\_IDLE was triggered by selecting an inter-RAT cell while T311 was running;

1> if going to RRC\_IDLE was triggered by reception of the *RRCRelease* message including a *waitTime*:

2> start timer T302 with the value set to the *waitTime*;

2> inform the upper layer that access barring is applicable for all access categories except categories '0' and '2'.

[TS 38.304, clause 5.2.6]

At reception of *RRCRelease* message to transition the UE to RRC\_IDLE or RRC\_INACTIVE, UE shall attempt to camp on a suitable cell according to *redirectedCarrierInfo* if included in the *RRCRelease* message. If the UE cannot find a suitable cell, the UE is allowed to camp on any suitable cell of the indicated RAT. If the *RRCRelease* message does not contain the *redirectedCarrierInfo,* UE shall attempt to select a suitable cell on an NR carrier. If no suitable cell is found according to the above, the UE shall perform cell selection using stored information in order to find a suitable cell to camp on.

When returning to RRC\_IDLE state after UE moved to RRC\_CONNECTED state from *camped on any cell* state, UE shall attempt to camp on an acceptable cell according to *redirectedCarrierInfo*, if included in the *RRCRelease* message. If the UE cannot find an acceptable cell, the UE is allowed to camp on any acceptable cell of the indicated RAT. If the *RRCRelease* message does not contain *redirectedCarrierInfo* UE shall attempt to select an acceptable cell on an NR frequency. If no acceptable cell is found according to the above, the UE not in SNPN Access Mode shall continue to search for an acceptable cell of any PLMN in state *any cell selection*.

11.1.5.3 Test description

11.1.5.3.1 Pre-test conditions

System Simulator:

- 3 cells

- NR Cell 1 as defined in TS 38.508-1 [4] Table 4.4.2-3. System information combination NR-6 as defined in TS 38.508-1 [4], sub-clause 4.4.3.1.2.

- E-UTRA Cell 1 as defined in TS 36.508 [7] Table 4.4.2-2. System information combination 31 as defined in TS 36.508 [7], sub-clause 4.4.3.1.1.

- E-UTRA Cell 3 as defined in TS 36.508 [7] Table 4.4.2-2. System information combination 1 as defined in TS 36.508 [7], sub-clause 4.4.3.1.1. Cell 3 is set as "reserved for operator use" in SIB1.

- Power levels are constant and as defined in Tables 11.1.5.3.1-1/2.

Table 11.1.5.3.1-1: Time instances of cell power level and parameter changes for conducted test environment

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Parameter name | Unit | NR Cell 1 | E-UTRA Cell 1 | E-UTRA Cell 3 | Remark |
| T0 | SS/PBCH SSS EPRE | dBm/SCS | -88 | - | - |  |
| RS EPRE | dBm/15kHz | - | -85 | -73 |

Table 11.1.5.3.1-2: Time instances of cell power level and parameter changes for OTA test environment

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Parameter name | Unit | NR Cell 1 | E-UTRA Cell 1 | E-UTRA Cell 3 | Remark |
| T0 | SS/PBCH SSS EPRE | dBm/SCS | -82 | - | - |  |
| RS EPRE | dBm/15kHz | - | -96 | -96 |

UE:

- The UE fitted with a USIM with access class 0..9

Preamble:

- With E-UTRA Cell 1 "Serving cell", E-UTRA Cell 3 "Non-suitable "Off" cell" and NR Cell 1 "Non-suitable "Off" cell" in accordance with TS 38.508-1 [4], Table 6.2.2.1-3, the UE is brought to state RRC\_IDLE using generic procedure parameters Connectivity (*E-UTRA/EPC*) and Unrestricted nr PDN (*On*) in accordance with the procedure described in TS 38.508-1 [4], clause 4.5.2. 4G GUTI and eKSI are assigned and security context established.

- The UE is switched-off.

- With E-UTRA Cell 1 "Non-suitable "Off" cell", E-UTRA Cell 3 "Non-suitable "Off" cell" and NR Cell 1 "Serving cell" in accordance with TS 38.508-1 [4], Table 6.2.2.1-3, the UE is brought to state 1N-A, RRC\_IDLE Connectivity (NR), with at least one IMS PDU session on NR Cell 1, in accordance with the procedure described in TS 38.508-1 [4], Table 4.5.2.2-2. 5G-GUTI and ngKSI are assigned.

11.1.5.3.2 Test procedure sequence

Table 11.1.5.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U – S | Message |  |  |
| 0 | Void | - | - | - | - |
| - | EXCEPTION: The following messages are to be observed on NR Cell 1 unless explicitly stated otherwise. | - | - | - | - |
| 1 | The SS transmits a *Paging* message. | <-- | NR RRC: *Paging* | - | - |
| 2 | The UE transmits an *RRCSetupRequest* message. | --> | NR RRC: RRCSetupRequest | - | - |
| 3-9a2 | Steps 3 to 9a2 of the NR RRC\_CONNECTED procedure in TS 38.508-1 [4] Table 4.5.4.2-3 are executed to successfully complete the service request procedure. | - | - | - | - |
| 9A | Set the power levels according to “T0” as per Table 11.1.5.3.1-1/2. | - | - | - | - |
| 10 | Make the UE attempt an MTSI MO Speech Call. | - | - | - | - |
| 11 | The UE transmits an INVITE message. | - | - | - | - |
| 12 | Void | - | - | - | - |
| 12a1 | Void | - |  | - | - |
| 13 | The SS transmits an *RRCRelease* message. | <-- | NR RRC: RRCRelease | - | - |
| - | EXCEPTION: The following messages are to be observed on E-UTRA Cell 1 unless explicitly stated otherwise. | - | - | - | - |
| 14 | Check: Does the UE send an *RRCConnectionRequest* message on E-UTRA cell 1? | --> | RRC: RRCConnectionRequest | 1 | P |
| 15 | SS transmits an *RRCConnectionSetup* message. | <-- | RRC: RRCConnectionSetup | - | - |
| - | EXCEPTION: Steps 15Aa1 to 15Ab3 describe behaviour that depends on the UE implementation; the "lower case letter" identifies a step sequence that take place depending on the UE implementation. | - | - | - | - |
| 15a1-15b3 | Void | - | - | - | - |
| 15Aa1 | If the UE tries to preserve the IP address of the PDN connection then check does the UE transmit an ATTACH REQUEST message? | --> | RRC: RRCConnectionSetupComplete NAS: ATTACH REQUEST | 1 | P |
| 15Ab1 | Else check: does the UE transmit a TRACKING AREA UPDATE REQUEST message? | --> | RRC: *RRCConnectionSetupComplete* NAS: TRACKING AREA UPDATE REQUEST | 1 | P |
| 15Ab2 | The SS transmites a TRACKING AREA UPDATE REJECT message to UE. | <-- | RRC: DLInformationTransfer  NAS: TRACKING AREA UPDATE REQUEST REJECT | - | - |
| 15Ab3 | The UE transmits an ATTACH REQUEST message. | --> | RRC: ULInformationTransfer  NAS: ATTACH REQUEST | - | - |
| 16-27 | Steps 5 to 16 of the generic test procedure for UE registration (TS 36.508 [7] Table 4.5.2.3-1). | - | - | - | - |
| - | EXCEPTION: In parallel to the events described in steps 28 to 36 the steps specified in Table 11.1.5.3.2-2 may take place to transfer other PDU sessions to EPS. | - | - | - | - |
| - | EXCEPTION: In parallel to the events described in steps 28 to 37 the UE may perform IMS re-registration on EUTRAN as per steps 3-11 as defined in 34.229-1 [35] subclause C.46 using the message “REGISTER” with condition A31. | - | - | - | - |
| 28-32 | Steps 9a1-13 from the Generic Test Procedure for MTSI MO speech call establishment (TS 36.508 [7] table 4.5A.6.3-1) are performed. | - | - | - | - |
| 33-34 | Void | - | - | - | - |
| 35 | Check: Does the UE transmit an ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT message? | --> | RRC: ULInformationTransfer  NAS:ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT | 1 | P |
| 36 | The SS waits 1 second. | - | - | - | - |
| 36a1 | Void | - | - | - | - |
| 37 | Release IMS Call as specified in the generic procedure in TS 34.229-1 [35] subclause C.32. | - | - | - | - |

Table 11.1.5.3.2-2: Parallel behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Check: Does the UE transmit a PDN CONNECTIVITY REQUEST message to request an additional PDN. | --> | RRC: ULInformationTransfer  NAS: PDN CONNECTIVITY REQUEST | 1 | P |
| 2 | The SS configures a new data radio bearer, associated with the additional default EPS bearer context. *RRCConnectionReconfiguration* message contains the ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message. | <-- | RRC: RRCConnectionReconfiguration  NAS:  ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST |  |  |
| 3 | The UE transmits an *RRCConnectionReconfigurationComplete* message to confirm the establishment of additional default bearer. | --> | RRC: RRCConnectionReconfigurationComplete |  |  |
| - | EXCEPTION: In parallel to the event described in step 4 below, if initiated by the UE the generic procedure for IP address allocation in the U-plane specified in TS 36.508 [7] subclause 4.5A.1 takes place performing IP address allocation in the U-plane. | - | - |  |  |
| 4 | The UE transmits an ACTIVATE DEFAULT EPS BEARER CONTEXT ACCEPT message. | --> | RRC: ULInformationTransfer  NAS: ACTIVATE DEFAULT EPS BEARER CONTEXT ACCEPT |  |  |

11.1.5.3.3 Specific message contents

Table 11.1.5.3.3-0: REGISTRATION ACCEPT (preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| Extended protocol discriminator | ‘0111 1110’B | 5GS mobility management messages |  |
| Security header type | ’0000’B | Plain 5GS NAS message, not security protected |  |
| Spare half octet | '0000'B |  |  |
| 5GS network feature support | ‘0100 0001 0000 0000’B | Interworking without N26 interface supported |  |

Table 11.1.5.3.3-1: RRCRelease (step 13, table 11.1.5.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table Table 4.6.1-16 | | | |
| Information Element | Value/Remark | Comment | Condition |
| RRCRelease ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcRelease SEQUENCE { |  |  |  |
| redirectedCarrierInfo CHOICE { |  |  |  |
| eutra SEQUENCE { |  |  |  |
| eutraFrequency | Downlink EARFCN of E-UTRA cell 3 |  |  |
| cnType | epc |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.1.5.3.3-2: ATTACH REQUEST (step 15Aa1, table 11.1.5.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7.2-4 | | | |
| Information Element | Value/Remark | Comment | Condition |
| NAS key set identifier | KSIASME that was created when the UE last registered to EPC E-UTRA |  |  |
| EPS mobile identity | GUTI, assigned by E-UTRA Cell 1 at the initial registration when the UE entered S1 |  |  |
| Last visited registered TAI | The TAI the last visited E-UTRA Cell belonged to, if any. Not included if the UE does not have last stored EPC TAI. |  |  |
| Old GUTI type | "Native GUTI" |  |  |
| ESM message container | PDN CONNECTIVITY REQUEST message to active PDU sessions which the UE intends to transfer to EPS. |  |  |

Table 11.1.5.3.3-3: PDN CONNECTIVITY REQUEST (Table 11.1.5.3.3-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7.3-20 | | | |
| Information Element | Value/remark | Comment | Condition |
| EPS bearer identity | 0 | No EPS bearer identity assigned, for coding see Table 9.11.4.8.1 in TS 24.501 [22] |  |
| Procedure transaction identity | Any value from 1 to 254 |  |  |
| PDN connectivity request message identity | '1101 0000'B | PDN connectivity request |  |
| Request type | '010'B | Handover |  |
| PDN type | Any value between '001'B, '010'B, '011'B and '100'B | The allowed values are respectively IPv4, IPv6, IPv4v6 and "unused but interpreted as IPv6 by the network" |  |
| Protocol configuration options | PDU session ID of 5GS PDU session |  |  |

Table 11.1.5.3.3-4: TRACKING AREA UPDATE REQUEST (step 15Ab1, table 11.1.5.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7.2-27 with condition NR. | | | |
| Information Element | Value/Remark | Comment | Condition |
| "Active" flag | 0001 | Bearer Establishment requested |  |
| EPS bearer context status | Present | EBI corresponding to active PDU Sessions need to be set to 1 |  |
| NAS key set identifier | KSIASME that was created when the UE last registered to EPC E-UTRA |  |  |
| Old GUTI | GUTI, mapped from the 5G-GUTI assigned at the initial registration when the UE entered N1 |  |  |
| Last visited registered TAI | The TAI the last visited E-UTRA Cell belonged to, if any. Not included if the UE does not have last stored EPC TAI. |  |  |
| Old GUTI type | "Native GUTI" |  |  |
| UE status | "UE is in 5GMM-REGISTERED state" |  |  |

Table 11.1.5.3.3-5: TRACKING AREA UPDATE REJECT (step 15Ab2, table 11.1.5.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7.2-26. | | | |
| Information Element | Value/Remark | Comment | Condition |
| EMM cause | ‘0000 1001’B | #9 "UE identity cannot be derived by the network" |  |

Table 11.1.5.3.3-6: ATTACH REQUEST (step 15Ab3, table 11.1.5.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7.2-4. | | | |
| Information Element | Value/Remark | Comment | Condition |
| IMSI | IMSI of the UE |  |  |

Table 11.1.5.3.3-7: PDN CONNECTIVITY REQUEST (step 1, table 11.1.5.3.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7.3-20 | | | |
| Information Element | Value/remark | Comment | Condition |
| EPS bearer identity | 0 | No EPS bearer identity assigned, for coding see Table 9.11.4.8.1 in TS 24.501 [22] |  |
| Procedure transaction identity | Any value from 1 to 254 |  |  |
| PDN connectivity request message identity | '1101 0000'B | PDN connectivity request |  |
| Request type | '010'B | Handover |  |
| PDN type | Any value between '001'B, '010'B, '011'B and '100'B | The allowed values are respectively IPv4, IPv6, IPv4v6 and "unused but interpreted as IPv6 by the network" |  |
| Access point name | Not present or any allowed value |  |  |
| Protocol configuration options | PDU session ID of 5GS PDU session |  |  |

Table 11.1.5.3.3-8: SystemInformationBlockType1 of E-UTRA Cell 3 (all steps, table 11.1.5.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7] Table 4.4.3.2-3 | | | |
| Information Element | Value/remark | Comment | Condition |
| SystemInformationBlockType1 ::= SEQUENCE { |  |  |  |
| cellAccessRelatedInfo SEQUENCE { |  |  |  |
| plmn-IdentityList SEQUENCE (SIZE (1..6)) OF SEQUENCE { | 1 entry |  |  |
| cellReservedForOperatorUse[1] | reserved |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.1.5.3.3-9: ATTACH ACCEPT (preamble, step 25; step 14, TS 36.508 [7], Table 4.5.2.3-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 36.508 [7] Table 4.7.2-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| EPS network feature support | '0000 0011 0100 1000'B | - IMS voice over PS session in S1 mode supported  - emergency bearer services in S1 mode supported  - ePCO supported  - Interworking without N26 interface supported |  |

Table 11.1.5.3.3-10: ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST (preamble, step 25; step 14, TS 36.508 [7], Table 4.5.2.3-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7] Table 4.7.3-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol configuration options |  |  |  |
| Container ID n+2 | Not present | Session-AMBR are not present |  |
| Container ID n+3 | Not present | QoS rules are not present |  |
| Container ID n+4 | Not present | Qos flow descriptions are not present |  |

### 11.1.6 MT MMTEL voice call setup from NR RRC\_IDLE / EPS Fallback with redirection / Single registration mode without N26 interface / Success

11.1.6.1 Test Purpose (TP)

(1)

**with** {UE supporting both S1 mode and N1 mode and operating in single-registration mode, and, the Network has indicated "interworking without N26 interface supported", and, the UE is in NR RRC\_IDLE state }

**ensure that** {

**when** { UE receives a *Paging* message with MT MMTEL voice call, the MT IMS voice session establishment has been initiated and the UE receives a RRCRelease message which includes redirectedCarrierInfo indicating redirection to eutra }

**then** { UE selects the E-UTRA cell, performs an ATTACH or a TAU procedure, **and**, successfully completes the MT MMTEL call setup in EPS }

}

11.1.6.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS23.502, clauses 4.11.2.2, 4.13.6.1; TS 24.501, clauses 4.5.4.1, 4.8.2.3; TS 38.331, clause 5.3.11. Unless otherwise stated these are Rel-15 requirements.

[TS 23.502, clause 4.11.2.2]

The following procedure is used by UEs in single-registration or dual registration mode on mobility from 5GS to EPS.

In the case of network sharing the UE selects the target PLMN ID according to clause 5.18.3 of TS 23.501 [2].



Figure 4.11.2.2-1: Mobility procedure from 5GS to EPS without N26 interface

The UE operating in single-registration mode can start the procedure from Step 1 or Step 5. The UE operating in dual-registration mode starts the procedure from Step 5.

NOTE 1: The network has indicated the "Interworking without N26" to the UE. To support IP address preservation, the UE in single-registration mode starts the procedure from Step 5. If the UE in single-registration mode starts the procedure from Step 1, the IP address preservation is not provided.

0. UE is registered in 5GS and established PDU sessions. The FQDN for the S5/S8 interface of the PGW-C+SMF is also stored in the UDM by the PGW-C+SMF during PDU Session setup in addition to what is specified in clause 4.3.2.2.1 and clause 4.3.2.2.2.

NOTE 2: At 5GS to EPS mobility, the MME use the FQDN for the S5/S8 interface of the PGW-C+SMF to find the PGW-C+SMF, and when UE moves back from EPS to 5GS, the AMF uses FQDN for the S5/S8 interface of the PGW-C+SMF to find the PGW-C+SMF.

1. Step 1 as in clause 5.3.3.1 (Tracking Area Update) in TS 23.401 [13].

2. Step 2 as in clause 5.3.3.1 (Tracking Area Update) in TS 23.401 [13] with the following modifications:

The UE shall provide a EPS-GUTI that is mapped from the 5G-GUTI following the mapping rules specified in TS 23.501 [2]. The UE indicates that it is moving from 5GC.

3. Step 3 as in clause 5.3.3.1 (Tracking Area Update) in TS 23.401 [13].

4. If the MME determined that the old node is an AMF based on UE's GUTI mapped from 5G-GUTI and the MME is configured to support 5GS-EPS interworking without N26 procedure, the MME sends a TAU Reject to the UE.

5. Step 1 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13] with the modifications captured in clause 4.11.2.4.1.

6. Step 2 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13].

7. Steps 4-7 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13], with the modifications captured in clause 4.11.2.4.1.

8. Step 8 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13], with the modifications captured in clause 4.11.2.4.1.

9. Step 11 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13], with the following modifications:

The subscription profile the MME receives from HSS+UDM includes per DNN/APN at most one PGW-C+SMF FQDN as described in in clause 5.17.2.1 in TS 23.501 [2].

10. Steps 12-24 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13], with the modifications as described in clause 4.11.2.4.1.

11. Step 25 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13].

12. Step 26 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13].

13. If the UE has remaining PDU Sessions in 5GS which it wants to transfer to EPS and maintain the same IP address/prefix, the UE performs the UE requested PDN Connectivity Procedure as specified in TS 23.401 [13] clause 5.10.2 and sets the Request Type to "handover" in Step 1 of the procedure with modification captured in clause 4.11.2.4.2. UE provides an APN and the PDU Session ID corresponding to the PDU Session it wants to transfer to EPS. The UE provides the PDU Session ID in PCO as described in clause 4.11.1.1.

UEs in single-registration mode performs this step for each PDU Session immediately after completing the E-UTRAN Initial Attach procedure. UEs in dual-registration mode may perform this step any time after the completing of E-UTRAN Initial Attach procedure. Also, UEs in dual-registration mode may perform this step only for a subset of PDU Sessions.

The MME determines the PGW-C+SMF address for the Create Session Request based on the APN received from the UE and the subscription profile received from the HSS+UDM in Step 9 or when the HSS+UDM notifies the MME for the new PGW-C+SMF ID in the updated subscription profile.

The PGW-C+SMF uses the PDU Session ID to correlate the transferred PDN connection with the PDU Session in 5GC.

As a result of the procedure the PGW-U+UPF starts routing DL data packets to the Serving GW for the default and any dedicated EPS bearers established for this PDN connection.

14. The PGW-C+SMF initiates release of the PDU Session(s) in 5GS transferred to EPS as specified in clause 4.3.4.2 with the following clarification:

In step 2, the PGW-C+SMF shall not release IP address/prefix(es) allocated for the PDU Session.

If UP connection of the PDU Session is not active, step 3b is not executed, thus the steps triggered by step 3b are not executed;

If UP connection of the PDU Session is active, the SMF invokes the Namf\_Communication\_N1N2MessageTransfer service operation without including N1 SM container (PDU Session Release Command).

[TS 23.502, clause 4.13.6.1]

Figure 4.13.6.1-1 describes the EPS fallback procedure for IMS voice.

When the UE is served by the 5G System, the UE has one or more ongoing PDU Sessions each including one or more QoS Flows. The serving PLMN AMF has sent an indication towards the UE during the Registration procedure that IMS voice over PS session is supported, see clause 5.16.3.10 in TS 23.501 [2] and the UE has registered in the IMS. If N26 is not supported, the serving PLMN AMF sends an indication towards the UE during the Registration procedure that interworking without N26 is supported, see clause 5.17.2.3.1 in TS 23.501 [2].



Figure 4.13.6.1-1: EPS Fallback for IMS voice

1. UE camps on NG-RAN in the 5GS and an MO or MT IMS voice session establishment has been initiated.

2. Network initiated PDU Session modification to setup QoS flow for voice reaches the NG-RAN (see N2 PDU Session Request in clause 4.3.3).

3. NG-RAN is configured to support EPS fallback for IMS voice and decides to trigger fallback to EPS, taking into account UE capabilities, indication from AMF that "Redirection for EPS fallback for voice is possible" (received as part of initial context setup as defined in TS 38.413 [10]), network configuration (e.g. N26 availability configuration) and radio conditions. If NG-RAN decides not to trigger fallback to EPS, then the procedure stops here and following steps are not executed.

NG-RAN may initiate measurement report solicitation from the UE including E-UTRAN as target.

NOTE 1: If AMF has indicated that "Redirection for EPS fallback for voice is not possible", then AN Release via inter-system redirection to EPS is not performed in step 5.

4. NG-RAN responds indicating rejection of the PDU Session modification to setup QoS flow for IMS voice received in step 2 by PDU Session Response message towards the PGW-C+SMF (or H-SMF+P-GW-C via V-SMF, in case of roaming scenario) via AMF with an indication that mobility due to fallback for IMS voice is ongoing. The PGW-C+SMF maintains the PCC rule(s) associated with the QoS Flow(s).

5. NG-RAN initiates either handover (see clause 4.11.1.6.1), or AN Release via inter-system redirection to EPS (see clause 4.2.6 and clause 4.11.1.3.2), taking into account UE capabilities. The PGW-C+SMF reports change of the RAT type if subscribed by PCF as specified in clause 4.11.1.6.1, or clause 4.11.1.3.2.6. When the UE is connected to EPS, either 6a or 6b is executed

6a. In the case of 5GS to EPS handover, see clause 4.11.1.6.1, and in the case of inter-system redirection to EPS with N26 interface, see clause 4.11.1.3.2. In either case the UE initiates TAU procedure; or

6b. In the case of inter-system redirection to EPS without N26 interface, see clause 4.11.2.2. If the UE supports Request Type flag "handover" for PDN connectivity request during the attach procedure as described in clause 5.3.2.1 of TS 23.401 [13] and has received the indication that interworking without N26 is supported, then the UE initiates Attach with PDN connectivity request with request type "handover".

In inter-system redirection, the UE uses the emergency indication in the RRC message as specified in clause 6.2.2 of TS 36.331 [16] and E-UTRAN provides the emergency indication to MME during Tracking Area Update or Attach procedure. For the handover procedure see clause 4.11.1.6.1, step 1.

7. After completion of the mobility procedure to EPS or as part of the 5GS to EPS handover procedure (see clause 4.11.1.6.1), the SMF/PGW re-initiates the setup of the dedicated bearer for IMS voice, mapping the 5G QoS to EPC QoS parameters. The PGW-C+SMF behaves as specified in clause 4.9.1.3.1. The PGW-C+SMF reports about Successful Resource Allocation and Access Network Information if subscribed by PCF.

8. The IMS voice session establishment is continued.

At least for the duration of the voice call in EPS the E-UTRAN is configured to not trigger any handover to 5GS.

[TS 24.501, clause 4.5.4.1]

When the UE is in 5GMM-IDLE mode, upon receiving a request from the upper layers for an access attempt, the NAS shall categorize the access attempt into access identities and an access category following subclause 4.5.2, table 4.5.2.1 and table 4.5.2.2, and subclause 4.5.3, and provide the applicable access identities and the access category to the lower layers for the purpose of access control checking. In this request to the lower layer the NAS can also provide to the lower layer the RRC establishment cause determined as specified in subclause 4.5.6 of this specification.

NOTE 1: The access barring check is performed by the lower layers.

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

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

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

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

If the lower layers indicate that the access attempt is barred, the NAS shall not initiate the procedure to send the initial NAS message for the access attempt. Additionally:

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

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

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

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

b) if the event which triggered the access attempt was an MO-SMSoIP-attempt-started indication:

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

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

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

NOTE 4: Barring timers, on a per access category basis, are run by the lower layers. At expiry of barring timers, the indication of alleviation of access barring is indicated to the NAS on a per access category basis.

[TS 24.501, clause 4.8.2.3]

At inter-system change from N1 mode to S1 mode in EMM-IDLE mode when:（ PDU SEESION ACTIVE）

a) the UE supports non-IP PDN type and at least one PDU session is active; or

b) the UE does not support non-IP PDN type and at least one PDU session of IPv4, IPv6 or IPv4v6 PDU session type is active,

the UE shall proceed as follows:

a) if the UE supports sending an ATTACH REQUEST message containing a PDN CONNECTIVITY REQUEST message with request type set to "handover" to transfer a PDU session from N1 mode to S1 mode and the UE has received an "interworking without N26 interface supported" indication from the network, the UE shall:

1) enter substates EMM-DEREGISTERED.NORMAL-SERVICE and 5GMM-REGISTERED.NO-CELL-AVAILABLE;

2) map the PDU session(s) which the UE intends to transfer to EPS to the default EPS bearer context of the corresponding PDN connection(s) as specified in subclause 6.1.4.2; and

3) initiate an EPS attach procedure and include a PDN CONNECTIVITY REQUEST message with request type set to "handover" in the ATTACH REQUEST message to activate a default EPS bearer context for one of the active PDU sessions which the UE intends to transfer to EPS.

After successful completion of the EPS attach procedure, the UE shall reset the registration attempt counter and the attach attempt counter (see 3GPP TS 24.301 [15]) and attempt to activate each of the other default EPS bearer contexts, if any, by initiating a stand-alone PDN connectivity procedure with request type set to "handover" in the PDN CONNECTIVITY REQUEST message; and

b) otherwise, enter substates EMM-REGISTERED.NORMAL-SERVICE and 5GMM-REGISTERED.NO-CELL-AVAILABLE and initiate a tracking area update procedure (see 3GPP TS 24.301 [15]).

At inter-system change from N1 mode to S1 mode in EMM-IDLE mode when:（NO PDU SESSION）

a) the UE supports non-IP PDN type and no PDU session is active; or

b) the UE does not support non-IP PDN type and no PDU session of IPv4, IPv6 or IPv4v6 PDU session type is active,

the UE shall enter substates EMM-DEREGISTERED.NORMAL-SERVICE and 5GMM-DEREGISTERED.NO-CELL-AVAILABLE, and initiate an attach procedure.

At inter-system change from S1 mode to N1 mode in 5GMM-IDLE mode, the UE shall:

a) enter substate 5GMM-REGISTERED.NORMAL-SERVICE and substate EMM-REGISTERED.NO-CELL-AVAILABLE;

b) map the default EPS bearer context(s) of the PDN connection(s) which the UE intends to transfer to 5GS, if any, to the corresponding PDU session(s) as specified in subclause 6.1.4.2; and

c) initiate the registration procedure for mobility and periodic registration update indicating "mobility registration updating" in the 5GS registration type IE of the REGISTRATION REQUEST message (see subclause 5.5.1.3).

After having successfully registered in N1 mode the UE shall reset the registration attempt counter and the attach attempt counter (see 3GPP TS 24.301 [15]) and:

a) if the UE supports the PDU session establishment procedure with request type set to "existing PDU session" to transfer a PDN connection from S1 mode to N1 mode and the UE has received an "interworking without N26 interface supported" indication from the network, attempt to transfer the PDN connection(s) which the UE intends to transfer to 5GS, if any, from S1 mode to N1 mode by initiating the PDU session establishment procedure with request type set to "existing PDU session"; and

b) otherwise, establish PDU session(s) corresponding to the PDN connection(s) which the UE intends to transfer to 5GS, if any, by initiating the PDU session establishment procedure with request type set to "initial request".

See subclause 5.1.4.3 for coordination between 5GMM and EMM and subclause 6.1.4.2 for coordination between 5GSM and ESM.

[TS 38.331, clause 5.3.11]

UE shall:

1> reset MAC;

1> if T302 is running:

2> stop timer T302;

2> perform the actions as specified in 5.3.14.4;

1> stop all timers that are running except T320 and T325;

1> discard the UE Inactive AS context;

1> set the variable *pendingRnaUpdate* to *false*, if that is set to *true*;

1> discard the KgNB, the KRRCenc key, the KRRCint, the KUPint key and the KUPenc key, if any;

1> release all radio resources, including release of the RLC entity, the MAC configuration and the associated PDCP entity and SDAP for all established RBs;

1> indicate the release of the RRC connection to upper layers together with the release cause;

1> enter RRC\_IDLE and perform cell selection as specified in TS 38.304 [20], except if going to RRC\_IDLE was triggered by selecting an inter-RAT cell while T311 was running;

1> if going to RRC\_IDLE was triggered by reception of the *RRCRelease* message including a *waitTime*:

2> start timer T302 with the value set to the *waitTime*;

2> inform the upper layer that access barring is applicable for all access categories except categories '0' and '2'.

11.1.6.3 Test description

11.1.6.3.1 Pre-test conditions

System Simulator:

- 2 cells

- NR Cell 1 as defined in TS 38.508-1 [4] Table 4.4.2-3. System information combination NR-6 as defined in TS 38.508-1 [4], sub-clause 4.4.3.1.2.

- E-UTRA Cell 1 as defined in TS 36.508 [7] Table 4.4.2-2. System information combination 31 as defined in TS 36.508 [7], sub-clause 4.4.3.1.1.

- Power levels are constant and as defined in Tables 11.1.6.3.1-1/2.

Table 11.1.6.3.1-1: Time instances of cell power level and parameter changes for conducted test environment

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter name | Unit | NR Cell 1 | E-UTRA Cell 1 | Remark |
| T0 | SS/PBCH SSS EPRE | dBm/SCS | -88 | - |  |
| RS EPRE | dBm/15kHz | - | -91 |

Table 11.1.6.3.1-2: Time instances of cell power level and parameter changes for OTA test environment

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter name | Unit | NR Cell 1 | E-UTRA Cell 1 | Remark |
| T0 | SS/PBCH SSS EPRE | dBm/SCS | -82 | - |  |
| RS EPRE | dBm/15kHz | - | -91 |

UE:

None.

Preamble:

- With E-UTRA Cell 1 "Serving cell" and NR Cell 1 "Non-suitable "Off" cell" in accordance with TS 38.508-1 [4], Table 6.2.2.1-3, the UE is brought to state RRC\_IDLE using generic procedure parameters Connectivity (*E-UTRA/EPC*) and Unrestricted nr PDN (*On*) in accordance with the procedure described in TS 38.508-1 [4], clause 4.5.2. 4G GUTI and eKSI are assigned and security context established.

- The UE is switched-off.

- With E-UTRA Cell 1 "Non-suitable "Off" cell" and NR Cell 1 "Serving cell" in accordance with TS 38.508-1 [4], Table 6.2.2.1-3, the UE is brought to state 1N-A, RRC\_IDLE Connectivity (NR), in accordance with the procedure described in TS 38.508-1 [4], with one IMS PDU session on NR Cell 1, Table 4.5.2.2-2. 5G-GUTI and ngKSI are assigned and security context established.

11.1.6.3.2 Test procedure sequence

Table 11.1.6.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U – S | Message |  |  |
| 1 | Void | - | - | - | - |
| - | EXCEPTION: Uless otherwise stated the following messages are exchange on NR Cell 1. | - | - | - | - |
| 2 | The SS transmits a *Paging* message. | <-- | NR RRC: Paging | - | - |
| 3 | The UE transmits an *RRCSetupRequest* message. | --> | NR RRC: RRCSetupRequest | - | - |
| 4 | The SS transmits an *RRCSetup* message. | <-- | NR RRC: RRCSetup | - | - |
| 5 | The UE transmits an *RRCSetupComplete* message and a SERVICE REQUEST message. | --> | NR RRC: RRCSetupComplete  5GMM: SERVICE REQUEST | - | - |
| 5A | The SS transmits a *SecurityModeCommand* message. | <-- | NR RRC: SecurityModeCommand | - | - |
| 5B | The UE transmits a *SecurityModeComplete* message. | --> | NR RRC: SecurityModeComplete | - | - |
| 5C | Set the power levels according to “T0” as per Table 11.1.6.3.1-1/2. | - | - | - | - |
| 6 | The SS transmits an *RRCRelease* message. | <-- | NR RRC: RRCRelease | - | - |
| - | EXCEPTION: The following message was sent on E-UTRA Cell 1. | - | - | - | - |
| 7 | UE transmits an *RRCConnectionRequest* message. | --> | RRC: RRCConnectionRequest | - | - |
| 8 | SS transmits an *RRCConnectionSetup* message. | <-- | RRC: RRCConnectionSetup | - | - |
| - | EXCEPTION: Steps 8a1 to 8b3 describe behaviour that depends on the UE implementation; the "lower case letter" identifies a step sequence that take place depending on the UE implementation. | - | - | - | - |
| 8a1 | If the UE tries to preserve the IP address of the PDN connection then check does the UE transmit an ATTACH REQUEST message? | --> | RRC: RRCConnectionSetupComplete NAS: ATTACH REQUEST | 1 | P |
| 8b1 | Else check: does the UE transmit a TRACKING AREA UPDATE REQUEST message? | --> | RRC: *RRCConnectionSetupComplete* NAS: TRACKING AREA UPDATE REQUEST | 1 | P |
| 8b2 | The SS transmites a TRACKING AREA UPDATE REJECT message to UE. | <-- | RRC: DLInformationTransfer  NAS: TRACKING AREA UPDATE REQUEST REJECT | - | - |
| 8b3 | The UE transmits an ATTACH REQUEST message. | --> | RRC: ULInformationTransfer  NAS: ATTACH REQUEST | - | - |
| 9-20 | Steps 5 to 16 of the generic test procedure for UE registration (TS 36.508 [7] Table 4.5.2.3-1). | - | - | - | - |
| - | EXCEPTION: In parallel to the events described in steps 21 to 41 the steps specified in Table 11.1.6.3.2-2 may take place to transfer other PDU sessions to EPS. | - | - | - | - |
| - | EXCEPTION: In parallel to the events described in steps 21 to 29 the UE may perform IMS re-registration on EUTRAN as per steps as defined in defined in 34.229-1 [35] subclause C.46 using the message “REGISTER” with condition A31. 34.229-1 [35] subclause C.46. | - | - | - | - |
| 21-22 | Void | - | - | - | - |
| 23-28 | Steps 9-14 from the Generic Test Procedure for MTSI MT speech call establishment (TS 36.508 [7] table 4.5A.7.3-1) are performed. | - | - | - | - |
| 29 | Check: Does the UE transmit an ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT message? | --> | RRC: ULInformationTransfer  NAS:ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT | 1 | P |
| 30-40 | Steps 16-26 from the Generic Test Procedure for MTSI MT speech call establishment (TS 36.508 [7] table 4.5A.7.3-1) are performed. | - | - | - | - |
| 41 | The SS waits 1 second. | - | - | - | - |
| 42 | Release IMS Call as specified in the generic procedure in TS 34.229-1 [35] subclause C.33. | - | - | - | - |

Table 11.1.6.3.2-2: Parallel behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Check: Does the UE transmit a PDN CONNECTIVITY REQUEST message to request an additional PDN. | --> | RRC: ULInformationTransfer  NAS: PDN CONNECTIVITY REQUEST | 1 | P |
| 2 | The SS configures a new data radio bearer, associated with the additional default EPS bearer context. *RRCConnectionReconfiguration* message contains the ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message. | <-- | RRC: RRCConnectionReconfiguration  NAS:  ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST |  |  |
| 3 | The UE transmits an *RRCConnectionReconfigurationComplete* message to confirm the establishment of additional default bearer. | --> | RRC: RRCConnectionReconfigurationComplete |  |  |
| - | EXCEPTION: In parallel to the event described in step 4 below, if initiated by the UE the generic procedure for IP address allocation in the U-plane specified in TS 36.508 [7] subclause 4.5A.1 takes place performing IP address allocation in the U-plane. | - | - |  |  |
| 4 | The UE transmits an ACTIVATE DEFAULT EPS BEARER CONTEXT ACCEPT message. | --> | RRC: ULInformationTransfer  NAS: ACTIVATE DEFAULT EPS BEARER CONTEXT ACCEPT |  |  |

11.1.6.3.3 Specific message contents

Table 11.1.6.3.3-0: REGISTRATION ACCEPT (preamble; step 14, TS 38.508-1 [4], Table 4.5.2.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| Extended protocol discriminator | ‘0111 1110’B | 5GS mobility management messages |  |
| Security header type | ’0000’B | Plain 5GS NAS message, not security protected |  |
| Spare half octet | '0000'B |  |  |
| 5GS network feature support | ‘0100 0001 0000 0000’B | Interworking without N26 interface supported |  |

Table 11.1.6.3.3-1: RRCRelease (step 6, table 11.1.6.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table Table 4.6.1-16 | | | |
| Information Element | Value/Remark | Comment | Condition |
| RRCRelease ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcRelease SEQUENCE { |  |  |  |
| redirectedCarrierInfo CHOICE { |  |  |  |
| eutra SEQUENCE { |  |  |  |
| eutraFrequency | Downlink EARFCN of cell 1 |  |  |
| cnType | epc |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.1.6.3.3-1A: ATTACH REQUEST (step 8a1, table 11.1.6.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7.2-4. | | | |
| Information Element | Value/Remark | Comment | Condition |
| NAS key set identifier | KSIASME that was created when the UE last registered to EPC E-UTRA |  |  |
| EPS mobile identity | GUTI, assigned by E-UTRA Cell 1 at the initial registration when the UE entered S1 |  |  |
| Last visited registered TAI | The TAI the last visited E-UTRA Cell belonged to, if any. Not included if the UE does not have last stored EPC TAI. |  |  |
| Old GUTI type | "Native GUTI" |  |  |
| ESM message container | PDN CONNECTIVITY REQUEST message to active PDU sessions which the UE intends to transfer to EPS. |  |  |

Table 11.1.6.3.3-1B: PDN CONNECTIVITY REQUEST (step 8a1, table 11.1.6.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7.3-20 | | | |
| Information Element | Value/remark | Comment | Condition |
| EPS bearer identity | 0 | No EPS bearer identity assigned |  |
| Procedure transaction identity | Any value from 1 to 254 |  |  |
| PDN connectivity request message identity | '1101 0000'B | PDN connectivity request |  |
| Request type | '010'B | Handover |  |
| PDN type | Any value between '001'B, '010'B, '011'B and '100'B | The allowed values are respectively IPv4, IPv6, IPv4v6 and "unused but interpreted as IPv6 by the network" |  |
| Protocol configuration options | PDU session ID of 5GS PDU session |  |  |

Table 11.1.6.3.3-2: TRACKING AREA UPDATE REQUEST (step 8b1, table 11.1.6.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7.2-27 with condition NR. | | | |
| Information Element | Value/Remark | Comment | Condition |
| "Active" flag | 0001 | Bearer Establishment requested |  |
| EPS bearer context status | Present | EBI corresponding to active PDU Sessions need to be set to 1 |  |
| NAS key set identifier | KSIASME that was created when the UE last registered to EPC E-UTRA |  |  |
| Old GUTI | GUTI, mapped from the 5G-GUTI assigned at the initial registration when the UE entered N1 |  |  |
| Last visited registered TAI | The TAI the last visited E-UTRA Cell belonged to, if any. Not included if the UE does not have last stored EPC TAI. |  |  |
| Old GUTI type | "Native GUTI" |  |  |
| UE status | "UE is in 5GMM-REGISTERED state" |  |  |

Table 11.1.6.3.3-3: TRACKING AREA UPDATE REJECT (step8b2, table 11.1.6.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7.2-26. | | | |
| Information Element | Value/Remark | Comment | Condition |
| EMM cause | ‘0000 1001’B | #9 "UE identity cannot be derived by the network" |  |

Table 11.1.6.3.3-4: ATTACH REQUEST (step 8b3, table 11.1.6.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7.2-4. | | | |
| Information Element | Value/Remark | Comment | Condition |
| IMSI | IMSI of the UE |  |  |

Table 11.1.6.3.3-5: ATTACH ACCEPT (preamble, step 18; step 14, TS 36.508 [7], Table 4.5.2.3-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 36.508 [7] Table 4.7.2-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| EPS network feature support | '0000 0011 0100 1000'B | - IMS voice over PS session in S1 mode supported  - emergency bearer services in S1 mode supported  - ePCO supported  - Interworking without N26 interface supported |  |

Table 11.1.6.3.3-6: ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST (preamble, step 18; step 14, TS 36.508 [7], Table 4.5.2.3-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7] Table 4.7.3-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol configuration options |  |  |  |
| Container ID n+2 | Not present | Session-AMBR are not present |  |
| Container ID n+3 | Not present | QoS rules are not present |  |
| Container ID n+4 | Not present | Qos flow descriptions are not present |  |

Table 11.1.6.3.3-7: PDN CONNECTIVITY REQUEST (step 1, table 11.1.6.3.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7.3-20 | | | |
| Information Element | Value/remark | Comment | Condition |
| Access point name | Not present or any allowed value |  |  |

### 11.1.7 Emergency call setup from NR RRC\_IDLE / Emergency Services Fallback to EPS with redirection / Single registration mode with N26 interface / Success

Editor’s Note: This test may fail a conformant UE after test completion due to UE specific implementation of handling N1 enablement signalling

11.1.7.1 Test Purpose (TP)

(1)

***with*** { UE supporting both S1 mode and N1 mode and operating in single-registration mode, and, the Network has indicated "interworking without N26 interface not supported", and, the UE in NR RRC\_IDLE state }

ensure that {

***when*** { User initiates an Emergency call and the UE completes Access control checking in 5GMM-IDLE mode }

***then*** { UE requests the establishment of an Emergency call by transmitting an *RRCSetupRequest* message with *establishmentCause* set to 'emergency', and, a SERVICE REQUEST message with Service type set to 'emergency services fallback' }

}

(2)

***with*** { UE is NR RRC\_CONNECTED state after having requested a MMTEL call establishment and the MO IMS voice session establishment has been initiated }

ensure that {

***when*** { UE receives a RRCRelease message which includes *redirectedCarrierInfo* indicating redirection with *cnType*=epc }

***then*** { UE selects the E-UTRA cell, performs a TAU procedure, and, successfully completes the Emergency call setup in EPS }

}

11.1.7.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501 [22], subclauses 5.6.1.1, 5.6.1.2, 5.6.1.4; TS 23.502 [31], subclause 4.13.4.2; TS 24.301 [21], subclauses 4.4.2.3, 5.5.3.2.2 and TS 24.229 [44] subclause U.2.2.6.4. Unless otherwise stated these are Rel-15 requirements.

NOTE: Conformance requirements in regard to establishing an emergency call in EPS are not provided. This can be found in IMS Emergency tests specified in TS 36.523-1 [13].

[TS 24.501, subclause 5.6.1.1]

The UE shall invoke the service request procedure when:

...

h) the UE, in 5GMM-IDLE, 5GMM-CONNECTED mode over 3GPP access, or 5GMM-CONNECTED mode with RRC inactive indication, receives a request for emergency services fallback from the upper layer and performs emergency services fallback as specified in subclause 4.13.4.2 of 3GPP TS 23.502 [9]; or

[TS 24.501, subclause 5.6.1.2]

For case h) in subclause 5.6.1.1, the UE shall send a SERVICE REQUEST message with service type set to "emergency services fallback".

[TS 24.501, subclause 5.6.1.4]

For case h) in subclause 5.6.1.1, the UE shall treat the indication from the lower layers when the UE has changed to S1 mode or E-UTRA connected to 5GCN (see 3GPP TS 23.502 [9]) as successful completion of the procedure and stop timer T3517.

[TS 23.502, subclause 4.13.4.2]

The call flow in Figure 4.13.4.2-1 describes the procedure for emergency services fallback.



Figure 4.13.4.2-1: Emergency Services Fallback

1. UE camps on E-UTRA or NR cell in the 5GS (in either CM\_IDLE or CM\_CONNECTED state).

2. UE has a pending IMS emergency session request (e.g. voice) from the upper layers.

3. If the AMF has indicated support for emergency services using fallback via the Registration Accept message for the current RAT, the UE sends a Service Request message indicating that it requires emergency services fallback.

...

5. Based on the target CN indicated in message 4, one of the following procedures is executed by NG-RAN:

...

5b. NG-RAN initiates handover (see clause 4.11.1.2.1) or redirection to E-UTRAN connected to EPS. NG-RAN uses the security context provided by the AMF to secure the redirection procedure.

If the redirection procedure is used either in 5a or 5b the target CN is also conveyed to the UE in order to be able to perform the appropriate NAS procedures (S1 or N1 Mode).

[TS 24.301, subclause 4.4.2.3]

Secure exchange of NAS messages via a NAS signalling connection is usually established by the MME during the attach procedure by initiating a security mode control procedure. After successful completion of the security mode control procedure, all NAS messages exchanged between the UE and the MME are sent integrity protected using the current EPS security algorithms, and except for the messages specified in subclause 4.4.5, all NAS messages exchanged between the UE and the MME are sent ciphered using the current EPS security algorithms.

...

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

1) if the tracking area updating procedure is initiated as specified in 3GPP TS 24.501 [54], the UE shall transmit a TRACKING AREA UPDATE REQUEST message integrity protected with the current 5G NAS security context and the UE shall derive a mapped EPS security context (see subclause 8.6.1 of 3GPP TS 33.501 [56]). The UE shall include the eKSI indicating the 5G NAS security context value in the TRACKING AREA UPDATE REQUEST message.

After receiving the TRACKING AREA UPDATE REQUEST message including the eKSI, the MME forwards the TRACKING AREA UPDATE REQUEST message to the source AMF, if possible, to obtain the mapped EPS security context from the AMF as specified in 3GPP TS 33.501 [56]. The MME re-establishes the secure exchange of NAS messages by either:

- replying with a TRACKING AREA UPDATE ACCEPT message that is integrity protected and ciphered using the mapped EPS NAS security context. From this time onward, all NAS messages exchanged between the UE and the MME are sent integrity protected and except for the messages specified in subclause 4.4.5, all NAS messages exchanged between the UE and the MME are sent ciphered; or

[TS 24.301, subclause 5.5.3.2.2]

The UE in state EMM-REGISTERED shall initiate the tracking area updating procedure by sending a TRACKING AREA UPDATE REQUEST message to the MME,

...

z) when the UE performs inter-system change from N1 mode to S1 mode in EMM-IDLE mode, the UE operates in single-registration mode, and conditions specified in 3GPP TS 24.501 [54] apply;

...

zd) when the UE performs inter-system change from N1 mode to S1 mode in EMM-CONNECTED mode.

For all cases except case b, the UE shall set the EPS update type IE in the TRACKING AREA UPDATE REQUEST message to "TA updating". For case b, the UE shall set the EPS update type IE to "periodic updating".

...

When initiating a tracking area updating procedure while in S1 mode, the UE shall use the current EPS NAS integrity key to integrity protect the TRACKING AREA UPDATE REQUEST message, unless the UE is performing inter-system change from N1 mode to S1 mode.

...

If a UE has established PDN connection(s) and uplink user data pending to be sent via user plane when it initiates the tracking area updating procedure, or uplink signalling not related to the tracking area updating procedure when the UE does not support control plane CIoT EPS optimization, it may also set an "active" flag in the TRACKING AREA UPDATE REQUEST message to indicate the request to establish the user plane to the network and to keep the NAS signalling connection after the completion of the tracking area updating procedure.

...

If the UE has a current EPS security context, the UE shall include the eKSI (either KSIASME or KSISGSN) in the NAS Key Set Identifier IE in the TRACKING AREA UPDATE REQUEST message. Otherwise, the UE shall set the NAS Key Set Identifier IE to the value "no key is available". If the UE has a current EPS security context, the UE shall integrity protect the TRACKING AREA UPDATE REQUEST message with the current EPS security context. Otherwise the UE shall not integrity protect the TRACKING AREA UPDATE REQUEST message.

...

For the case z and zd, the TRACKING AREA UPDATE REQUEST message shall be integrity protected using the 5GS security context available in the UE. The UE shall include a GUTI, mapped from 5G-GUTI (see 3GPP TS 23.501 [54] and 3GPP TS 23.003 [2]), in the Old GUTI IE in the TRACKING AREA UPDATE REQUEST message. In addition, the UE shall include Old GUTI type IE with GUTI set to "Native GUTI", and the UE shall include a UE status IE with a 5GMM registration status set to "UE is in 5GMM-REGISTERED state".

When the tracking area updating procedure is initiated in EMM-IDLE mode, the UE may also include an EPS bearer context status IE in the TRACKING AREA UPDATE REQUEST message, indicating which EPS bearer contexts are active in the UE. The UE shall include the EPS bearer context status IE in TRACKING AREA UPDATE REQUEST message:

- ...

- for the case z; and

...

If the UE initiates the first tracking area updating procedure following an initial registration in N1 mode and the UE is operating in the single-registration mode, the UE shall include a UE radio capability information update needed IE in the TRACKING AREA UPDATE REQUEST message.

...

If the UE supports NB-S1 mode, Non-IP PDN type, or N1 mode, then the UE shall support the extended protocol configuration options IE.

For all cases except case b, if the UE supports the extended protocol configuration options IE, then the UE shall set the ePCO bit to "extended protocol configuration options supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message.

...

For all cases except case b, if the UE supports dual connectivity with NR, then the UE shall set the DCNR bit to "dual connectivity with NR supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message and shall include the UE additional security capability IE in the TRACKING AREA UPDATE REQUEST message.

...

For all cases except case b, if the UE supports N1 mode, the UE shall set the N1mode bit to "N1 mode supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message and shall include the UE additional security capability IE in the TRACKING AREA UPDATE REQUEST message.

[TS 24.229, subclause U.2.2.6.4]

NOTE: This subclause covers only the case where the UE selects the IM CN subsystem in accordance with the conventions and rules specified in 3GPP TS 23.167 [4B] and describes the IP-CAN specific procedure. It does not preclude the use of CS domain. When a CS system based on 3GPP TS 24.008 [8] is to be used, clause B.5 applies.

When the UE operates in single-registration mode as described in 3GPP TS 24.501 [258] and the UE recognises that a call request is an emergency call, if:

1) the IM CN subsystem is selected in accordance with the conventions and rules specified in 3GPP TS 23.167 [4B]; and

2) the UE is currently registered to the 5GS services while the UE is in an NR cell connected to 5GCN;

then the following treatment is applied:

1) if the EMC indicates "Emergency services not supported":

a) if the UE supports emergency services fallback as specified in 3GPP TS 23.501 [257] and the emergency services fallback is available (i.e., "ESFB is Y" as described in 3GPP TS 23.167 [4B]), the UE shall attempt emergency services fallback as specified in 3GPP TS 24.501 [258]. If the UE receives from the lower layers an indication that the emergency services fallback attempt failed, the UE may behave as described in bullet b) below assuming that the emergency services fallback is not available;

…

11.1.7.3 Test description

11.1.7.3.1 Pre-test conditions

System Simulator:

- 2 cells

- NR Cell 1 as defined in TS 38.508-1 [4] Table 4.4.2-3. System information combination NR-6 as defined in TS 38.508-1 [4], subclause 4.4.3.1.2.

- E-UTRA Cell 1 as defined in TS 36.508 [7] Table 4.4.2-2. System information combination 31 as defined in TS 36.508 [7], subclause 4.4.3.1.1.

- Power levels are constant and as defined in Tables 11.1.7.3.1-1/2.

Table 11.1.7.3.1-1: Time instances of cell power level and parameter changes for conducted test environment

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter name | Unit | NR Cell 1 | E-UTRA Cell 1 | Remark |
| T0 | SS/PBCH SSS EPRE | dBm/SCS | -88 | - |  |
| RS EPRE | dBm/15kHz | - | -91 |
| T1 | SS/PBCH SSS EPRE | dBm/SCS | Off | - |  |
|  | RS EPRE | dBm/15kHz | - | -91 |  |

Table 11.1.7.3.1-2: Time instances of cell power level and parameter changes for OTA test environment

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter name | Unit | NR Cell 1 | E-UTRA Cell 1 | Remark |
| T0 | SS/PBCH SSS EPRE | dBm/SCS | -82 | - |  |
| RS EPRE | dBm/15kHz | - | -91 |
| T1 | SS/PBCH SSS EPRE | dBm/SCS | Off | - |  |
|  | RS EPRE | dBm/15kHz | - | -91 |  |

UE:

None.

Preamble:

- With E-UTRA Cell 1 "Serving cell" and NR Cell 1 "Non-suitable "Off" cell" in accordance with TS 38.508-1 [4], Table 6.2.2.1-3, the UE is brought to state RRC\_IDLE using generic procedure parameters Connectivity (*E-UTRA/EPC*) and Unrestricted nr PDN (*On*) in accordance with the procedure described in TS 38.508-1 [4], clause 4.5.2. 4G GUTI and eKSI are assigned and security context established.

- the UE is switched-off.

- With E-UTRA Cell 1 "Non-suitable "Off" cell" and NR Cell 1 "Serving cell" in accordance with TS 38.508-1 [4], Table 6.2.2.1-3, the UE is brought to state 1N-A, RRC\_IDLE Connectivity (NR), in accordance with the procedure described in TS 38.508-1 [4], Table 4.5.2.2-2. 5G-GUTI and ngKSI are assigned and security context established.

11.1.7.2 Test procedure sequence

Table 11.1.7.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Void | - | - | - | - |
| - | EXCEPTION: Unless otherwise stated the following messages are exchange on NR Cell 1. | - | - | - | - |
| 2 | Make the UE initiate an Emergency call. | - | - | - | - |
| 3 | Check: Does the UE transmit an *RRCSetupRequest* message with *establishmentCause* set to 'emergency'? | --> | NR RRC: RRCSetupRequest | 1 | P |
| 4 | The SS transmits an *RRCSetup* message. | <-- | NR RRC: *RRCSetup* | - | - |
| 5 | Check: Does the UE transmit a SERVICE REQUEST message with Service type set to 'emergency services fallback'?  NOTE: The UE shall request 'emergency services fallback' when the AMF has indicated support for emergency services using fallback via the Registration Accept message for the current RAT as per TS 23.502 [31], subclause 4.13.4.2. | --> | NR RRC: RRCSetupComplete  5GMM: SERVICE REQUEST | 1 | P |
| 5A | The SS transmits a SecurityModeCommand message. | <-- | NR RRC: SecurityModeCommand | - | - |
| 5B | The UE transmits a SecurityModeComplete message. | --> | NR RRC: SecurityModeComplete | - | - |
| 5C | Set the power levels according to “T0” as per Table 11.1.7.3.1-1/2. | - | - | - | - |
| 6 | SS transmits *RRCRelease* message indicating redirection to E-UTRA Cell 1. | <-- | NR RRC: RRCRelease | - | - |
| - | EXCEPTION: Unless otherwise stated the following messages are exchange on E-UTRA Cell 1. | - | - | - | - |
| 7 | The UE transmits an *RRCConnectionRequest* message with 'establishmentCause' set to 'emergency'. | --> | RRC: RRCConnectionRequest | 2 | P |
| 8-10b2 | Steps 2-4b2 from the Tracking area updating procedure as specified in TS 38.508-1 [4], Table 4.9.7.2.2-1 are performed (UE performs inter-system change from N1 to S1, mapped EPS NAS security context from the 5GC). | - | - | - | - |
| 10A-10D | Steps 5-8 from the Generic Test Procedure for IMS Emergency call establishment in EUTRA: Normal Service as specified in TS 36.508 [7], Table 4.5A.4.3-1 are performed. | - | - | - | - |
| 10E | SS responds with TRACKING AREA UPDATE ACCEPT message. | <-- | RRC: DLInformationTransfer  NAS: TRACKING AREA UPDATE ACCEPT | - | - |
| 11 | Check: Does the UE transmit a TRACKING AREA UPDATE COMPLETE message? | --> | RRC: ULInformationTransfer  NAS: TRACKING AREA UPDATE COMPLETE | 2 | P |
| 12-17 | Steps 9-14 from the Generic Test Procedure for IMS Emergency call establishment in EUTRA: Normal Service as specified in TS 36.508 [7], Table 4.5A.4.3-1 are performed. | - | - | - | - |
| 18-19 | Void | - | - | - | - |
| 20 | Check: Does the UE transmit an ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT message? | --> | RRC: ULInformationTransfer  NAS: ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT | 2 | P |
| 21 | The SS waits 1 second. | - | - | - | - |
| 21A | Set the power levels according to “T1” as per Table 11.1.7.3.1-1/2. | - | - | - | - |
| 22 | Release IMS Call as specified in the generic procedure in TS 34.229-1 [35] subclause C.32. | - | - | - | - |
| 23 | The SS releases the RRC connection. | <-- | E-UTRA RRC: RRCConnectionRelease | - | - |
| 24 | SS starts Timer T1=60s. | - | - | - | - |
| - | EXCEPTION: Steps 25a1 to 25b1 describe behaviour that depends on the UE implementation. |  |  |  |  |
| 25a1 | The UE transmits an RRCConnectionRequest. | --> | RRC: RRCConnectionRequest | - | - |
| 25a2 | Stop Timer T1 |  |  |  |  |
| 25a3-25a7 | Steps 2-6 of 36.508 Table 6.4.2.7-1 are executed. | - | - | - | - |
| 25b1 | Timer T1 expires. | - | - | - | - |

11.1.7.3.3 Specific message contents

Table 11.1.7.3.3-1: REGISTRATION REQUEST (Preamble; TS 38.508-1 [4], Table 4.5.2.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM capability |  |  |  |
| S1 mode (octet 3, bit 1) | '1'B | S1 mode supported |  |

Table 11.1.7.3.3-2: REGISTRATION ACCEPT (Preamble; TS 38.508-1 [4], Table 4.5.2.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS network feature support |  |  |  |
| Emergency service support indicator for 3GPP access (EMC) (octet 3, bit 3 and bit 4) | '00'B | Emergency services not supported |  |
| Emergency service fallback indicator for 3GPP access (EMF) (octet 3, bit 5 and bit 6) | '01'B | Emergency services fallback supported in NR connected to 5GCN only |  |

Table 11.1.7.3.3-3: RRCSetupRequest (step 3, table 11.1.7.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-23 | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCSetupRequest ::= SEQUENCE { |  |  |  |
| rrcSetupRequest SEQUENCE { |  |  |  |
| establishmentCause | emergency |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.1.7.3.3-4: SERVICE REQUEST (step 5, table 11.1.7.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-16 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Service type | '0100'B | emergency services fallback |  |

Table 11.1.7.3.3-5: RRCRelease (step 6, table 11.1.7.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.6.1-16 | | | |
| Information Element | Value/Remark | Comment | Condition |
| RRCRelease ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcRelease SEQUENCE { |  |  |  |
| redirectedCarrierInfo CHOICE { |  |  |  |
| eutra SEQUENCE { |  |  |  |
| eutraFrequency | Downlink EARFCN of E-UTRA Cell 1 |  |  |
| cnType | epc |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.1.7.3.3-6: RRCConnectionRequest (step 7, Table 11.1.7.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.6.1-16 | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCConnectionRequest ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcConnectionRequest-r8 SEQUENCE { |  |  |  |
| establishmentCause | emergency |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.1.7.3.3-6a: TRACKING AREA UPDATE REQUEST (step 9, Table 11.1.7.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7.2-27, condition NR | | | |
| Information Element | Value/remark | Comment | Condition |
| UE network capability |  |  | NR |
| All octets with the exception of octet 8, bit 8 and octet 9, bit 6 | Any allowed value |  |  |
| Extended protocol configuration options (ePCO) (octet 8, bit 8) | Any allowed value |  |  |
| N1 mode supported (N1mode) (octet 9, bit 6) | Any allowed value |  |  |

Table 11.1.7.3.3-7: Void

Table 11.1.7.3.3-8: Void

Table 11.1.7.3.3-8a: TRACKING AREA UPDATE ACCEPT (Step 10D, Table 11.1.7.3.2-1)

|  |
| --- |
| Derivation Path: TS 36.508 [7] with Table 4.7.2-24, condition NR. |

Table 11.1.7.3.3-9: PDN CONNECTIVITY REQUEST (step 12, Table 11.1.7.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7.3-20, condition NOT (Interworking\_with\_5GS) | | | |
| Information Element | Value/Remark | Comment | Condition |
| Request type | '0100'B | emergency |  |
| Access point name | Not present |  |  |

Table 11.1.7.3.3-10: ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST (step 15, Table 11.1.7.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 36.508 [7], Table 4.7.3-6 and table 4.6.1-8 with condition UM-DRB-ADD(2). | | | |
| Information Element | Value/Remark | Comment | Condition |
| EPS bearer identity | an additional EPS Bearer Id different from default EPS Bearer Id or/and any mapped EPS bearer |  |  |
| Access point name | sos | APN value as recommended by IR.88 clause 6.4 [39] |  |

Table 11.1.7.3.3-11: Void

### 11.1.8 MO MMTEL voice call setup from NR RRC\_CONNECTED / EPS Fallback with handover / Single registration mode with N26 interface / voiceFallbackIndication

11.1.8.1 Test Purpose (TP)

(1)

***with*** { UE supporting both S1 mode and N1 mode and operating in single-registration mode, and, the Network has indicated "interworking without N26 interface not supported", **and**, the UE is in NR RRC\_CONNECTED state, then, the User initiates a MMTEL call, the MO IMS voice session establishment has been initiated }

***ensure that*** {

***when*** { UE receives a *MobilityFromNRCommand* message which includes *targetRAT-Type* set to *eutra* and with voiceFallbackIndication, and the UE does not succeed in establishing the connection to the target radio access technology }

***then*** { UE selects another suitable E-UTRA cell with starting a TAU procedure by using “mo-VoiceCall” as the establishment cause value in RRCConnectionRequest, ***and***, UE successfully completes the MO MMTEL call in EPS }

}

11.1.8.2 Conformance requirements

References: The conformance requirements covered in the present test case are specified in: TS 23.502, clauses 4.13.6.1, TS 24.501, clauses 4.8.2.2, 5.5.1.2.2, 5.5.1.2.4, 5.1.4.2 and 6.1.4.1, TS 38.331, clause 5.4.3.5. Unless otherwise stated these are Rel-16 requirements.

[TS 23.502, clause 4.13.6.1]

Figure 4.13.6.1-1 describes the EPS fallback procedure for IMS voice.

When the UE is served by the 5G System, the UE has one or more ongoing PDU Sessions each including one or more QoS Flows. The serving PLMN AMF has sent an indication towards the UE during the Registration procedure that IMS voice over PS session is supported, see clause 5.16.3.10 in TS 23.501 [2] and the UE has registered in the IMS. If N26 is not supported, the serving PLMN AMF sends an indication towards the UE during the Registration procedure that interworking without N26 is supported, see clause 5.17.2.3.1 in TS 23.501 [2].



Figure 4.13.6.1-1: EPS Fallback for IMS voice

1. UE camps on NG-RAN in the 5GS and an MO or MT IMS voice session establishment has been initiated.

2. Network initiated PDU Session modification to setup QoS flow for voice reaches the NG-RAN (see N2 PDU Session Request in clause 4.3.3).

3. NG-RAN is configured to support EPS fallback for IMS voice and decides to trigger fallback to EPS, taking into account UE capabilities, indication from AMF that "Redirection for EPS fallback for voice is possible" (received as part of initial context setup as defined in TS 38.413 [10]), network configuration (e.g. N26 availability configuration) and radio conditions. If NG-RAN decides not to trigger fallback to EPS, then the procedure stops here and following steps are not executed.

NG-RAN may initiate measurement report solicitation from the UE including E-UTRAN as target.

NOTE 1: If AMF has indicated that "Redirection for EPS fallback for voice is not possible", then AN Release via inter-system redirection to EPS is not performed in step 5.

4. NG-RAN responds indicating rejection of the PDU Session modification to setup QoS flow for IMS voice received in step 2 by PDU Session Modification Response message towards the PGW-C+SMF (or H-SMF+P-GW-C via V-SMF, in the case of home routed roaming scenario) via AMF with an indication that mobility due to fallback for IMS voice is ongoing. The PGW-C+SMF maintains the PCC rule(s) associated with the QoS Flow(s) and reports the EPS Fallback event to the PCF if PCF has subscribed to this event.

5. NG-RAN initiates either handover (see clause 4.11.1.2.1), or AN Release via inter-system redirection to EPS (see clause 4.2.6 and clause 4.11.1.3.2), taking into account UE capabilities. The PGW-C+SMF reports change of the RAT type if subscribed by PCF as specified in clause 4.11.1.2.1, or clause 4.11.1.3.2.6. When the UE is connected to EPS, either 6a or 6b is executed

6a. In the case of 5GS to EPS handover, see clause 4.11.1.2.1, and in the case of inter-system redirection to EPS with N26 interface, see clause 4.11.1.3.2. In either case the UE initiates TAU procedure; or

6b. In the case of inter-system redirection to EPS without N26 interface, see clause 4.11.2.2. If the UE supports Request Type flag "handover" for PDN connectivity request during the attach procedure as described in clause 5.3.2.1 of TS 23.401 [13] and has received the indication that interworking without N26 is supported, then the UE initiates Attach with PDN connectivity request with request type "handover".

In inter-system redirection, the UE uses the emergency indication in the RRC message as specified in clause 6.2.2 of TS 36.331 [16] and E-UTRAN provides the emergency indication to MME during Tracking Area Update or Attach procedure. For the handover procedure see clause 4.11.1.2.1, step 1.

7. After completion of the mobility procedure to EPS or as part of the 5GS to EPS handover procedure (see clause 4.11.1.2.1), the SMF/PGW re-initiates the setup of the dedicated bearer(s) for the maintained PCC rule(s) in step 4 including of the dedicated bearer for IMS voice, mapping the 5G QoS to EPC QoS parameters. The PGW-C+SMF behaves as specified in clause 4.9.1.3.1. The PGW-C+SMF reports about Successful Resource Allocation and Access Network Information if subscribed by PCF.

The IMS signalling related to IMS voice call establishment continues after step 1 as specified in the TS 23.228 [55].

At least for the duration of the voice call in EPS the E-UTRAN is configured to not trigger any handover to 5GS.

[TS 24.501, clause 4.8.2.2]

See subclause 5.1.4.2 for coordination between 5GMM and EMM and subclause 6.1.4.1 for coordination between 5GSM and ESM.

[TS 24.501, clause 5.5.1.2.2]

If the UE supports S1 mode, the UE shall:

- set the S1 mode bit to "S1 mode supported" in the 5GMM capability IE of the REGISTRATION REQUEST message;

- include the S1 UE network capability IE in the REGISTRATION REQUEST message; and

- if the UE supports sending an ATTACH REQUEST message containing a PDN CONNECTIVITY REQUEST message with request type set to "handover" to transfer a PDU session from N1 mode to S1 mode, set the HO attach bit to "attach request message containing PDN connectivity request with request type set to handover to transfer PDU session from N1 mode to S1 mode supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

[TS 24.501, clause 5.5.1.2.4]

If the UE included S1 mode supported indication in the REGISTRATION REQUEST message, the AMF supporting interworking with EPS shall set the IWK N26 bit to either:

a) "interworking without N26 interface not supported" if the AMF supports N26 interface ; or

b) "interworking without N26 interface supported" if the AMF does not support N26 interface

in the 5GS network feature support IE in the REGISTRATION ACCEPT message.

The UE supporting S1 mode shall operate in the mode for interworking with EPS as follows:

a) if the IWK N26 bit in the 5GS network feature support IE is set to "interworking without N26 interface not supported", the UE shall operate in single-registration mode;

b) if the IWK N26 bit in the 5GS network feature support IE is set to "interworking without N26 interface supported" and the UE supports dual-registration mode, the UE may operate in dual-registration mode; or

NOTE 3: The registration mode used by the UE is implementation dependent.

c) if the IWK N26 bit in the 5GS network feature support IE is set to "interworking without N26 interface supported" and the UE only supports single-registration mode, the UE shall operate in single-registration mode.

The UE shall treat the received interworking without N26 interface indicator for interworking with EPS as valid in the entire PLMN and its equivalent PLMN(s).

The network informs the UE about the support of specific features, such as IMS voice over PS session, emergency services or emergency services fallback, in the 5GS network feature support information element. In a UE with IMS voice over PS session capability, the IMS voice over PS session indicator, the Emergency services support indicator, and the Emergency services fallback indicator shall be provided to the upper layers. The upper layers take the IMS voice over PS session indicator into account when selecting the access domain for voice sessions or calls. When initiating an emergency call, the upper layers also take the IMS voice over PS session indicator, the Emergency services support indicator, and the Emergency services fallback indicator into account for the access domain selection.

[TS 24.501, clause 5.1.4.2]

At inter-system change from N1 mode to S1 mode when there is at least one active PDU session for which interworking with EPS is supported as specified in subclause 6.1.4.1, the UE shall enter substates EMM-REGISTERED.NORMAL-SERVICE and 5GMM-REGISTERED.NO-CELL-AVAILABLE and initiate a tracking area updating procedure (see 3GPP TS 24.301 [15]).

[TS 24.501, clause 6.1.4.1]

Upon inter-system change from N1 mode to S1 mode, the UE shall create the default EPS bearer context and the dedicated EPS bearer context(s) based on the parameters of the mapped EPS bearer contexts or the associations between QoS flow and mapped EPS bearer in the PDU session, if available. The EPS bearer identity assigned for the QoS flow of the default QoS rule becomes the EPS bearer identity of the default bearer in the corresponding PDN connection. If there is no EPS bearer identity assigned to the QoS flow of the default QoS rule, the UE shall release locally the PDU session. If there is no EPS bearer identity assigned to the QoS flow(s) which is not associated with the default QoS rule, the UE shall locally delete the QoS rules and the QoS flow level QoS parameters associated with the QoS flow(s). The UE uses the parameters from each PDU session for which interworking with EPS is supported to create corresponding default EPS bearer context and optionally dedicated EPS bearer context(s) as follows:

a) the PDU session type of the PDU session shall be mapped to the PDN type of the default EPS bearer context as follows:

1) the PDN type shall be set to "non-IP" if the PDU session type is "Ethernet" or "Unstructured";

2) the PDN type shall be set to "IPv4" if the PDU session type is "IPv4";

3) the PDN type shall be set to "IPv6" if the PDU session type is "IPv6"; and

4) the PDN type shall be set to "IPv4v6" if the PDU session type is "IPv4v6";

b) the PDU address of the PDU session shall be mapped to the PDN address of the default EPS bearer context as follows:

1) the PDN address of the default EPS bearer context is set to the PDU address of the PDU session, if the PDU session type is "IPv4", "IPv6" or "IPv4v6"; and

2) the PDN address of the default EPS bearer context is set to zero, if the PDU session type is "Ethernet" or "Unstructured";

c) the DNN of the PDU session shall be mapped to the APN of the default EPS bearer context;

d) the APN-AMBR and extended APN-AMBR received in the parameters of the default EPS bearer context of the mapped EPS bearer contexts shall be mapped to the APN-AMBR and extended APN-AMBR of the default EPS bearer context;

e) for each PDU session in state PDU SESSION ACTIVE, PDU SESSION MODIFICATION PENDING or PDU SESSION INACTIVE PENDING the UE shall set the state of the mapped EPS bearer context(s) to BEARER CONTEXT ACTIVE; and

f) for any other PDU session the UE shall set the state of the mapped EPS bearer context(s) to BEARER CONTEXT INACTIVE.

Additionally, for each mapped EPS bearer context or the association between QoS flow and mapped EPS bearer in the PDU session:

a) the EPS bearer identity shall be set to the EPS bearer identity received in the mapped EPS bearer context, or the EPS bearer identity associated with the QoS flow;

b) the EPS QoS parameters shall be set to the mapped EPS QoS parameters of the EPS bearer received in the mapped EPS bearer context, or the EPS QoS parameters associated with the QoS flow;

c) the extended EPS QoS parameters shall be set to the mapped extended EPS QoS parameters of the EPS bearer received in the mapped EPS bearer context, or the extended EPS QoS parameters associated with the QoS flow; and

d) the traffic flow template shall be set to the mapped traffic flow template of the EPS bearer received in the mapped EPS bearer context, or the stored traffic flow template associated with the QoS flow, if available.

After inter-system change from N1 mode to S1 mode, the UE shall associate the PDU session identity, the S-NSSAI, and the session-AMBR with the default EPS bearer context, and for each EPS bearer context mapped from one or more QoS flows, associate the QoS rule(s) for the QoS flow(s) and the QoS flow description(s) for the QoS flow(s) with the EPS bearer context.

After inter-system change from N1 mode to S1 mode, the UE and the SMF shall maintain the PDU session type of the PDU session until the PDN connection corresponding to the PDU session is released if the UE supports non-IP PDN type and the PDU session type is "Ethernet" or "Unstructured".

After inter-system change from N1 mode to S1 mode, the UE and the SMF shall maintain the always-on PDU session indication.

After inter-system change from N1 mode to S1 mode, the UE and the SMF shall maintain the maximum number of supported packet filters until the PDN connection corresponding to the PDU session is released.

[TS 38.331, clause 5.4.3.5]

The UE shall:

1> if the UE does not succeed in establishing the connection to the target radio access technology:

2> if the UE supports Radio Link Failure Report for Inter-RAT MRO:

3> store handover failure information in *VarRLF-Report* according to 5.3.10.5;

2> if voiceFallbackIndication is included in the MobilityFromNRCommand message:

3> attempt to select an E-UTRA cell:

4> if a suitable E-UTRA cell is selected:

5> perform the actions upon going to RRC\_IDLE as specified in 5.3.11, with release cause 'RRC connection failure';

11.1.8.3 Test Description

11.1.8.3.1 Pre-test conditions

System Simulator:

- 3 cells

- NR Cell 1 as defined in TS 38.508-1 [4] Table 4.4.2-3. System information combination NR-6 as defined in TS 38.508-1 [4], sub-clause 4.4.3.1.2.

- E-UTRA Cell 1 and Cell 2 as defined in TS 36.508 [7] Table 4.4.2-2. System information combination 31 as defined in TS 36.508 [7], sub-clause 4.4.3.1.1.

- N26 interface is configured.

- Power levels are constant and as defined in Tables 11.1.8.3.1-1/2.

Table 11.1.8.3.1-1: Time instances of cell power level and parameter changes for conducted test environment

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Parameter name | Unit | NR Cell 1 | E-UTRA Cell 1 | E-UTRA Cell 2 | Remark |
| T0 | SS/PBCH SSS EPRE | dBm/SCS | -88 | - | - |  |
| RS EPRE | dBm/15kHz | - | "Off" | -91 |

Table 11.1.8.3.1-2: Time instances of cell power level and parameter changes for OTA test environment

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Parameter name | Unit | NR Cell 1 | E-UTRA Cell 1 | E-UTRA Cell 2 | Remark |
| T0 | SS/PBCH SSS EPRE | dBm/SCS | -82 | - | - |  |
| RS EPRE | dBm/15kHz | - | "Off" | -91 |

UE:

- The UE is configured to use IMS preconditions

Preamble:

- With E-UTRA Cell 1 "Serving cell", E-UTRA Cell 2 "Non-suitable "Off" cell" and NR Cell 1 "Non-suitable "Off" cell" in accordance with TS 38.508-1 [4], Table 6.2.2.1-3, the UE is brought to state RRC\_IDLE using generic procedure parameters Connectivity (*E* *-UTRA/EPC*) and Unrestricted nr PDN (*On)* in accordance with the procedure described in TS 38.508-1 [4], clause 4.5.2. 4G GUTI and eKSI are assigned and security context established.

- The UE is switched-off.

- With E-UTRA Cell 1 "Non-suitable "Off" cell", E-UTRA Cell 2 "Non-suitable "Off" cell" and NR Cell 1 "Serving cell" in accordance with TS 38.508-1 [4], Table 6.2.2.1-3, the UE is brought to state 1N-A, RRC\_IDLE Connectivity (NR) with at least one IMS PDU session on NR Cell 1, in accordance with the procedure described in TS 38.508-1 [4], Table 4.5.2.2-2. 5G-GUTI and ngKSI are assigned.

11.1.8.3.2 Test procedure sequence

Table 11.1.8.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U – S | Message |  |  |
| 1 | Void | - | - | - | - |
| - | The following messages are to be observed on NR Cell 1 unless explicitly stated otherwise. | - | - | - | - |
| 2 | The SS transmits a *Paging* message. | <-- | NR RRC: *Paging* | - | - |
| 3 | The UE transmits an *RRCSetupRequest* message. | --> | NR RRC: RRCSetupRequest | - | - |
| 4-9 | Steps 3 to 8 of the NR RRC\_CONNECTED procedure in TS 38.508-1 [4] Table 4.5.4.2-3 are executed to successfully complete the service request procedure. | - | - | - | - |
| 10 | Set the power levels according to “T0” as per Table 11.1.8.3.1-1/2. | - | - | - | - |
| 11 | Make the UE attempt an MTSI MO Speech Call. |  |  |  |  |
| 12-16 | Steps 1-5 of the MTSI MO speech call for 5GS procedure according to TS 34.229-5 [41] subclause A.9.1 take place. | - | - | - | - |
| 17 | The SS transmits a *MobilityFromNRCommand* message which includes target eutra cell set to E-UTRA Cell 1 according to 38.508-1 [4] Table 4.6.1-8. | <-- | NR RRC: MobilityFromNRCommand | - | - |
| - | The following messages are to be observed on E-UTRA Cell 2 unless explicitly stated otherwise. | - | - | - | - |
| 18 | Check: Does the UE transmit an *RRCConnectionRequest* message on E-UTRA cell 2? | --> | RRC: RRCConnectionRequest | 1 | P |
| 19-23 | UE performs generic procedure as defined in TS 38.508-1 [4], Table 4.9.7.2.2-1 Steps 2-6 for N1 to S1 Inter mode change with condition ‘connected without release’ & ‘mapped 5G security context’. | - | - | - | - |
| 24-27 | Generic Test Procedure as defined in Steps 5-8 of TS 36.508 [7] Table 4.5A.6.3-1 is performed to establish radio bearer corresponding to IMS PDN. | - | - | - | - |
| 28 | The SS configures a new RLC-UM data radio bearer with condition DRB (0,1), associated with the dedicated EPS bearer context. *RRCConnectionReconfiguration* message contains the ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST message. EPS bearer context #4 (QCI 1) according to TS 36.508 [7] Table 6.6.2-1: Reference dedicated EPS bearer contexts.  Reference dedicated EPS bearer contexts is to establish the dedicated EPS bearer context on IMS PDN. | <-- | RRC: RRCConnectionReconfiguration  NAS: ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST | - | - |
| - | EXCEPTION: In parallel to the events described in steps 291-3 below, the steps specified in table 11.1.8.3.2-2 will take place. | - | - | - | - |
| 29 | The UE transmits an RRCConnectionReconfigurationComplete message. | --> | RRC: RRCConnectionReconfigurationComplete | - | - |
| 30 | The UE transmits an *ULInformationTransfer* message including the ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT message. | --> | RRC: ULInformationTransfer  NAS: ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT | - | - |
| 31 | The SS waits 1 second for call duration. | - | - | - | - |
| 32 | Release IMS Call as specified in the generic procedure in TS 34.229-1 [35] subclause C.32. | - | - | - | - |

Table 11.1.8.3.2-2: Parallel behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
|  | EXCEPTION: Steps 1a1 to 1a7 describe behaviour that depends on the UE capability; the "lower case letter" identifies a step sequence that take place if a capability is supported | - | - | - | - |
| 1a1-1a2 | The UE performs IMS re-registration on EUTRAN as per steps 1-2 as defined in TS 34.229-1 [35] C.46. | - | - | - | - |
| 1a3-1a6A | Steps 1-5 clause A.9.2 “EPS Fallback for Voice Call / steps after fallback / 5GS” of TS 34.229-5 [41] take place. | - | - | - | - |
| 1a7 | Check: Does the UE send an ACK to acknowledge receipt of the 200 OK for INVITE? | --> | SIP: ACK | 1 | P |

11.1.8.3.3 Specific message contents

Table 11.1.8.3.3-1: REGISTRATION REQUEST (preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM capability |  |  |  |
| S1 mode | '1'B | S1 mode supported |  |
| S1 UE network capability | Present but contents not checked |  |  |

Table 11.1.8.3.3-2:REGISTRATION ACCEPT (preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS network feature support |  |  |  |
| IMS- VoPS-3GPP | '1'B | IMS voice over PS session supported over 3GPP access |  |
| IWK N26 | '0'B | Interworking without N26 interface not supported |  |

Table 11.1.8.3-3: Void

Table 11.1.8.3.3-4: MobilityFromNRCommand (step 17, Table 11.1.8.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.6.1-8 | | | |
| Information Element | Value/remark | Comment | Condition |
| MobilityFromNRCommand::= SEQUENCE { |  |  |  |
| rrc-TransactionIdentifier | RRC-TransactionIdentifier |  |  |
| criticalExtensions CHOICE { |  |  |  |
| mobilityFromNRCommand ::= SEQUENCE { |  |  |  |
| targetRAT-Type | eutra |  |  |
| targetRAT-MessageContainer | RRCConnectionReconfiguration |  |  |
| nas-SecurityParamFromNR | 8 LSB of the downlink NAS COUNT |  |  |
| nonCriticalExtension { |  |  |  |
| voiceFallbackIndication-r16 | true |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.1.8.3.3-5: RRCConnectionReconfiguration (Table 11.1.8.3.3-4)

|  |
| --- |
| Derivation Path: TS 36.508 [7] Table 4.6.1-8 with condition HO-TO-EUTRA(n,0) |

Table 11.1.8.3.3-6: RRCConnectionRequest (step 18, table 11.1.8.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 36.508 [7] Table 4.6.1-16 | | | |
| Information Element | Value/Remark | Comment | Condition |
| RRCConnectionRequest ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcConnectionRequest-r8 SEQUENCE { |  |  |  |
| ue-Identity CHOICE { |  |  |  |
| s-TMSI | Any allowed value |  |  |
| } |  |  |  |
| establishmentCause | mo-VoiceCall-v1280 | mo-VoiceCall |  |
| spare | Present but contents not checked |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.1.8.3.3-7: *SystemInformationBlockType2* for E-UTRA Cell 2 (preamble and all steps, Table 11.1.8.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.4.3.3-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| SystemInformationBlockType2 ::= SEQUENCE { |  |  |  |
| voiceServiceCauseIndication-r12 | true |  |  |
| } |  |  |  |

### 11.1.9 MO MMTEL voice call setup from NR RRC\_IDLE / EPS Fallback with redirection / Single registration mode with N26 interface / voiceFallbackIndication

11.1.9.1 Test Purpose (TP)

(1)

**with** { UE being in NR RRC\_CONNECTED state after having requested an MMTEL call establishment and the MO IMS voice session establishment has been initiated }

**ensure that** {

**when** { UE receives an RRCRelease message which includes redirectedCarrierInfo indicating redirection to E-UTRA and with voiceFallbackIndication }

**then** {UE selects the E-UTRA cell, uses “mo-VoiceCall” as the establishment cause value in RRC Connection Request, performs a TAU procedure, and, successfully completes the MMTEL call setup in EPS }

}

11.1.9.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 24.501, clauses 4.5.4.1; TS 38.331, clause 5.3.8.3, 5.3.11. Unless otherwise stated these are Rel-16 requirements.

[TS 24.501, clause 4.5.4.1]

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

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

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

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

NOTE 1: The access barring check is performed by the lower layers.

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

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

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

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

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

[TS 38.331, clause 5.3.8.3]

The UE shall:

1> delay the following actions defined in this sub-clause 60 ms from the moment the *RRCRelease* message was received or optionally when lower layers indicate that the receipt of the *RRCRelease* message has been successfully acknowledged, whichever is earlier;

1> stop timer T380, if running;

1> stop timer T320, if running;

1> if timer T316 is running;

2> stop timer T316;

2> clear the information included in *VarRLF-Report,* if any;

1> stop timer T350, if running;

1> if theAS security is not activated:

2> ignore any field included in *RRCRelease* message except *waitTime*;

2> perform the actions upon going to RRC\_IDLE as specified in 5.3.11 with the release cause 'other' upon which the procedure ends;

1> if the *RRCRelease* message includes *redirectedCarrierInfo* indicating redirection to *eutra*:

2> if *cnType* is included:

3> after the cell selection, indicate the available CN Type(s) and the received *cnType* to upper layers;

NOTE 1: Handling the case if the E-UTRA cell selected after the redirection does not support the core network type specified by the *cnType,* is up to UE implementation.

2> if voiceFallbackIndication is included:

3> consider the RRC connection release was for EPS fallback for IMS voice (see TS 23.502 [43]);

[TS 38.331, clause 5.3.11]

UE shall:

1> reset MAC;

1> if T302 is running:

2> stop timer T302;

2> perform the actions as specified in 5.3.14.4;

1> stop all timers that are running except T320 and T325;

1> discard the UE Inactive AS context;

1> set the variable *pendingRnaUpdate* to *false*, if that is set to *true*;

1> discard the KgNB, the KRRCenc key, the KRRCint, the KUPint key and the KUPenc key, if any;

1> release all radio resources, including release of the RLC entity, the MAC configuration and the associated PDCP entity and SDAP for all established RBs;

1> indicate the release of the RRC connection to upper layers together with the release cause;

1> enter RRC\_IDLE and perform cell selection as specified in TS 38.304 [20], except if going to RRC\_IDLE was triggered by selecting an inter-RAT cell while T311 was running;

1> if going to RRC\_IDLE was triggered by reception of the *RRCRelease* message including a *waitTime*:

2> start timer T302 with the value set to the *waitTime*;

2> inform the upper layer that access barring is applicable for all access categories except categories '0' and '2'.

11.1.9.3 Test description

11.1.9.3.1 Pre-test conditions

System Simulator:

- 2 cells

- NR Cell 1 is configured according to TS 38.508-1 [4] Table 4.4.2-3 and is connected to 5GC.

- E-UTRA Cell 1 is configured to TS 36.508 [7] Table 4.4.2-2 and is connected to EPC.

- System information for the NR Cell 1 in accordance with combination NR-6 in TS 38.508-1 [4] sub-clause 4.4.3.1.2, and, for the E-UTRA Cell 1 in accordance with system information combination 31 as defined in TS 36.508 [7], subclause 4.4.3.1.1.

- Power levels are constant and as defined in Tables 11.1.9.3.1-1/2.

Table 11.1.9.3.1-1: Time instances of cell power level and parameter changes for conducted test environment

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter name | Unit | NR Cell 1 | E-UTRA Cell 1 | Remark |
| T0 | SS/PBCH SSS EPRE | dBm/SCS | -88 |  |  |
| RS EPRE | dBm/15kHz |  | -85 |  |

Table 11.1.9.3.1-2: Time instances of cell power level and parameter changes for OTA test environment

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter name | Unit | NR Cell 1 | E-UTRA Cell 1 | Remark |
| T0 | SS/PBCH SSS EPRE | dBm/SCS | -82 | - |  |
| RS EPRE | dBm/15kHz | - | -85 |

UE:

- The UE is configured to use IMS preconditions

Preamble:

With E-UTRA Cell 1 "Serving cell" and NR Cell 1 "Non-suitable "Off" cell" in accordance with TS 38.508-1 [4], Table 6.2.2.1-3, the UE is brought to state RRC\_IDLE using generic procedure parameters Connectivity (*E-UTRA/EPC*) and Unrestricted nr PDN (*On*) in accordance with the procedure described in TS 38.508-1 [4], clause 4.5.2. 4G GUTI and eKSI are assigned and security context established

The UE is switched-off

With E-UTRA Cell 1 "Non-suitable "Off" cell" and NR Cell 1 "Serving cell" in accordance with TS 38.508-1 [4], Table 6.2.2.1-3, the UE is brought to state 1N-A, RRC\_IDLE Connectivity (NR), in accordance with the procedure described in TS 38.508-1 [4], Table 4.5.2.2-2. 5G-GUTI and ngKSI are assigned and security context established.

11.1.9.3.2 Test procedure sequence

Table 11.1.9.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 0 | Void | - | - | - | - |
| 1 | Make the UE attempt an MTSI MO Speech Call (Note 1). | - | - | - | - |
| 2 | UE sends NR RRCSetupRequest with EstablishmentCause set to ‘mo-VoiceCall’. | --> | NR RRC: RRCSetupRequest | - | - |
| 3 | SS transmits an NR *RRCSetup* message | <-- | NR RRC: RRCSetup | - | - |
| 4 | UE transmits an NR *RRCSetupComplete* message to confirm the successful completion of the connection establishment including initiation of 5GSM procedure by including the SERVICE REQUEST message with *Service Type* set to ‘*data*’. | --> | NR RRC: *RRCSetupComplete* 5GSM: SERVICE REQUEST | - | - |
| 5 | Set the power levels according to “T0” as per Table 11.1.9.3.1-1/2. | - | - | - | - |
| 6-7 | Void | - | - | - | - |
| 8 | Steps 5-8 of expected sequence from Table 4.5.4.2-3 as defined in TS 38.508-1 [4] are performed. | - | - | - | - |
| 9-13 | Steps 1-5 of expected sequence from A.9.1 as defined in TS 34.229-5 [41] are performed for setting up MTSI MO speech call - EPS fallback. | - | - | - | - |
| 14 | SS transmits *RRCRelease* message indicating redirection to E-UTRA Cell 1. | <-- | NR RRC: RRCRelease | - | - |
| - | EXCEPTION: Unless otherwise stated all the messages below are transmitted on the cell specified in the test case. | - | - | - | - |
| 15 | The UE transmits an *RRCConnectionRequest* message on the cell specified in the test case. | --> | RRC: RRCConnectionRequest | 1 | P |
| 16-20 | UE performs generic procedure as defined in TS 38.508-1 [4], Table 4.9.7.2.2-1 Steps 2-6 for N1 to S1 Inter mode change with condition ‘connected without release’ & ‘mapped 5G security context’. | - | - | - | - |
| 21-24 | Generic Test Procedure as defined in Steps 5-8 of TS 36.508 [7] Table 4.5A.6.3-1 is performed to establish radio bearer corresponding to IMS PDN. | - | - | - | - |
| - | EXCEPTION: Steps 25a1-25a2 describe a step sequence depending on UE implementation. | - | - | - | - |
| 25a1-25a2 | The UE may perform steps 1-2 according to TS 34.229-1 subclause C.46 to perform IMS re-registration on EUTRAN. | - | - | - | - |
| 26 | The SS configures a new RLC-UM data radio bearer with condition DRB (0,1), associated with the dedicated EPS bearer context. *RRCConnectionReconfiguration* message contains the ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST message. EPS bearer context #4 (QCI 1) according to table 6.6.2-1: Reference dedicated EPS bearer contexts. | <-- | RRC: RRCConnectionReconfiguration  NAS:  ACTIVATE DEDICATED EPS BEARER CONTEXT REQUEST | - | - |
| - | EXCEPTION: In parallel to the events described in steps 27-28 the steps specified in table 11.1.9.3.2-2 will take place. | - | - | - | - |
| 27 | The UE transmits an *RRCConnectionReconfigurationComplete* message to confirm the establishment of the new data radio bearer, associated with the dedicated EPS bearer. | --> | RRC: RRCConnectionReconfigurationComplete | - | - |
| 28 | The UE transmits an ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT message. | --> | RRC: ULInformationTransfer  NAS:ACTIVATE DEDICATED EPS BEARER CONTEXT ACCEPT | 1 | P |
| 29 | UE is triggered by MMI to release the call. | - | - | - | - |
| 30-33 | Follow the Test Steps 2-5 as defined in TS 34.229-1 [35] subclause C.32 for Generic test procedure for MO release of IMS call followed by EPS Bearer Deactivation. | - | - | - | - |

Table 11.1.9.3.2-2: Parallel behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1-4A | Steps 1 to 5 of the the generic procedure “EPS Fallback for Voice Call / steps after fallback / 5GS” as defined in Appendix A.9.2 of TS 34.229-5 [41] take place. | - | - | - | - |
| 5 | Check: Does the UE perform step 6 of the generic procedure “EPS Fallback for Voice Call / steps after fallback / 5GS” as defined in Appendix A.9.2 of TS 34.229-5 [41] take place? | --> | SIP: ACK | 1 | P |

11.1.9.3.3 Specific message contents

Table 11.1.9.3.3-1: RRCRelease (step 6, table 11.1.9.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table Table 4.6.1-16 | | | |
| Information Element | Value/Remark | Comment | Condition |
| RRCRelease ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcRelease SEQUENCE { |  |  |  |
| redirectedCarrierInfo CHOICE { |  |  |  |
| eutra SEQUENCE { |  |  |  |
| eutraFrequency | Downlink EARFCN of cell 1 |  |  |
| cnType | epc |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| nonCriticalExtension { |  |  |  |
| nonCriticalExtension { |  |  |  |
| voiceFallbackIndication-r16 | true |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.1.9.3.3-2: RRCConnectionRequest (step 15, table 11.1.9.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 36.508 [7] Table 4.6.1-16 | | | |
| Information Element | Value/Remark | Comment | Condition |
| RRCConnectionRequest ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcConnectionRequest-r8 SEQUENCE { |  |  |  |
| ue-Identity CHOICE { |  |  |  |
| s-TMSI | Any allowed value |  |  |
| } |  |  |  |
| establishmentCause | mo-VoiceCall-v1280 | mo-VoiceCall |  |
| spare | Present but contents not checked |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.1.9.3.3-3: *SystemInformationBlockType2* for E-UTRA Cell 1 (preamble and all steps, Table 11.1.9.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.4.3.3-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| SystemInformationBlockType2 ::= SEQUENCE { |  |  |  |
| voiceServiceCauseIndication-r12 | true |  |  |
| } |  |  |  |

### 11.1.10 MO MMTEL voice call setup from NR RRC\_IDLE / EPS Fallback with redirection / Single registration mode with N26 interface / No E-UTRA Disabling In 5GS / attach attempt counter is equal to 5 / Success

11.1.10.1 Test Purpose (TP)

(1)

**with** { UE supporting both S1 mode and N1 mode and is switched on without NG-RAN coverage but with very poor E-UTRA coverage }

**ensure that** {

**when** { E-UTRA capability was disabled due to the UE's attach attempt counter counter having reached 5 and UE moves back to NG-RAN and E-UTRA coverage }

**then** { UE re-enables the E-UTRA capability }

}

(2)

**with** { UE in NR RRC\_IDLE state and operating in single-registration mode and the Network having indicated "interworking without N26 interface not supported" }

**ensure that** {

**when** { UE initiates an MMTEL call }

**then** { UE enables the E-UTRA capability }

}

11.1.10.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.301, clauses 4.5 and 5.5.1.2.6, TS 23.502, clause 4.13.6.1 and TS 38.331, clause 5.3.8.3. Unless otherwise stated these are Rel-17 requirements.

[TS 24.301, clause 4.5]

The UE shall only disable the E-UTRA capability when in EMM-IDLE mode.

When the UE supports both N1 mode and S1 mode then the UE's capability to access the 5GCN via E-UTRA shall not be affected, if the UE's E-UTRA capability is disabled or enabled.

When the UE is disabling the E-UTRA capability not due to redirection to 5GCN required, it should proceed as follows:

a) select another RAT (GERAN, UTRAN, or NG-RAN if the UE has not disabled its N1 mode capability for 3GPP access as specified in 3GPP TS 24.501 [54]) of the registered PLMN or a PLMN from the list of equivalent PLMNs;

b) if another RAT of the registered PLMN or a PLMN from the list of equivalent PLMNs cannot be found, or the UE does not have a registered PLMN, then perform PLMN selection as specified in 3GPP TS 23.122 [6]. As an implementation option, instead of performing PLMN selection, the UE may select another RAT of the chosen PLMN. If disabling of E-UTRA capability was not due to UE initiated detach procedure for EPS services only, the UE may re-enable the E-UTRA capability for this PLMN selection; or

c) if no other allowed PLMN and RAT combinations are available, then the UE may re-enable the E-UTRA capability and remain registered for EPS services in E-UTRAN of the registered PLMN. If the UE chooses this option, then it may periodically attempt to select another PLMN and RAT combination that can provide non-EPS services. How this periodic scanning is done, is UE implementation dependent.

…

…

As an implementation option, the UE may start a timer for enabling E-UTRA when the UE's attach attempt counter or tracking area updating attempt counter reaches 5 and the UE disables E-UTRA capability for cases described in clauses 5.5.1.2.6, 5.5.1.3.4.3, 5.5.1.3.6, 5.5.3.2.6, 5.5.3.3.4.3 and 5.5.3.3.6. The UE should memorize the identity of the PLMNs where E-UTRA capability were disabled. On expiry of this timer:

- if the UE is in Iu mode or A/Gb mode and is in idle mode as specified in 3GPP TS 24.008 [13] on expiry of the timer, the UE should enable the E-UTRA capability;

- if the UE is in Iu mode or A/Gb mode and an RR connection exists, the UE shall delay enabling E-UTRA capability until the RR connection is released;

- if the UE is in Iu mode and a PS signalling connection exists but no RR connection exists, the UE may abort the PS signalling connection before enabling E-UTRA capability;

- if the UE is in N1 mode and is in 5GMM-IDLE mode as specified in 3GPP TS 24.501 [54], on expiry of the timer, the UE should enable the E-UTRA capability; and

- if the UE is in N1 mode and is in 5GMM-CONNECTED mode as specified in 3GPP TS 24.501 [54], on expiry of the timer, the UE shall delay enabling the E-UTRA capability until the N1 NAS signalling connection is released.

If the UE attempts to establish an emergency bearer service or to access RLOS in a PLMN where the E-UTRA capability was disabled due to the UE's attach attempt counter or tracking area updating attempt counter have reached 5, the UE may enable the E-UTRA capability for that PLMN memorized by the UE.

The UE may support being configured for No E-UTRA Disabling In 5GS (see 3GPP TS 24.368 [50] or 3GPP TS 31.102 [17]). If the UE supports being configured for No E-UTRA Disabling in 5GS, No E-UTRA Disabling In 5GS is enabled if the corresponding configuration parameter is present and set to enabled. Otherwise, No E-UTRA Disabling In 5GS is disabled. If No E-UTRA Disabling In 5GS is enabled at the UE and the UE selects an NG-RAN cell in a PLMN where the E-UTRA capability was disabled due to the UE's attach attempt counter or tracking area updating attempt counter having reached 5, the UE shall enable the E-UTRA capability for that PLMN.

For other cases, it is up to the UE implementation when to enable the E-UTRA capability.

NOTE: If the UE is not operating in CS/PS mode 1 operation, the value of the timer for enabling E-UTRA capability is recommended to be not larger than the default value of T3402.

[TS 24.301, clause 5.5.1.2.6]

The following abnormal cases can be identified:

…

c) T3410 timeout

The UE shall abort the attach procedure. The NAS signalling connection, if any, shall be released locally.

NOTE 2: The NAS signalling connection can also be released if the UE deems that the network has failed the authentication check as specified in clause 5.4.2.7.

The UE shall proceed as described below.

…

For the cases b, c, d, l, la and m:

- Timer T3410 shall be stopped if still running.

- For the cases b, c, d, l when the "Extended wait time" is ignored, and la when the "Extended wait time CP data" is ignored, if the attach request is neither for emergency bearer services nor for initiating a PDN connection for emergency bearer services with attach type not set to "EPS emergency attach", the attach attempt counter shall be incremented, unless it was already set to 5.

- If the attach attempt counter is less than 5:

- for the cases l, la and m, the attach procedure is started, if still necessary, when timer T3346 expires or is stopped;

- for the cases b, c, d, l when the "Extended wait time" is ignored, and la when the "Extended wait time CP data" is ignore, if the attach request is neither for emergency bearer services nor for initiating a PDN connection for emergency bearer services with attach type not set to "EPS emergency attach", timer T3411 is started and the state is changed to EMM-DEREGISTERED.ATTEMPTING-TO-ATTACH. When timer T3411 expires the attach procedure shall be restarted, if still required by ESM sublayer.

- If the attach attempt counter is equal to 5:

- the UE shall delete any GUTI, TAI list, last visited registered TAI, list of equivalent PLMNs and KSI, shall set the update status to EU2 NOT UPDATED, and shall start timer T3402. The state is changed to EMM-DEREGISTERED.ATTEMPTING-TO-ATTACH or optionally to EMM-DEREGISTERED.PLMN-SEARCH in order to perform a PLMN selection according to 3GPP TS 23.122 [6]; and

- if A/Gb mode, Iu mode or N1 mode is supported by the UE:

- if A/Gb mode or Iu mode is supported by the UE, the UE shall in addition handle the GMM parameters GMM state, GPRS update status, P-TMSI, P-TMSI signature, RAI and GPRS ciphering key sequence number as specified in 3GPP TS 24.008 [13] for the abnormal case when a normal attach procedure fails and the attach attempt counter is equal to 5;

- if the UE is operating in single-registration mode, the UE shall in addition handle the 5GMM parameters 5GMM state, 5GS update status, 5G-GUTI, last visited registered TAI, TAI list and ngKSI as specified in 3GPP TS 24.501 [54] for the abnormal case when an initial registration procedure performed over 3GPP access fails and the registration attempt counter is equal to 5; and

- the UE shall attempt to select GERAN, UTRAN or NG-RAN radio access technology and proceed with appropriate GMM or 5GMM specific procedures. Additionally, if the UE selects GERAN or UTRAN radio access technology, the UE may disable the E-UTRA capability as specified in clause 4.5. If No E-UTRA Disabling In 5GS is enabled at the UE (see 3GPP TS 24.368 [50] or 3GPP TS 31.102 [17]) and the UE selects NG-RAN radio access technology, it shall not disable the E-UTRA capability; otherwise, the UE may disable the E-UTRA capability as specified in clause 4.5.

NOTE 5: Whether the UE requests RRC to treat the active E-UTRA cell as barred (see 3GPP TS 36.304 [21]) is left to the UE implementation.

[TS 23.502, clause 4.13.6.1]

Figure 4.13.6.1-1 describes the EPS fallback procedure for IMS voice.

When the UE is served by the 5G System, the UE has one or more ongoing PDU Sessions each including one or more QoS Flows. The serving PLMN AMF has sent an indication towards the UE during the Registration procedure that IMS voice over PS session is supported, see clause 5.16.3.10 of TS 23.501 [2] and the UE has registered in the IMS. If N26 is not supported, the serving PLMN AMF sends an indication towards the UE during the Registration procedure that interworking without N26 is supported, see clause 5.17.2.3.1 of TS 23.501 [2].



Figure 4.13.6.1-1: EPS Fallback for IMS voice

1. UE camps on NG-RAN in the 5GS and an MO or MT IMS voice session establishment has been initiated.

2. Network initiated PDU Session modification to setup QoS flow for voice reaches the NG-RAN (see N2 PDU Session Request in clause 4.3.3).

3. NG-RAN is configured to support EPS fallback for IMS voice and decides to trigger fallback to EPS, taking into account UE capabilities, indication from AMF that "Redirection for EPS fallback for voice is possible" (received as part of initial context setup, handover resource allocation or path switch request acknowledge as defined in TS 38.413 [10]), network configuration (e.g. N26 availability configuration) and radio conditions. If NG-RAN decides not to trigger fallback to EPS, then the procedure stops here and following steps are not executed.

NG-RAN may initiate measurement report solicitation from the UE including E-UTRAN as target.

NOTE 1: If AMF has indicated that "Redirection for EPS fallback for voice is not possible", then EPS fallback for IMS voice is not performed in step 5. If NG-RAN has not received indication "Redirection for EPS fallback for voice", the decision to execute EPS fallback for IMS voice or not is based on network configuration (e.g. based on N26 availability and other criteria).

4. NG-RAN responds indicating rejection of the PDU Session modification to setup QoS flow for IMS voice received in step 2 by PDU Session Modification Response message towards the SMF+PGW-C (or H-SMF+P-GW-C via V-SMF, in the case of home routed roaming scenario) via AMF with an indication that mobility due to fallback for IMS voice is ongoing. The SMF+PGW-C maintains the PCC rule(s) associated with the QoS Flow(s) and reports the EPS Fallback event to the PCF if PCF has subscribed to this event.

5. NG-RAN initiates either handover (see clause 4.11.1.2.1), or AN Release via inter-system redirection to EPS (see clause 4.2.6 and clause 4.11.1.3.2), taking into account UE capabilities. The SMF+PGW-C reports change of the RAT type if subscribed by PCF as specified in clause 4.11.1.2.1, or clause 4.11.1.3.2.6. When the UE is connected to EPS, either 6a or 6b is executed

6a. In the case of 5GS to EPS handover, see clause 4.11.1.2.1 and in the case of inter-system redirection to EPS with N26 interface, see clause 4.11.1.3.2. In either case the UE initiates TAU procedure and the UE includes active flag in the request in the case of inter-system redirection to EPS; or

6b. In the case of inter-system redirection to EPS without N26 interface, see clause 4.11.2.2. If the UE supports Request Type flag "handover" for PDN connectivity request during the attach procedure as described in clause 5.3.2.1 of TS 23.401 [13] and has received the indication that interworking without N26 is supported, then the UE initiates Attach with PDN connectivity request with request type "handover".

In the case of inter-system redirection for the emergency service, the UE uses the emergency indication in the RRC message as specified in clause 6.2.2 of TS 36.331 [16] and E-UTRAN provides the emergency indication to MME during Tracking Area Update or Attach procedure. For the handover procedure see clause 4.11.1.2.1, step 1.

7. After completion of the mobility procedure to EPS or as part of the 5GS to EPS handover procedure, the SMF+PGW-C re-initiates the setup of the dedicated bearer(s) for the maintained PCC rule(s) in step 4 including of the dedicated bearer for IMS voice, mapping the 5G QoS to EPC QoS parameters as specified in clause 4.11.1.2.1. The SMF+PGW-C reports about Successful Resource Allocation and Access Network Information if subscribed by PCF.

The IMS signalling related to IMS voice call establishment continues after step 1 as specified in the TS 23.228 [55].

At least for the duration of the voice call in EPS the E-UTRAN is configured to not trigger any handover to 5GS.

[TS 38.331, clause 5.3.8.3]

The UE shall:

1> delay the following actions defined in this clause 60 ms from the moment the *RRCRelease* message was received or optionally when lower layers indicate that the receipt of the *RRCRelease* message has been successfully acknowledged, whichever is earlier;

1> stop timer T380, if running;

1> stop timer T320, if running;

1> if timer T316 is running;

2> stop timer T316;

2> clear the information included in *VarRLF-Report,* if any;

1> stop timer T350, if running;

1> stop timer T346g, if running;

1> if theAS security is not activated:

2> ignore any field included in *RRCRelease* message except *waitTime*;

2> perform the actions upon going to RRC\_IDLE as specified in 5.3.11 with the release cause 'other' upon which the procedure ends;

1> if the *RRCRelease* message includes *redirectedCarrierInfo* indicating redirection to *eutra*:

2> if *cnType* is included:

3> after the cell selection, indicate the available CN Type(s) and the received *cnType* to upper layers;

NOTE 1: Handling the case if the E-UTRA cell selected after the redirection does not support the core network type specified by the *cnType,* is up to UE implementation.

2> if *voiceFallbackIndication* is included:

3> consider the RRC connection release was for EPS fallback for IMS voice (see TS 23.502 [43]);

11.1.10.3 Test description

11.1.10.3.1 Pre-test conditions

System Simulator:

- NR Cell 1 is configured according to TS 38.508-1 [4] Table 4.4.2-3 and is connected to 5GC.

- E-UTRA Cell 1 is configured to TS 36.508 [7] Table 4.4.2-2 and is connected to EPC.

- System information for the NR Cell 1 in accordance with combination NR-6 in TS 38.508-1 [4] sub-clause 4.4.3.1.2, and, for the E-UTRA Cell 1 in accordance with system information combination 31 as defined in TS 36.508 [7], subclause 4.4.3.1.1.

- N26 interface is configured.

- Power levels are constant and as defined in Tables 11.1.10.3.1-1/2.

Table 11.1.10.3.1-1: Time instances of cell power level and parameter changes for conducted test environment

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter name | Unit | NR Cell 1 | E-UTRA Cell 1 | Remark |
| T0 | SS/PBCH SSS EPRE | dBm/SCS | “Off” |  |  |
| RS EPRE | dBm/15kHz |  | -100 |  |
| T1 | SS/PBCH SSS EPRE | dBm/SCS | -88 |  |  |
| RS EPRE | dBm/15kHz |  | “Off” |  |
| T2 | SS/PBCH SSS EPRE | dBm/SCS | -88 |  |  |
| RS EPRE | dBm/15kHz |  | -85 |  |
| T3 | SS/PBCH SSS EPRE | dBm/SCS | “Off” |  |  |
| RS EPRE | dBm/15kHz |  | -85 |  |

Table 11.1.10.3.1-2: Time instances of cell power level and parameter changes for OTA test environment

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter name | Unit | NR Cell 1 | E-UTRA Cell 1 | Remark |
| T0 | SS/PBCH SSS EPRE | dBm/SCS | “Off” |  |  |
| RS EPRE | dBm/15kHz |  | -100 |  |
| T1 | SS/PBCH SSS EPRE | dBm/SCS | -82 |  |  |
| RS EPRE | dBm/15kHz |  | “Off” |  |
| T2 | SS/PBCH SSS EPRE | dBm/SCS | -82 |  |  |
| RS EPRE | dBm/15kHz |  | -96 |  |
| T3 | SS/PBCH SSS EPRE | dBm/SCS | “Off” |  |  |
| RS EPRE | dBm/15kHz |  | -96 |  |

UE:

- The UE is configured to use preconditions.

- The UE is configured with a value of No E-UTRA Disabling In 5GS set to 1.

Preamble:

- With E-UTRA Cell 1 "Serving cell" and NR Cell 1 "Non-suitable "Off" cell" in accordance with TS 38.508-1 [4], Table 6.2.2.1-3, the UE is brought to state RRC\_IDLE using generic procedure parameters Connectivity (*E-UTRA/EPC*) and Unrestricted nr PDN (*On*) in accordance with the procedure described in TS 38.508-1 [4], clause 4.5.2. 4G GUTI and eKSI are assigned and security context established.

- The UE is switched-off

- With E-UTRA Cell 1 "Non-suitable "Off" cell" and NR Cell 1 "Serving cell" in accordance with TS 38.508-1 [4], Table 6.2.2.1-3, the UE is brought to state 1N-A, RRC\_IDLE Connectivity (NR), in accordance with the procedure described in TS 38.508-1 [4], Table 4.5.2.2-2. 5G-GUTI and ngKSI are assigned and security context established.

- The UE is switched-off

11.1.10.3.2 Test procedure sequence

Table 11.1.10.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **St** | **Procedure** | **Message Sequence** | | **TP** | **Verdict** |
|  |  | **U - S** | **Message** |  |  |
| 1 | Set the power levels according to “T0” as per Table 11.1.10.3.1-1/2. | - | - | - | - |
| 2 | The UE is switched on. | - | - | - | - |
| - | The following messages are to be observed on E-UTRA Cell 1 unless explicitly stated otherwise. | - | - | - | - |
| - | EXCEPTION: The steps 3 and 4 below are repeated for 4 times. | - | - | - | - |
| 3 | The UE transmits an ATTACH REQUEST message. | --> | ATTACH REQUEST | - | - |
| 4 | The SS waits 25 seconds (15 seconds T3410 and 10 seconds T3411). | - | - | - | - |
| 5 | The UE transmits an ATTACH REQUEST message. (Attach attempt counter = 5) | --> | ATTACH REQUEST | - | - |
| 6 | The SS releases the RRC connection. | - | - | - | - |
| 7 | Set the power levels according to “T1” as per Table 11.1.10.3.1-1/2. | - | - | - | - |
| - | The following messages are to be observed on NR Cell 1 unless explicitly stated otherwise. | - | - | - | - |
| 8-9 | Steps 2-3 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 10 | Check: Does the UE transmit a REGISTRATION REQUEST message with E-UTRA Capability enabled? | --> | 5GMM: REGISTRATION  REQUEST | 1 | P |
| 11-26a1 | Generic Test Procedure as defined in Steps 5-20a1 of TS 38.508-1 [4] Table 4.5.2.2-2 are performed. | - | - | - | - |
| 27 | Make the UE attempt an MTSI MO Speech Call (Note 1). | - | - | - | - |
| 28 | The UE transmits *RRCSetupRequest* with EstablishmentCause set to ‘mo-VoiceCall’. | --> | NR RRC: *RRCSetupRequest* | - | - |
| 29-34 | Steps 3-8 of Table 4.5.4.2-3 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 35-39 | Steps 1-5 of expected sequence from A.9.1 as defined in TS 34.229-5 [41] are performed for initiating an MTSI MO speech call. | - | - | - | - |
| 40 | Set the power levels according to “T2” as per Table 11.1.10.3.1-1/2. |  |  |  |  |
| 41 | SS transmits *RRCRelease* message indicating redirection to E-UTRA Cell 1. | <-- | NR RRC: *RRCRelease* | - | - |
| 42-43 | Steps 1-2 of Table 4.9.7.2.2-1 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 44 | Check: Does the UE transmit an *RRCConnectionSetupComplete* message to confirm the successful completion of the connection establishment and a TRACKING AREA UPDATE REQUEST message is sent to update the registration of the actual tracking area? | --> | RRC*: RRCConnectionSetupComplete* NAS: TRACKING AREA UPDATE REQUEST | 2 | P |
| 45 | Set the power levels according to “T3” as per Table 11.1.10.3.1-1/2. | - | - | - | - |
| 46 | The SS transmits a TRACKING AREA UPDATE REJECT message with EMM cause = '' Congestion '' and T3346 IE set to 30 sec. | <-- | NAS: TRACKING AREA UPDATE REJECT | - | - |
| 47 | The SS releases the RRC connection. | - | - | - | - |
| Note 1: This could be done by e.g. MMI or AT command. | | | | | |

11.1.10.3.3 Specific message contents

Table 11.1.10.3.3-1: REGISTRATION REQUEST (step 10, Table 11.1.10.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type value | ‘001’B | Initial registration |  |
| 5GMM capability |  |  |  |
| S1 mode | ‘1’B | S1 mode  supported |  |

Table 11.1.10.3.3-2: RRCRelease (step 41, Table 11.1.10.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.6.1-16 | | | |
| Information Element | Value/Remark | Comment | Condition |
| RRCRelease ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcRelease SEQUENCE { |  |  |  |
| redirectedCarrierInfo CHOICE { |  |  |  |
| eutra SEQUENCE { |  |  |  |
| eutraFrequency | Downlink EARFCN of EUTRA cell 1 |  |  |
| cnType | epc |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.1.10.3.3-3: TRACKING AREA UPDATE REQUEST (step 44, Table 11.1.10.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1[4] Table 4.9.7.2.3-1. | | | |
| Information Element | Value/remark | Comment | Condition |
| EPS update type |  |  |  |
| EPS update type Value | ''001'B | ‘Combined TA/LA updating’ |  |
| "Active" flag | ‘1’B |  |  |
| NAS key set identifier | ‘111’B |  |  |
| Old GUTI | GUTI, mapped from the 5G-GUTI assigned at the initial registration when the UE entered N1 |  |  |
| Additional GUTI | Not present |  |  |
| Last visited registered TAI | Not included |  |  |

Table 11.1.10.3.3-4: TRACKING AREA UPDATE REJECT (step 46, Table 11.1.10.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: 36.508 table 4.7.2-26 | | | |
| Information Element | Value/Remark | Comment | Condition |
| EMM cause | '00010110'B | #22 ''Congestion'' |  |
| T3346 value | '00001111'B | 30 sec |  |

## 11.2 5G-SRVCC

### 11.2.1 5G-SRVCC from NG-RAN to 3GPP UTRAN

11.2.1.1 Test Purpose (TP)

(1)

***with*** { the UE is in NR RRC\_CONNECTED state }

***ensure that*** {

***when*** { UE receives a *MobilityFromNRCommand* message and an IMS voice call is ongoing and an UTRA Speech RAB combination is configured for an UTRA cell }

***then*** { UE transmits a HANDOVER TO UTRAN COMPLETE message on the utra cell }

}

(2)

***with*** { the UE has performed 5G-SRVCC from NG-RAN to UTRAN }

***ensure that*** {

***when*** { UE in 5GMM-DEREGISTERED state moves from a UTRAN to NG-RAN coverage }

***then*** { UE starts the Initial registration procedure on the NR cell }

}

11.2.1.2 Conformance requirements

References: The conformance requirements covered in the present test case are specified in TS 23.216, clause 6.5.4, TS 38.331, clause 5.4.3.3 and TS 24.501, clause 5.5.1.2.2. Unless otherwise stated these are Rel-16 requirements.

[TS 23.216, clause 6.5.4]

Depicted in Figure 6.5.4-1 is a call flow for 5G-SRVCC from NG-RAN to 3GPP UTRAN.



Figure 6.5.4-1: 5G-SRVCC from NG-RAN to 3GPP UTRAN call flow

1. UE establishes the PDU session for IMS.

2. 5G-SRVCC HO is triggered by NG-RAN.

3. NG-RAN sends a Handover Required (Target ID, generic Source to Target Transparent Container, 5G-SRVCC HO indication) message to the source AMF. The Target ID is the UTRAN RNC-ID. 5G-SRVCC HO Indication indicates to AMF that this if for 5G-SRVCC. The Generic Source to Target Transparent Container is the Source RNC to Target RNC Transparent container.

4. AMF determines the HO is used for 5G-SRVCC by the 5G-SRVCC HO Indication. AMF selects an MME\_SRVCC that can have Sv connection to the MSC SERVER/MSC according to the target RNC ID which is included in the Target ID.

NOTE: The MME\_SRVCC selection can be realised through operator's configuration.

5. AMF sends the forward relocation request (IMSI, Target ID, STN-SR, C-MSISDN, MM Context, Generic Source to Target Transparent Container, 5G-SRVCC HO Indication, Supported Codec IE, MS ClassMark 2, Emergency Indication, Equipment Identifier) to MME\_SRVCC. The Emergency Indication and the equipment identifier are included if the ongoing session is emergency session. Authenticated IMSI and C MSISDN are also included in this case, if available.

6. MME\_SRVCC initiates the PS-CS handover procedure towards MSC Server. Steps 5 to 13 as specified in Figure 6.2.2.1-1 (referenced by clause 6.2.2.1A SRVCC from E-UTRAN to UTRAN without PS HO) are performed for the PS-CS handover procedure.

7. MME\_SRVCC receives the response message from MSC server after HO preparation is completed. MME\_SRVCC sends the Forward Relocation Response message (Target to Source Transparent Container) to AMF.

8. AMF sends the HO command to NG-RAN.

9. NG-RAN sends a HO command to the UE. UE detects the 5G-SRVCC HO.

10. UE tunes to the target UTRAN cell.

11. Handover Detection at the target RNS occurs, then the target RNS sends Handover Detection message to the target MSC SERVER/MSC.

12. The UE sends a Handover Complete message via the target RNS to the target MSC SERVER. Steps 19 to 21as specified in Figure 6.2.2.1-1 (referenced by clause 6.2.2.1A SRVCC from E-UTRAN to UTRAN without PS HO) are performed for this handover complete procedure. At this stage, the target MSC SERVER/MSC can send/receive voice data.

13. MSC SERVER sends MME\_SRVCC the SRVCC PS to CS completion.

14. MME\_SRVCC forwards the Forward Relocation completion message which includes the information received in step 13 to AMF.

15. AMF forwards the Forward Relocation Complete ACK message to MME\_SRVCC. AMF releases the UE context related to MME\_SRVCC.

16. MME\_SRVCC forwards the PS to CS Complete ACK message to MSC server. MME\_SRVCC removes stored UE context. After receives the message, MSC server removes the UE context related to the MME\_SRVCC.

17. AMF performs the PDU session release procedure for all the PDU session(s) which is described in TS 23.502 [45] indicating that the release is due to PS to CS handover for 5G SRVCC.

18. For an emergency services session after handover is complete, the source AMF or the MSC Server may respectively invoke the Namf\_Location\_EventNotify service operation or send a Subscriber Location Report, towards a GMLC associated with the source or target side, respectively, carrying the identity of the MSC Server, as defined respectively in TS 23.273 [50] or TS 23.271 [29], to support location continuity.

The IMS service control is described in TS 23.292 [13] when UE accesses in UTRAN cell due to 5G-SRVCC.

[TS 38.331, clause 5.4.3.3]

Reception of the MobilityFromNRCommand by the UE

The UE shall:

1> stop timer T310, if running;

1> stop timer T312, if running;

1> if T316 is running:

2> stop timer T316;

2> clear the information included in *VarRLF-Report*, if any;

1> if T390 is running:

2> stop timer T390 for all access categories;

2> perform the actions as specified in 5.3.14.4;

1> if the *targetRAT-Type* is set to *eutra*:

2> consider inter-RAT mobility as initiated towards E-UTRA;

2> forward the *nas-SecurityParamFromNR* to the upper layers, if included;

1> else if the *targetRAT-Type* is set to *utra-fdd*:

2> consider inter-RAT mobility as initiated towards UTRA-FDD;

2> forward the *nas-SecurityParamFromNR* to the upper layers, if included;

1> access the target cell indicated in the inter-RAT message in accordance with the specifications of the target RAT.

[TS 24.501, clause 5.5.1.2.2]

The UE in state 5GMM-DEREGISTERED shall initiate the registration procedure for initial registration by sending a REGISTRATION REQUEST message to the AMF,

a) when the UE performs initial registration for 5GS services;

b) when the UE performs initial registration for emergency services;

c) when the UE performs initial registration for SMS over NAS; and

d) when the UE moves from GERAN to NG-RAN coverage or the UE moves from a UTRAN to NG-RAN coverage and the following applies:

1) the UE initiated a GPRS attach or routing area updating procedure while in A/Gb mode or Iu mode; or

2) the UE has performed 5G-SRVCC from NG-RAN to UTRAN as specified in 3GPP TS 23.216 [6A],

and since then the UE did not perform a successful EPS attach or tracking area updating procedure in S1 mode or registration procedure in N1 mode,

…

11.2.1.3 Test Description

11.2.1.3.1 Pre-test conditions

System Simulator:

- NR Cell 1 with system information combination NR-1 as defined in TS 38.508-1 [4].

- UTRA Cell 5 as defined in TS 36.508 [7].

UE:

None.

Preamble:

- The UE is in test state 0N-B according to TS 38.508-1.

11.2.1.3.2 Test procedure sequence

Table 11.2.1.3.2-1/2 illustrate the downlink power levels and other changing parameters to be applied for the cell at various time instants of the test execution. The exact instants on which these values shall be applied are described in the texts in this clause. The configuration T0 indicates the initial conditions for preamble. Configurations marked "T1" and “T2” are applied at the points indicated in the Main behaviour description in Table 11.2.1.3.2-3.

Table 11.2.1.3.2-1: Time instances of cell power level and parameter changes for FR1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter | Unit | NR Cell 1 | UTRA Cell 5 | Remark |
| T0 | SS/PBCH  SSS EPRE | dBm/  SCS | -88 | - |  |
| CPICH\_Ec (UTRA FDD) | dBm/3.84 MHz | - | Off |  |
| T1 | SS/PBCH  SSS EPRE | dBm/  SCS | -88 | - |  |
| CPICH\_Ec (UTRA FDD) | dBm/3.84 MHz | - | -60 |  |
| T2 | SS/PBCH  SSS EPRE | dBm/  SCS | -88 | - |  |
| CPICH\_Ec (UTRA FDD) | dBm/3.84 MHz | - | Off |  |

Table 11.2.1.3.2-2: Time instances of cell power level and parameter changes for FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter | Unit | NR Cell 1 | UTRA Cell 5 | Remark |
| T0 | SS/PBCH  SSS EPRE | dBm/  SCS | -82 | - |  |
| CPICH\_Ec (UTRA FDD) | dBm/3.84 MHz | - | Off |  |
| T1 | SS/PBCH  SSS EPRE | dBm/  SCS | -82 | - |  |
| CPICH\_Ec (UTRA FDD) | dBm/3.84 MHz | - | -60 |  |
| T2 | SS/PBCH  SSS EPRE | dBm/  SCS | -82 | - |  |
| CPICH\_Ec (UTRA FDD) | dBm/3.84 MHz | - | Off |  |

Table 11.2.1.3.2-3: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U – S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| - | The following messages are to be observed on NR Cell 1 unless explicitly stated otherwise. | - | - | - | - |
| 2-3 | The UE establishes RRC connection by executing steps 2-3 of Table 4.5.2.2-2 in TS 38.508-1 [4]. | - | - | - | - |
| 4 | The UE transmits an *RRCSetupComplete* message and a REGISTRATION REQUEST message indicating 5G-SRVCC from NG-RAN to UTRAN supported. | --> | NR RRC: RRCSetupComplete  5GMM: REGISTRATION REQUEST | - | - |
| 5-19 | Steps 5-19a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 20 | The SS transmits a *UECapabilityEnquiry* message to request UE radio access capability information for NR and UTRA. | <-- | NR RRC: UECapabilityEnquiry | - | - |
| 21 | The UE transmits a *UECapabilityInformation* message.  NOTE: The start-CS values received, should be used to configure ciphering on cell 5. | --> | NR RRC: UECapabilityInformation | - | - |
| 22 | The SS releases the RRC Connection. | <-- | NR RRC: RRCRelease | - | - |
| 23 | Perform Generic Test Procedure for IMS MO speech call establishment as specified in TS 38.508-1 [4], subclause 4.9.15. | - | - | - | - |
| 24 | Set the power levels according to “T1” as per Table 11.2.1.3.2-1/2. | - | - | - | - |
| 25 | The SS transmits a *MobilityFromNRCommand* message*.* | <-- | NR RRC: MobilityFromNRCommand | - | - |
| - | The following messages are to be observed on UTRA Cell 5 unless explicitly stated otherwise. | - | - | - | - |
| 26 | Check: Does the UE transmit a HANDOVER TO UTRAN COMPLETE messageon cell 5? | --> | HANDOVER TO UTRAN COMPLETE | 1 | P |
| - | EXCEPTION: In parallel to the events described in step 27 to 32 the steps specified in table 11.2.1.3.2-4 takes place. | - | - | - | - |
| 27 | The SS transmits a SECURITY MODE COMMAND message for the CS domain. | <-- | SECURITY MODE COMMAND | - | - |
| 28 | The UE transmits a SECURITY MODE COMPLETE message. | --> | SECURITY MODE COMPLETE | - | - |
| 29 | The SS transmits an UTRAN MOBILITY INFORMATION message to notify CN information. | <-- | UTRAN MOBILITY INFORMATION | - | - |
| 30 | The UE transmits an UTRAN MOBILITY INFORMATION CONFIRM message. | --> | UTRAN MOBILITY INFORMATION CONFIRM | - | - |
| 31 | The SS transmits a TMSI REALLOCATION COMMAND message. | <-- | TMSI REALLOCATION COMMAND | - | - |
| 32 | The UE transmits a TMSI REALLOCATION COMPLETE message. | --> | TMSI REALLOCATION COMPLETE | - | - |
| 33 | Make the UE release the CS call. | - | - | - | - |
| 33A | The UE transmits a DISCONNECT message. | --> | DISCONNECT |  |  |
| 33B | The SS transmits a RELEASE message. | <-- | RELEASE | - | - |
| 33C | The UE transmits a RELEASE COMPLETE message. | --> | RELEASE COMPLETE | - | - |
| 33D | The SS releases the RRC connection. | - | - | - | - |
| 34 | Set the power levels according to “T2” as per Table 11.2.1.3.2-1/2. | - | - | - | - |
| 35-52 | Check: Does the UE perform initial registration procedure on NR Cell 1 as steps 2-19a1 of Table 4.5.2.2-2 NR RRC\_IDLE in TS 38.508-1 [4]? | - | - | 2 | P |

Table 11.2.1.3.2-4: Parallel behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Check: Does the UE transmit an ATTACH REQUEST message? | --> | ATTACH REQUEST | - | - |
| 1AA | The SS transmits an AUTHENTICATION AND CIPHERING REQUEST message. | <-- | AUTHENTICATION AND CIPHERING REQUEST | - | - |
| 1AB | The UE transmits an AUTHENTICATION AND CIPHERING RESPONSE message. | --> | AUTHENTICATION AND CIPHERING RESPONSE | - | - |
| 1A | The SS transmits a SECURITY MODE COMMAND message for the PS domain. | <-- | SECURITY MODE COMMAND | - | - |
| 1B | The UE transmits a SECURITY MODE COMPLETE message. | --> | SECURITY MODE COMPLETE | - | - |
| 2 | The SS transmits an ATTACH ACCEPT message. | <-- | ATTACH ACCEPT | - | - |
| 3 | The UE transmits an ATTACH COMPLETE message. | --> | ATTACH COMPLETE | - | - |

11.2.1.3.3 Specific message contents

Table 11.2.1.3.3-1: Message REGISTRATION REQUEST (step 4, Table 11.2.1.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GMM capability |  |  |  |
| 5GSRVCC (octet 4, bit 1) | '1'B | 5G-SRVCC from NG-RAN to UTRAN supported |  |

Table 11.2.1.3.3-2: *UECapabilityEnquiry* (step 20, Table 11.2.1.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-31 | | | |
| Information Element | Value/remark | Comment | Condition |
| UECapabilityEnquiry ::= SEQUENCE { |  |  |  |
| rrc-TransactionIdentifier | RRC-TransactionIdentifier |  |  |
| criticalExtensions CHOICE { |  |  |  |
| ueCapabilityEnquiry SEQUENCE { |  |  |  |
| ue-CapabilityRAT-RequestList SEQUENCE (SIZE (1.. maxRAT-CapabilityContainers)) OF CapabilityRAT-Request { | 2 entries |  |  |
| UE-CapabilityRAT-Request[1] SEQUENCE { |  | entry 1 |  |
| rat-Type | nr |  |  |
| } |  |  |  |
| UE-CapabilityRAT-Request[2] SEQUENCE { |  | entry 2 |  |
| rat-Type | utra-fdd-v1610 |  |  |
| } |  |  |  |
| } |  |  |  |
| lateNonCriticalExtension | Not present |  |  |
| nonCriticalExtension | Not present |  |  |
| } |  |  |  |
| criticalExtensionsFuture |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.2.1.3.3-3: *UECapabilityInformation* (step 21, Table 11.2.1.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-32 | | | |
| Information Element | Value/remark | Comment | Condition |
| UECapabilityInformation ::= SEQUENCE { |  |  |  |
| rrc-TransactionIdentifier | RRC-TransactionIdentifier |  |  |
| criticalExtensions CHOICE { |  |  |  |
| ueCapabilityInformation SEQUENCE { |  |  |  |
| ue-CapabilityRAT-ContainerList SEQUENCE (SIZE (0..maxRAT-CapabilityContainers)) OF CapabilityRAT- Container{ | 2 entries |  |  |
| UE-CapabilityRAT- Container[1] SEQUENCE { |  | entry 1 |  |
| rat-Type | nr |  |  |
| ueCapabilityRAT-Container | Not checked |  |  |
| } |  |  |  |
| UE-CapabilityRAT- Container[2] SEQUENCE { |  | entry 2 |  |
| rat-Type | utra-fdd-v1610 |  |  |
| ueCapabilityRAT-Container | Octet string | INTER RAT HANDOVER INFO |  |
| } |  |  |  |
| } |  |  |  |
| lateNonCriticalExtension | Not checked |  |  |
| nonCriticalExtension | Not checked |  |  |
| } |  |  |  |
| criticalExtensionsFuture | Not checked |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.2.1.3.3-4: *MobilityFromNRCommand* (step 25, Table 11.2.1.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.6.1-8 | | | |
| Information Element | Value/remark | Comment | Condition |
| MobilityFromNRCommand::= SEQUENCE { |  |  |  |
| rrc-TransactionIdentifier | RRC-TransactionIdentifier |  |  |
| criticalExtensions CHOICE { |  |  |  |
| mobilityFromNRCommand ::= SEQUENCE { |  |  |  |
| targetRAT-Type | utra-fdd-v1610 |  |  |
| targetRAT-MessageContainer | HANDOVER TO UTRAN COMMAND(UTRA RRC message) |  |  |
| nas-SecurityParamFromNR | 4 LSB of the downlink NAS COUNT |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.2.1.3.3-5: HANDOVER TO UTRAN COMMAND(Table 11.2.1.3.3-4)

|  |
| --- |
| Derivation Path: TS 36.508 [7], Table 4.7B.1-1, condition UTRA Speech |

Table 11.2.1.3.3-6: SECURITY MODE COMMAND(step 27, Table 11.2.1.3.2-3)

| Derivation Path: TS 36.508 [7], Table 4.7B.1-n | | |
| --- | --- | --- |
| Information Element | Condition | Value/remark |
| Ciphering mode info |  | Not Present |

Table 11.2.1.3.3-7: Void

Table 11.2.1.3.3-8: SECURITY MODE COMMAND(step 1A, 11.2.1.3.2-4)

| Derivation Path: TS 36.508 [7], Table 4.7B.1-n | | |
| --- | --- | --- |
| Information Element | Condition | Value/remark |
| Ciphering mode info |  | StartRestart |
| Integrity protection mode info |  | modify |
| CN Domain Identity |  | ps-domain |

## 11.3 Unified Access Control (UAC)

### 11.3.1 UAC / Access Identity 0 / 0% access probability / MTSI MO speech call / SMSoIP

11.3.1.1 Test Purpose (TP)

(1)

**with** { UE not configured for special AIs (1,2,11-15) having received a SIB1 message indicating UAC Info set to 0% accessibility for Access category 4 and in NR RRC\_IDLE }

**ensure** **that** {

**when** { User initiates MMTEL Voice call }

**then** { UE does not initiate connection over NR Cell }

}

(2)

**with** { UE not configured for special AIs (1,2,11-15) , previously barred for MO MTSI MMTEL Voice in NR RRC\_IDLE & current SIB1 indicates no access barred as part of UAC Info }

**ensure** **that** {

**when** { user tries another MO MTSI MMTEL Voice session after T390 expires }

**then** { UE is able to successfully establish MMTEL Voice session }

}

(3)

**with** { UE not configured for special AIs (1,2,11-15) with SIB1 indicating UAC info set to 0% accessibility for Access category 6 in NR RRC\_CONNECTED state }

**ensure** **that** {

**when** { user tries to send SMS over IP }

**then** { UE does not initiate SMS access attempt }

}

(4)

**Void**

11.3.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in TS 24.501: clause 4.5.2, 4.5.4.2 and 4.5.6 and TS 38.331: clause 5.3.14.1, 5.3.14.2, 5.3.14.4 and 5.3.14.5. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 4.5.2]

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

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

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

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

Table 4.5.2.1: Access identities

|  |  |
| --- | --- |
| Access Identity number | UE configuration |
| 0 | UE is not configured with any parameters from this table |
| 1 (NOTE 1) | UE is configured for multimedia priority service (MPS). |
| 2 (NOTE 2) | UE is configured for mission critical service (MCS). |
| 3-10 | Reserved for future use |
| 11 (NOTE 3) | Access Class 11 is configured in the UE. |
| 12 (NOTE 3) | Access Class 12 is configured in the UE. |
| 13 (NOTE 3) | Access Class 13 is configured in the UE. |
| 14 (NOTE 3) | Access Class 14 is configured in the UE. |
| 15 (NOTE 3) | Access Class 15 is configured in the UE. |
| NOTE 1: Access identity 1 is valid when: - the USIM file EFUAC\_AIC indicates the UE is configured for access identity 1 and the RPLMN is the HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present), or a visited PLMN of the home country (see the definition of home country in 3GPP TS 24.301 [15]); or - the UE receives the 5GS network feature support IE with the MPS indicator bit set to "Access identity 1 valid in RPLMN or equivalent PLMN" from the RPLMN as described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4.  NOTE 2: Access identity 2 is used by UEs configured for MCS and is valid when: - the USIM file EFUAC\_AIC indicates the UE is configured for access identity 2 and the RPLMN is the HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present), or a visited PLMN of the home country (see 3GPP TS 23.122 [5]); or - the UE receives the 5GS network feature support IE with the MCS indicator bit set to "Access identity 2 valid in RPLMN or equivalent PLMN" from the RPLMN as described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4.  NOTE 3: Access identities 11 and 15 are valid in HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present). Access Identities 12, 13 and 14 are valid in HPLMN and visited PLMNs of home country only (see the definition of home country in 3GPP TS 24.301 [15]). | |

The UE uses the MPS indicator bit of the 5GS network feature support IE to determine if access identity 1 is valid. Processing of the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message is described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4. The UE shall not consider access identity 1 to be valid when the UE is not in the country of its HPLMN prior to receiving the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message being set to "Access identity 1 valid in RPLMN or equivalent PLMN".

When the UE is in the country of its HPLMN, the contents of the USIM files EFUAC\_AIC and EFACC as specified in 3GPP TS 31.102 [22] and the rules specified in table 4.5.2.1 are used to determine the applicability of access identity 1 and access classes 11 - 15. When the UE is in the country of its HPLMN, and the USIM file EFUAC\_AIC does not indicate the UE is configured for access identity 1, the UE uses the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message to determine if access identity 1 is valid. When the UE is in the country of its HPLMN, and the USIM file EFUAC\_AIC indicates the UE is configured for access identity 1, the MPS indicator bit of the 5GS network feature support IE is not applicable. When the UE is not in the country of its HPLMN, the contents of the USIM files EFUAC\_AIC and EFACC are not applicable.

The UE uses the MCS indicator bit of the 5GS network feature support IE to determine if access identity 2 is valid. Processing of the MCS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message is described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4. The UE shall not consider access identity 2 to be valid when the UE is not in the country of its HPLMN prior to receiving the MCS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message being set to "Access identity 2 valid in RPLMN or equivalent PLMN".

When the UE is in the country of its HPLMN, the contents of the USIM files EFUAC\_AIC and EFACC as specified in 3GPP TS 31.102 [22] and the rules specified in table 4.5.2.1 are used to determine the applicability of access identity 2 and access classes 11 - 15. When the UE is in the country of its HPLMN, and the USIM file EFUAC\_AIC does not indicate the UE is configured for access identity 2, the UE uses the MCS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message to determine if access identity 2 is valid. When the UE is in the country of its HPLMN, and the USIM file EFUAC\_AIC indicates the UE is configured for access identity 2, the MCS indicator bit of the 5GS network feature support IE is not applicable. When the UE is not in the country of its HPLMN, the contents of the USIM files EFUAC\_AIC and EFACC are not applicable.

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

NOTE: The case when an access attempt matches more than one rule includes the case when multiple events trigger an access attempt at the same time.

Table 4.5.2.2: Mapping table for access categories

|  |  |  |  |
| --- | --- | --- | --- |
| Rule # | Type of access attempt | Requirements to be met | Access Category |
| 1 | Response to paging or NOTIFICATION over non-3GPP access;  5GMM connection management procedure initiated for the purpose of transporting an LPP message | Access attempt is for MT access | 0 (= MT\_acc) |
| 2 | Emergency | UE is attempting access for an emergency session (NOTE 1, NOTE 2) | 2 (= emergency) |
| 3 | Access attempt for operator-defined access category | UE stores operator-defined access category definitions valid in the current PLMN as specified in subclause 4.5.3, and access attempt is matching criteria of an operator-defined access category definition | 32-63  (= based on operator classification) |
| 4 | Access attempt for delay tolerant service | (a) UE is configured for NAS signalling low priority or UE supporting S1 mode is configured for EAB (see the "ExtendedAccessBarring" leaf of NAS configuration MO in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22]) where "EAB override" does not apply, and  (b). the UE received one of the categories a, b or c as part of the parameters for unified access control in the broadcast system information, and the UE is a member of the broadcasted category in the selected PLMN or RPLMN/equivalent PLMN  (NOTE 3, NOTE 5, NOTE 6, NOTE 7, NOTE 8) | 1 (= delay tolerant) |
| 5 | MO MMTel voice call | Access attempt is for MO MMTel voice call  or for NAS signalling connection recovery during ongoing MO MMTel voice call (NOTE 2) | 4 (= MO MMTel voice) |
| 6 | MO MMTel video call | Access attempt is for MO MMTel video call  or for NAS signalling connection recovery during ongoing MO MMTel video call (NOTE 2) | 5 (= MO MMTel video) |
| 7 | MO SMS over NAS or MO SMSoIP | Access attempt is for MO SMS over NAS (NOTE 4) or MO SMS over SMSoIP transfer  or for NAS signalling connection recovery during ongoing MO SMS or SMSoIP transfer (NOTE 2) | 6 (= MO SMS and SMSoIP) |
| 8 | UE NAS initiated 5GMM specific procedures | Access attempt is for MO signalling | 3 (= MO\_sig) |
| 9 | UE NAS initiated 5GMM connection management procedure or 5GMM NAS transport procedure | Access attempt is for MO data | 7 (= MO\_data) |
| 10 | An uplink user data packet is to be sent for a PDU session with suspended user-plane resources | No further requirement is to be met | 7 (= MO\_data) |
| NOTE 1: This includes 5GMM specific procedures while the service is ongoing and 5GMM connection management procedures required to establish a PDU session with request type = "initial emergency request" or "existing emergency PDU session", or to re-establish user-plane resources for such a PDU session. This further includes the service request procedure initiated with a SERVICE REQUEST message with the Service type IE set to "emergency services fallback".<  NOTE 2: Access for the purpose of NAS signalling connection recovery during an ongoing service, or for the purpose of NAS signalling connection establishment following fallback indication from lower layers during an ongoing service, is mapped to the access category of the ongoing service in order to derive an RRC establishment cause, but barring checks will be skipped for this access attempt.  NOTE 3: If the UE selects a new PLMN, then the selected PLMN is used to check the membership; otherwise the UE uses the RLPMN or a PLMN equivalent to the RPLMN.  NOTE 4: This includes the 5GMM connection management procedures triggered by the UE-initiated NAS transport procedure for transporting the MO SMS.  NOTE 5: The UE configured for NAS signalling low priority is not supported in this release of specification. If a UE supporting both S1 mode and N1 mode is configured for NAS signalling low priority in S1 mode as specified in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22], the UE shall ignore the configuration for NAS signalling low priority when in N1 mode.  NOTE 6: If the access category applicable for the access attempt is 1, then the UE shall additionally determine a second access category from the range 3 to 7. If more than one access category matches, the access category of the lowest rule number shall be chosen. The UE shall use the second access category only to derive an RRC establishment cause for the access attempt.  NOTE 7: "EAB override" does not apply, if the UE is not configured to allow overriding EAB (see the "Override\_ExtendedAccessBarring" leaf of NAS configuration MO in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22]), or if NAS has not received an indication from the upper layers to override EAB and the UE does not have a PDU session that was established with EAB override.  NOTE 8: For the definition of categories a, b and c associated with access category 1, see 3GPP TS 22.261 [3]. The categories associated with access category 1 are distinct from the categories a, b and c associated with EAB (see 3GPP TS 22.011 [1A]). | | | |

[TS 24.501, clause 4.5.4.1]

When the UE is in 5GMM-IDLE mode, upon receiving a request from the upper layers for an access attempt, the NAS shall categorize the access attempt into access identities and an access category following subclause 4.5.2, table 4.5.2.1 and table 4.5.2.2, and subclause 4.5.3, and provide the applicable access identities and the access category to the lower layers for the purpose of access control checking. In this request to the lower layer the NAS can also provide to the lower layer the RRC establishment cause determined as specified in subclause 4.5.6 of this specification.

NOTE 1: The access barring check is performed by the lower layers.

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

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

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

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

If the lower layers indicate that the access attempt is barred, the NAS shall not initiate the procedure to send the initial NAS message for the access attempt. Additionally:

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

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

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

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

b) if the event which triggered the access attempt was an MO-SMSoIP-attempt-started indication:

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

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

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

NOTE 4: Barring timers, on a per access category basis, are run by the lower layers. At expiry of barring timers, the indication of alleviation of access barring is indicated to the NAS on a per access category basis.

[TS 24.501, clause 4.5.6]

When 5GMM requests the establishment of a NAS-signalling connection, the RRC establishment cause used by the UE shall be selected according to one or more access identities (see subclause 4.5.2) and the determined access category as specified in table 4.5.6.1 and table 4.5.6.2. If the determined access category is an operator-defined access category, then the RRC establishment cause used by the UE shall be selected according to table 4.5.6.1 and table 4.5.6.2 based on one or more access identities (see subclause 4.5.2) and the standardized access category determined for the operator-defined access category as described in subclause 4.5.3.

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

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

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

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

[TS 38.331, clause 5.3.14.1]

The purpose of this procedure is to perform access barring check for an access attempt associated with a given Access Category and one or more Access Identities upon request from upper layers according to TS 24.501 [23] or the RRC layer.

After a handover resulting in change of PCell in RRC\_CONNECTED the UE shall defer access barring checks until it has obtained valid UAC information (from *SIB1*) from the target cell.

[TS 38.331, clause 5.3.14.2]

Upon initiation of the procedure, the UE shall:

1> if timer T390 is running for the Access Category:

2> consider the access attempt as barred;

1> else if timer T302 is running and the Access Category is neither '2' nor '0':

2> consider the access attempt as barred;

1> else:

2> if the Access Category is '0':

3> consider the access attempt as allowed;

2> else:

3> if *SIB1* includes *uac-BarringPerPLMN-List* and the *uac-BarringPerPLMN-List* contains an *UAC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to the PLMN selected by upper layers (see TS 24.501 [23]):

4> select the *UAC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to the PLMN selected by upper layers;

4> in the remainder of this procedure, use the selected *UAC-BarringPerPLMN* entry (i.e. presence or absence of access barring parameters in this entry) irrespective of the *uac-BarringForCommon* included in *SIB1*;

3> else if SIB1 includes *uac-BarringForCommon*:

4> in the remainder of this procedure use the *uac-BarringForCommon* (i.e. presence or absence of these parameters) included in *SIB1*;

3> else:

4> consider the access attempt as allowed;

3> if uac-BarringForCommon is applicable or the uac-ACBarringListType indicates that uac-ExplicitACBarringList is used:

4> if the corresponding *UAC-BarringPerCatList* contains a *UAC-BarringPerCat* entry corresponding to the Access Category:

5> select the *UAC-BarringPerCat* entry;

5> if the uac-BarringInfoSetList contains a UAC-BarringInfoSet entry corresponding to the selected uac-barringInfoSetIndex in the UAC-BarringPerCat:

6> select the UAC-BarringInfoSet entry;

6> perform access barring check for the Access Category as specified in 5.3.14.5, using the selected UAC-BarringInfoSet as "UAC barring parameter";

5> else:

6> consider the access attempt as allowed;

4> else:

5> consider the access attempt as allowed;

3> else if the uac-ACBarringListType indicates that uac-ImplicitACBarringList is used:

4> select the *uac-BarringInfoSetIndex* corresponding to the Access Category in the *uac-ImplicitACBarringList*;

4> if the uac-BarringInfoSetList contains the UAC-BarringInfoSet entry corresponding to the selected uac-BarringInfoSetIndex:

5> select the *UAC-BarringInfoSet* entry;

5> perform access barring check for the Access Category as specified in 5.3.14.5, using the selected *UAC-BarringInfoSet* as "UAC barring parameter";

4> else:

5> consider the access attempt as allowed;

3> else:

4> consider the access attempt as allowed;

1> if the access barring check was requested by upper layers:

2> if the access attempt is considered as barred:

3> if timer T302 is running:

4> inform the upper layer that access barring is applicable for all access categories except categories '0' and '2', upon which the procedure ends;

3> else:

4> inform upper layers that the access attempt for the Access Category is barred, upon which the procedure ends;

2> else:

3> inform upper layers that the access attempt for the Access Category is allowed, upon which the procedure ends;

1> else:

2> the procedure ends.

[TS 38.331, clause 5.3.14.4]

The UE shall:

1> if timer T302 expires or is stopped, and if timer T390 corresponding to an Access Category is not running; or

1> if timer T390 corresponding to an Access Category other than '2' expires or is stopped, and if timer T302 is not running; or

1> if timer T390 corresponding to the Access Category '2' expires or is stopped:

2> consider the barring for this Access Category to be alleviated;

1> when barring for an Access Category is considered being alleviated:

2> if the Access Category was informed to upper layers as barred:

3> inform upper layers about barring alleviation for the Access Category.

2> if barring is alleviated for Access Category '8':

3> perform actions specified in 5.3.13.8;

[TS 38.331, clause 5.3.14.5]

The UE shall:

1> if one or more Access Identities are indicated according to TS 24.501 [23], and

1> if for at least one of these Access Identities the corresponding bit in the *uac-BarringForAccessIdentity* contained in "UAC barring parameter" is set to *zero*:

2> consider the access attempt as allowed;

1> else:

2> draw a random number '*rand*' uniformly distributed in the range: 0 ≤ *rand* < 1;

2> if '*rand*' is lower than the value indicated by *uac-BarringFactor* included in "UAC barring parameter":

3> consider the access attempt as allowed;

2> else:

3> consider the access attempt as barred;

1> if the access attempt is considered as barred:

2> draw a random number '*rand*' that is uniformly distributed in the range 0 ≤ *rand* < 1;

2> start timer T390 for the Access Category with the timer value calculated as follows, using the *uac-BarringTime* included in"AC barring parameter":

T390 = (0.7+ 0.6 \* *rand*) \* *uac-BarringTime.*

11.3.1.3 Test description

11.3.1.3.1 Pre-test conditions

System Simulator:

- NR Cell 1.

- Cell power level is selected according to 38.508-1 [4] Table 6.2.2.1-3.

- System information combination NR-1 as defined in TS 38.508-1 [4] Table 4.4.3.1.2-1 is used in NR cell 1.

UE:

- None.

Preamble:

- The UE is switched on and brought to state 1N-A, RRC\_IDLE Connectivity (NR), in accordance with the procedure described in TS 38.508-1 [4], clause 4.5.2 and IMS PDU session establishment and IMS registration procedure need to be performed on NR Cell 1.

11.3.1.3.2 Test procedure sequence

Table 11.3.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1-12B | Void | - | - | - | - |
| 12C | SS changes *SIB1* according to Table 11.3.1.3.3-1 and sends Short Message on PDCCH using P-RNTI. Wait for 2.1\* modification period to allow the new system information to take effect. | <-- | PDCCH (DCI 1\_0): Short Message | - | - |
| 13 | Make the UE attempt a MMTel voice call. | - | - | - | - |
| 14 | Check: Does the UE transmit *RRCSetupRequest* message including *mo-VoiceCall* with within 21s? (Note 1) | --> | NR RRC: RRCSetupRequest | 1 | F |
| 15 | SS changes *SIB1* according to Table 11.3.1.3.3-1 and sends Short Message on PDCCH using P-RNTI. | <-- | PDCCH (DCI 1\_0): Short Message | - | - |
| 15A | Start Timer=120 sec | - | - | - | - |
| - | EXCEPTION: Steps 15Aa1-15Ab3 describes optional behaviour that depends on the UE implementation. | - | - | - | - |
| 15Aa1 | Check: Does the UE send NR RRCSetupRequest with EstablishmentCause set to ‘mo-VoiceCall’? | --> | NR RRC: RRCSetupRequest | 2 | P |
| 15Aa2 | Stop Timer=120 sec | - | - | - | - |
| 15Ab1 | Timer=120 sec expires | - | - | - | - |
| 15Ab2 | Make the UE attempt another MO MTSI MMTEL Voice session. | - | - | - | - |
| 15Ab3 | Check: Does the UE send NR RRCSetupRequest with EstablishmentCause set to ‘mo-VoiceCall’? | --> | NR RRC: RRCSetupRequest | 2 | P |
| 16-17 | Void | - | - | - | - |
| 18-28 | Step 3 to step 13 from test procedure for IMS MO speech call establishment as described in TS 38.508-1 [4] Table 4.9.15.2.2-1 take place. | - | - | - | - |
| 28A | Make the UE release the MO speech call. (Note 2) | - | - | - | - |
| 29-31 | Step 1 to step 5 from test procedure for test procedure for IMS MO speech call release as described in TS 38.508-1 [4] Table 4.9.17.2.2-1 take place. | - | - | - | - |
| 31A | The SS transmits an *RRCRelease* message to release RRC connection and move the UE to RRC\_IDLE. | <-- | NR RRC: RRCRelease | - | - |
| 32 | AT command to make the UE attempt to send SMS over IP | - | - | - | - |
| 33 | Check: Does the UE transmit an *RRCSetupRequest* message with 'establishmentCause' set to 'mo-SMS' within 21s? (Note 1) | --> | NR RRC: RRCSetupRequest | 3 | F |
| 34 | SS changes *SIB1* according to Table 11.3.1.3.3-1 and sends Short Message on PDCCH using P-RNTI. | <-- | PDCCH (DCI 1\_0): Short Message | - | - |
| 34A | Start Timer=120 sec | - | - | - | - |
| - | EXCEPTION: Steps 34Aa1-34Ab3 describes optional behaviour that depends on the UE implementation. | - | - | - | - |
| 34Aa1 | Check: Does the UE send NR *RRCSetupRequest* with *EstablishmentCause* set to ‘mo-SMS’? | --> | NR RRC: RRCSetupRequest | 3 | P |
| 34Aa2 | Stop Timer=120 sec | - | - | - | - |
| 34Ab1 | Timer=120 sec expires | - | - | - | - |
| 34Ab2 | AT command to make the UE attempt to send another SMS over IP | - | - | - | - |
| 34Ab3 | Check: Does the UE send NR *RRCSetupRequest* with *EstablishmentCause* set to ‘mo-SMS’? | --> | NR RRC: RRCSetupRequest | 3 | P |
| 35 | Void | - | - | - | - |
| 36-49 | Steps 3-16 from generic procedure IMS MO SMS in 5GS as described in TS 38.508-1 [4] Table 4.9.19.2.2-1 take place. | - | - | - | - |
| Note 1: T390 is a random value between (0.7 + 0.6 \* 0) \* uac-BarringTime(16s) = 11.2s and (0.7 + 0.6 \* 1) \* uac-BarringTime(16s) = 20.8s.  Note 2: This could be done by e.g. MMI or AT command. | | | | | |

11.3.1.3.3 Specific message contents

Table 11.3.1.3.3-1: *SIB1* of NR Cell 1 (All steps, Table 11.3.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-28 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| uac-BarringInfo SEQUENCE { |  |  |  |
| uac-BarringForCommon SEQUENCE (SIZE (1..maxAccessCat-1)) OF UAC-BarringPerCat { | 1 entry |  |  |
| UAC-BarringPerCat[1] SEQUENCE { |  | entry 1 |  |
| accessCategory | 4 | (= MO MMTel voice) | Step12C |
|  | 6 | (= MO SMS and SMSoIP) | Step 15 |
| uac-barringInfoSetIndex | 1 | Value 1 corresponds to the first entry in uac-BarringInfoSetList |  |
| } |  |  |  |
| } |  |  |  |
| uac-BarringPerPLMN-List | Not present |  |  |
| uac-BarringInfoSetList SEQUENCE (SIZE(1..maxBarringInfoSet)) OF UAC-BarringInfoSet { | 1 entry |  |  |
| UAC-BarringInfoSet[1] SEQUENCE { |  | entry 1 |  |
| uac-BarringFactor | p00 | 0% access probability |  |
| uac-BarringTime | s16 | 16 s |  |
| uac-BarringForAccessIdentity | '0000000'B |  |  |
| } |  |  |  |
| } |  |  |  |
| uac-AccessCategory1-SelectionAssistanceInfo | Not Present |  |  |
| } |  |  |  |
| uac-BarringInfo | Not present |  | Step 34 |
| } |  |  |  |

Table 11.3.1.3.3-2: RRCSetupRequest (step 15A and step 34A, Table 11.3.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.6.1-23 | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCSetupRequest ::= SEQUENCE { |  |  |  |
| rrcSetupRequest SEQUENCE { |  |  |  |
| establishmentCause | mo-Voicecall |  | Step 15Aa1 and 15Ab3 |
|  | mo-SMS |  | Step 34Aa1 and 34Ab3 |
| } |  |  |  |
| } |  |  |  |

### 11.3.1a UAC / Access Identity 0 / 0% access probability / Uplink user data transfer / RRC\_INACTIVE

11.3.1a.1 Test Purpose (TP)

(1)

**with** { UE not configured for special AIs (1,2,11-15) , with at least one PDU Session in 5GSM PDU SESSION ACTIVE state (with user plane suspended) in NR RRC\_INACTIVE state & SIB1 indicating 0% accessibility for Access Category 7 in NR RRC\_INACTIVE state }

**ensure** **that** {

**when** { User initiates uplink user data packet to be sent for a PDU session with suspended user-plane resources }

**then** { UE does not send the data packet }

}

11.3.1a.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in TS 24.501: clause 4.5.2, 4.5.4.2, 4.5.2A and 4.5.6 and TS 38.331: clause 5.3.14.1, 5.3.14.2, 5.3.14.4 and 5.3.14.5. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 4.5.2]

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

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

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

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

Table 4.5.2.1: Access identities

|  |  |
| --- | --- |
| Access Identity number | UE configuration |
| 0 | UE is not configured with any parameters from this table |
| 1 (NOTE 1) | UE is configured for multimedia priority service (MPS). |
| 2 (NOTE 2) | UE is configured for mission critical service (MCS). |
| 3-10 | Reserved for future use |
| 11 (NOTE 3) | Access Class 11 is configured in the UE. |
| 12 (NOTE 3) | Access Class 12 is configured in the UE. |
| 13 (NOTE 3) | Access Class 13 is configured in the UE. |
| 14 (NOTE 3) | Access Class 14 is configured in the UE. |
| 15 (NOTE 3) | Access Class 15 is configured in the UE. |
| NOTE 1: Access identity 1 is valid when: - the USIM file EFUAC\_AIC indicates the UE is configured for access identity 1 and the RPLMN is the HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present), or a visited PLMN of the home country (see the definition of home country in 3GPP TS 24.301 [15]); or - the UE receives the 5GS network feature support IE with the MPS indicator bit set to "Access identity 1 valid in RPLMN or equivalent PLMN" from the RPLMN as described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4.  NOTE 2: Access identity 2 is used by UEs configured for MCS and is valid when: - the USIM file EFUAC\_AIC indicates the UE is configured for access identity 2 and the RPLMN is the HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present), or a visited PLMN of the home country (see 3GPP TS 23.122 [5]); or - the UE receives the 5GS network feature support IE with the MCS indicator bit set to "Access identity 2 valid in RPLMN or equivalent PLMN" from the RPLMN as described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4.  NOTE 3: Access identities 11 and 15 are valid in HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present). Access Identities 12, 13 and 14 are valid in HPLMN and visited PLMNs of home country only (see the definition of home country in 3GPP TS 24.301 [15]). | |

The UE uses the MPS indicator bit of the 5GS network feature support IE to determine if access identity 1 is valid. Processing of the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message is described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4. The UE shall not consider access identity 1 to be valid when the UE is not in the country of its HPLMN prior to receiving the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message being set to "Access identity 1 valid in RPLMN or equivalent PLMN".

When the UE is in the country of its HPLMN, the contents of the USIM files EFUAC\_AIC and EFACC as specified in 3GPP TS 31.102 [22] and the rules specified in table 4.5.2.1 are used to determine the applicability of access identity 1 and access classes 11 - 15. When the UE is in the country of its HPLMN, and the USIM file EFUAC\_AIC does not indicate the UE is configured for access identity 1, the UE uses the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message to determine if access identity 1 is valid. When the UE is in the country of its HPLMN, and the USIM file EFUAC\_AIC indicates the UE is configured for access identity 1, the MPS indicator bit of the 5GS network feature support IE is not applicable. When the UE is not in the country of its HPLMN, the contents of the USIM files EFUAC\_AIC and EFACC are not applicable.

The UE uses the MCS indicator bit of the 5GS network feature support IE to determine if access identity 2 is valid. Processing of the MCS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message is described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4. The UE shall not consider access identity 2 to be valid when the UE is not in the country of its HPLMN prior to receiving the MCS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message being set to "Access identity 2 valid in RPLMN or equivalent PLMN".

When the UE is in the country of its HPLMN, the contents of the USIM files EFUAC\_AIC and EFACC as specified in 3GPP TS 31.102 [22] and the rules specified in table 4.5.2.1 are used to determine the applicability of access identity 2 and access classes 11 - 15. When the UE is in the country of its HPLMN, and the USIM file EFUAC\_AIC does not indicate the UE is configured for access identity 2, the UE uses the MCS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message to determine if access identity 2 is valid. When the UE is in the country of its HPLMN, and the USIM file EFUAC\_AIC indicates the UE is configured for access identity 2, the MCS indicator bit of the 5GS network feature support IE is not applicable. When the UE is not in the country of its HPLMN, the contents of the USIM files EFUAC\_AIC and EFACC are not applicable.

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

NOTE: The case when an access attempt matches more than one rule includes the case when multiple events trigger an access attempt at the same time.

Table 4.5.2.2: Mapping table for access categories

|  |  |  |  |
| --- | --- | --- | --- |
| Rule # | Type of access attempt | Requirements to be met | Access Category |
| 1 | Response to paging or NOTIFICATION over non-3GPP access;  5GMM connection management procedure initiated for the purpose of transporting an LPP message | Access attempt is for MT access | 0 (= MT\_acc) |
| 2 | Emergency | UE is attempting access for an emergency session (NOTE 1, NOTE 2) | 2 (= emergency) |
| 3 | Access attempt for operator-defined access category | UE stores operator-defined access category definitions valid in the current PLMN as specified in subclause 4.5.3, and access attempt is matching criteria of an operator-defined access category definition | 32-63  (= based on operator classification) |
| 4 | Access attempt for delay tolerant service | (a) UE is configured for NAS signalling low priority or UE supporting S1 mode is configured for EAB (see the "ExtendedAccessBarring" leaf of NAS configuration MO in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22]) where "EAB override" does not apply, and  (b). the UE received one of the categories a, b or c as part of the parameters for unified access control in the broadcast system information, and the UE is a member of the broadcasted category in the selected PLMN or RPLMN/equivalent PLMN  (NOTE 3, NOTE 5, NOTE 6, NOTE 7, NOTE 8) | 1 (= delay tolerant) |
| 5 | MO MMTel voice call | Access attempt is for MO MMTel voice call  or for NAS signalling connection recovery during ongoing MO MMTel voice call (NOTE 2) | 4 (= MO MMTel voice) |
| 6 | MO MMTel video call | Access attempt is for MO MMTel video call  or for NAS signalling connection recovery during ongoing MO MMTel video call (NOTE 2) | 5 (= MO MMTel video) |
| 7 | MO SMS over NAS or MO SMSoIP | Access attempt is for MO SMS over NAS (NOTE 4) or MO SMS over SMSoIP transfer  or for NAS signalling connection recovery during ongoing MO SMS or SMSoIP transfer (NOTE 2) | 6 (= MO SMS and SMSoIP) |
| 8 | UE NAS initiated 5GMM specific procedures | Access attempt is for MO signalling | 3 (= MO\_sig) |
| 9 | UE NAS initiated 5GMM connection management procedure or 5GMM NAS transport procedure | Access attempt is for MO data | 7 (= MO\_data) |
| 10 | An uplink user data packet is to be sent for a PDU session with suspended user-plane resources | No further requirement is to be met | 7 (= MO\_data) |
| NOTE 1: This includes 5GMM specific procedures while the service is ongoing and 5GMM connection management procedures required to establish a PDU session with request type = "initial emergency request" or "existing emergency PDU session", or to re-establish user-plane resources for such a PDU session. This further includes the service request procedure initiated with a SERVICE REQUEST message with the Service type IE set to "emergency services fallback".<  NOTE 2: Access for the purpose of NAS signalling connection recovery during an ongoing service, or for the purpose of NAS signalling connection establishment following fallback indication from lower layers during an ongoing service, is mapped to the access category of the ongoing service in order to derive an RRC establishment cause, but barring checks will be skipped for this access attempt.  NOTE 3: If the UE selects a new PLMN, then the selected PLMN is used to check the membership; otherwise the UE uses the RLPMN or a PLMN equivalent to the RPLMN.  NOTE 4: This includes the 5GMM connection management procedures triggered by the UE-initiated NAS transport procedure for transporting the MO SMS.  NOTE 5: The UE configured for NAS signalling low priority is not supported in this release of specification. If a UE supporting both S1 mode and N1 mode is configured for NAS signalling low priority in S1 mode as specified in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22], the UE shall ignore the configuration for NAS signalling low priority when in N1 mode.  NOTE 6: If the access category applicable for the access attempt is 1, then the UE shall additionally determine a second access category from the range 3 to 7. If more than one access category matches, the access category of the lowest rule number shall be chosen. The UE shall use the second access category only to derive an RRC establishment cause for the access attempt.  NOTE 7: "EAB override" does not apply, if the UE is not configured to allow overriding EAB (see the "Override\_ExtendedAccessBarring" leaf of NAS configuration MO in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22]), or if NAS has not received an indication from the upper layers to override EAB and the UE does not have a PDU session that was established with EAB override.  NOTE 8: For the definition of categories a, b and c associated with access category 1, see 3GPP TS 22.261 [3]. The categories associated with access category 1 are distinct from the categories a, b and c associated with EAB (see 3GPP TS 22.011 [1A]). | | | |

[TS 24.501, clause 4.5.2A]

[Rel-16]

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

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

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

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

Table 4.5.2A.1: Access identities

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

The contents of the unified access control configuration in the "list of subscriber data" stored in the ME (see 3GPP TS 23.122 [5]) and the rules specified in table 4.5.2A.1 are used to determine the applicability of access identity 1 in the SNPN. When the contents of the unified access control configuration in the "list of subscriber data" stored in the ME (see 3GPP TS 23.122 [5]) do not indicate the UE is configured for access identity 1 for the SNPN, the UE uses the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message to determine if access identity 1 is valid.

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

The contents of the unified access control configuration in the "list of subscriber data" stored in the ME (see 3GPP TS 23.122 [5]) and the rules specified in table 4.5.2A.1 are used to determine the applicability of access classes 11 to 15 in the SNPN.

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

NOTE: The case when an access attempt matches more than one rule includes the case when multiple events trigger an access attempt at the same time.

Table 4.5.2A.2: Mapping table for access categories

|  |  |  |  |
| --- | --- | --- | --- |
| Rule # | Type of access attempt | Requirements to be met | Access Category |
| 1 | Response to paging or NOTIFICATION over non-3GPP access (NOTE 11);  5GMM connection management procedure initiated for the purpose of transporting an LPP message without an ongoing 5GC-MO-LR procedure;  Access attempt to handover of MMTEL voice call, MMTEL video call or SMSoIP from non-3GPP access | Access attempt is for MT access, or handover of ongoing MMTEL voice call, MMTEL video call or SMSoIP from non-3GPP access | 0 (= MT\_acc) |
| 2 | Emergency | UE is attempting access for an emergency session (NOTE 1, NOTE 2) | 2 (= emergency) |
| 3 | Access attempt for operator-defined access category | UE stores operator-defined access category definitions valid in the SNPN as specified in subclause 4.5.3, and access attempt is matching criteria of an operator-defined access category definition | 32-63  (= based on operator classification) |
| 4 | Access attempt for delay tolerant service | (a) UE is configured for NAS signalling low priority, and  (b) the UE received one of the categories a, b or c as part of the parameters for unified access control in the broadcast system information, and the UE is a member of the broadcasted category in the selected SNPN or RSNPN  (NOTE 3, NOTE 5, NOTE 6, NOTE 7, NOTE 8) | 1 (= delay tolerant) |
| 4.1 | MO IMS registration related signalling | Access attempt is for MO IMS registration related signalling (e.g. IMS initial registration, re-registration, subscription refresh)  or for NAS signalling connection recovery during ongoing procedure for MO IMS registration related signalling (NOTE 2a) | 9 (= MO IMS registration related signalling) |
| 5 | MO MMTel voice call | Access attempt is for MO MMTel voice call  or for NAS signalling connection recovery during ongoing MO MMTel voice call (NOTE 2) | 4 (= MO MMTel voice) |
| 6 | MO MMTel video call | Access attempt is for MO MMTel video call  or for NAS signalling connection recovery during ongoing MO MMTel video call (NOTE 2) | 5 (= MO MMTel video) |
| 7 | MO SMS over NAS or MO SMSoIP | Access attempt is for MO SMS over NAS (NOTE 4) or MO SMS over SMSoIP transfer  or for NAS signalling connection recovery during ongoing MO SMS or SMSoIP transfer (NOTE 2) | 6 (= MO SMS and SMSoIP) |
| 8 | UE NAS initiated 5GMM specific procedures | Access attempt is for MO signalling | 3 (= MO\_sig) |
| 8.1 | Mobile originated location request | Access attempt is for mobile originated location request (NOTE 9) | 3 (= MO\_sig) |
| 8.2 | Mobile originated signalling transaction towards the PCF | Access attempt is for mobile originated signalling transaction towards the PCF (NOTE 10) | 3 (= MO\_sig) |
| 9 | UE NAS initiated 5GMM connection management procedure or 5GMM NAS transport procedure | Access attempt is for MO data | 7 (= MO\_data) |
| 10 | An uplink user data packet is to be sent for a PDU session with suspended user-plane resources | No further requirement is to be met | 7 (= MO\_data) |
| NOTE 1: In this release of the specification, there is no support for establishing an emergency session in an SNPN.  NOTE 2: Access for the purpose of NAS signalling connection recovery during an ongoing service as defined in subclause 4.5.5, or for the purpose of NAS signalling connection establishment following fallback indication from lower layers during an ongoing service as defined in subclause 4.5.5, is mapped to the access category of the ongoing service in order to derive an RRC establishment cause, but barring checks will be skipped for this access attempt.  NOTE 2a: Access for the purpose of NAS signalling connection recovery during an ongoing MO IMS registration related signalling as defined in subclause 4.5.5, or for the purpose of NAS signalling connection establishment following fallback indication from lower layers during an ongoing MO IMS registration related signalling as defined in subclause 4.5.5, is mapped to the access category of the MO IMS registration related signalling in order to derive an RRC establishment cause, but barring checks will be skipped for this access attempt.  NOTE 3: If the UE selects a new SNPN, then the selected SNPN is used to check the membership; otherwise the UE uses the RSNPN.  NOTE 4: This includes the 5GMM connection management procedures triggered by the UE-initiated NAS transport procedure for transporting the MO SMS.  NOTE 5: The UE configured for NAS signalling low priority is not supported in this release of specification.  NOTE 6: If the access category applicable for the access attempt is 1, then the UE shall additionally determine a second access category from the range 3 to 7. If more than one access category matches, the access category of the lowest rule number shall be chosen. The UE shall use the second access category only to derive an RRC establishment cause for the access attempt.  NOTE 7: Void.  NOTE 8: For the definition of categories a, b and c associated with access category 1, see 3GPP TS 22.261 [3]. The categories associated with access category 1 are distinct from the categories a, b and c associated with EAB (see 3GPP TS 22.011 [1A]).  NOTE 9: This includes: a) the UE-initiated NAS transport procedure for transporting a mobile originated location  request; b) the 5GMM connection management procedure triggered by a) above; and c) NAS signalling connection recovery during an ongoing 5GC-MO-LR procedure.  NOTE 10: This includes: a) the UE-initiated NAS transport procedure for transporting a mobile originated signalling  transaction towards the PCF; b) the 5GMM connection management procedure triggered by a) above; and c) NAS signalling connection recovery during an ongoing UE triggered V2X policy provisioning  procedure.  NOTE 11: The term "non-3GPP access" refers to the case when the UE is accessing SNPN services via a PLMN. | | | |

[TS 24.501, clause 4.5.4.2]

[Rel-15]

When the UE is in 5GMM-CONNECTED mode or 5GMM-CONNECTED mode with RRC inactive indication, upon detecting one of events 1) through 6) listed in subclause 4.5.1, the NAS shall categorize the corresponding access attempt into access identities and an access category following subclause 4.5.2, table 4.5.2.1 and table 4.5.2.2, and subclause 4.5.2.3, and provide the access identities and the access category to the lower layers for the purpose of access control checking. In this request to the lower layer the NAS can also provide to the lower layer the RRC establishment cause determined as specified in subclause 4.5.6 of this specification.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

NOTE 3: In this case prohibiting the initiation of the MMTEL voice session, MMTEL video session or prohibiting sending of the SMS over IP is performed by the upper layers.

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

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

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

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

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

[Rel-16]

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

a) subclause 4.5.2, table 4.5.2.1 and table 4.5.2.2, and subclause 4.5.2.3, if the UE is not operating in SNPN access mode; or

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

[TS 24.501, clause 4.5.6]

When 5GMM requests the establishment of a NAS-signalling connection, the RRC establishment cause used by the UE shall be selected according to one or more access identities (see subclause 4.5.2) and the determined access category as specified in table 4.5.6.1 and table 4.5.6.2. If the determined access category is an operator-defined access category, then the RRC establishment cause used by the UE shall be selected according to table 4.5.6.1 and table 4.5.6.2 based on one or more access identities (see subclause 4.5.2) and the standardized access category determined for the operator-defined access category as described in subclause 4.5.3.

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

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

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

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

[TS 38.331, clause 5.3.14.1]

The purpose of this procedure is to perform access barring check for an access attempt associated with a given Access Category and one or more Access Identities upon request from upper layers according to TS 24.501 [23] or the RRC layer.

After a PCell change in RRC\_CONNECTED the UE shall defer access barring checks until it has obtained *SIB1* (as specified in 5.2.2.2) from the target cell.

[TS 38.331, clause 5.3.14.2]

Upon initiation of the procedure, the UE shall:

1> if timer T390 is running for the Access Category:

2> consider the access attempt as barred;

1> else if timer T302 is running and the Access Category is neither '2' nor '0':

2> consider the access attempt as barred;

1> else:

2> if the Access Category is '0':

3> consider the access attempt as allowed;

2> else:

3> if *SIB1* includes *uac-BarringPerPLMN-List* that contains a *UAC-BarringPerPLMN* for the selected PLMN or SNPN:

4> if the procedure in 5.2.2.4.2 for a selected PLMN resulted in use of information in *npn-IdentityInfoList* and *UAC-BarringPerPLMN* has an entry with the *plmn-IdentityIndex* corresponding to used information in this list:

5> select the *UAC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to used information in the *npn-IdentityInfoList*;4> else:

5> select the *UAC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to the selected PLMN and the *PLMN-IdentityInfo, if any,* or the selected SNPN and the *npn-IdentityInfoList*;

3> if any *UAC-BarringPerPLMN* entry is selected:

4> in the remainder of this procedure, use the selected *UAC-BarringPerPLMN* entry (i.e. presence or absence of access barring parameters in this entry) irrespective of the *uac-BarringForCommon* included in *SIB1*;

3> else if SIB1 includes *uac-BarringForCommon*:

4> in the remainder of this procedure use the *uac-BarringForCommon* (i.e. presence or absence of these parameters) included in *SIB1*;

3> else:

4> consider the access attempt as allowed;

3> if uac-BarringForCommon is applicable or the uac-ACBarringListType indicates that uac-ExplicitACBarringList is used:

4> if the corresponding *UAC-BarringPerCatList* contains a *UAC-BarringPerCat* entry corresponding to the Access Category:

5> select the *UAC-BarringPerCat* entry;

5> if the uac-BarringInfoSetList contains a UAC-BarringInfoSet entry corresponding to the selected uac-barringInfoSetIndex in the UAC-BarringPerCat:

6> select the UAC-BarringInfoSet entry;

6> perform access barring check for the Access Category as specified in 5.3.14.5, using the selected UAC-BarringInfoSet as "UAC barring parameter";

5> else:

6> consider the access attempt as allowed;

4> else:

5> consider the access attempt as allowed;

3> else if the uac-ACBarringListType indicates that uac-ImplicitACBarringList is used:

4> select the *uac-BarringInfoSetIndex* corresponding to the Access Category in the *uac-ImplicitACBarringList*;

4> if the uac-BarringInfoSetList contains the UAC-BarringInfoSet entry corresponding to the selected uac-BarringInfoSetIndex:

5> select the *UAC-BarringInfoSet* entry;

5> perform access barring check for the Access Category as specified in 5.3.14.5, using the selected *UAC-BarringInfoSet* as "UAC barring parameter";

4> else:

5> consider the access attempt as allowed;

3> else:

4> consider the access attempt as allowed;

1> if the access barring check was requested by upper layers:

2> if the access attempt is considered as barred:

3> if timer T302 is running:

4> if timer T390 is running for Access Category '2':

5> inform the upper layer that access barring is applicable for all access categories except categories '0', upon which the procedure ends;

4> else

5> inform the upper layer that access barring is applicable for all access categories except categories '0' and '2', upon which the procedure ends;

3> else:

4> inform upper layers that the access attempt for the Access Category is barred, upon which the procedure ends;

2> else:

3> inform upper layers that the access attempt for the Access Category is allowed, upon which the procedure ends;

1> else:

2> the procedure ends.

[TS 38.331, clause 5.3.14.4]

The UE shall:

1> if timer T302 expires or is stopped, and if timer T390 corresponding to an Access Category is not running; or

1> if timer T390 corresponding to an Access Category other than '2' expires or is stopped, and if timer T302 is not running; or

1> if timer T390 corresponding to the Access Category '2' expires or is stopped:

2> consider the barring for this Access Category to be alleviated;

1> when barring for an Access Category is considered being alleviated:

2> if the Access Category was informed to upper layers as barred:

3> inform upper layers about barring alleviation for the Access Category.

2> if barring is alleviated for Access Category '8':

3> perform actions specified in 5.3.13.8;

[TS 38.331, clause 5.3.14.5]

The UE shall:

1> if one or more Access Identities are indicated according to TS 24.501 [23], and

1> if for at least one of these Access Identities the corresponding bit in the *uac-BarringForAccessIdentity* contained in "UAC barring parameter" is set to *zero*:

2> consider the access attempt as allowed;

1> else:

2> draw a random number '*rand*' uniformly distributed in the range: 0 ≤ *rand* < 1;

2> if '*rand*' is lower than the value indicated by *uac-BarringFactor* included in "UAC barring parameter":

3> consider the access attempt as allowed;

2> else:

3> consider the access attempt as barred;

1> if the access attempt is considered as barred:

2> draw a random number '*rand*' that is uniformly distributed in the range 0 ≤ *rand* < 1;

2> start timer T390 for the Access Category with the timer value calculated as follows, using the *uac-BarringTime* included in"AC barring parameter":

T390 = (0.7+ 0.6 \* *rand*) \* *uac-BarringTime.*

11.3.1a.3 Test description

11.3.1a.3.1 Pre-test conditions

System Simulator:

- NR Cell 1.

- Cell power level is selected according to 38.508-1 [4] Table 6.2.2.1-3.

- System information combination NR-1 as defined in TS 38.508-1 [4] Table 4.4.3.1.2-1 is used in NR Cell 1.

UE:

- None.

Preamble:

- The UE is in state 3N-A on NR Cell 1(serving cell) with at least one PDU session active according to TS 38.508-1 [4] Table 4.4A.2-1 and using the message condition UE TEST LOOP MODE B active with IP PDU delay = 2 second according to TS 38.508-1 [4]. DRB 1 is defined as default DRB for the PDU session.

- The IMS-VoPS-3GPP bit in the 5GS network feature support IE is set to "IMS voice over PS session not supported over 3GPP access" in REGISTRATION ACCEPT message.

11.3.1a.3.2 Test procedure sequence

Table 11.3.1a.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS changes SIB1 according to Table 11.3.1a.3.3-1 and sends Short Message on PDCCH using P-RNTI. Wait for 2.1\* modification period to allow the new system information to take effect. | <-- | PDCCH (DCI 1\_0): Short Message | - | - |
| 2 | The SS transmits one IP PDU. | - | - | - | - |
| 3 | The SS transmits an *RRCRelease* message with *suspendConfig* IE and move the UE to RRC\_Inactive state. | <-- | NR RRC: RRCRelease | - | - |
| 4 | Check: Does the UE transmit *RRCResumeRequest* message including *mo-Data* as resume cause within 6s? | --> | NR RRC: RRCResumeRequest | 1 | F |
| 5 | SS changes *SIB1* according to Table 11.3.1a.3.3-1 and sends Short Message on PDCCH using P-RNTI. Wait for the new system information to take effect and T390 to expire. (Note 1) | <-- | PDCCH (DCI 1\_0): Short Message | - | - |
| 5A | Start Timer=30 sec. (Note 2) | - | - | - | - |
|  | EXCEPTION: Steps 5Aa1-5Ab8 describe optional behaviour that depends on the UE implementation. | - | - |  |  |
| 5Aa1 | The UE transmits an RRCResumeRequest message including resumeCause as *mo-Data*. (Note 2) | --> | NR RRC: RRCResumeRequest | - | - |
| 5Aa2 | Stop Timer=30 | - | - | - | - |
| 5Ab1 | Timer=30 sec expires | - | - | - | - |
| 5Ab2 | The SS transmits a *Paging* message including a matched identity (correct *fullI-RNTI*). | <-- | NR RRC: *Paging* | - | - |
| 5Ab3 | The UE transmits an *RRCResumeRequest* message including resumeCause as *mt-Access*. | --> | NR RRC: RRCResumeRequest |  |  |
| 5Ab4 | The SS transmits an *RRCResume* message. | <-- | NR RRC: RRCResume | - | - |
| 5Ab5 | The UE transmits an *RRCResumeComplete* message. | --> | NR RRC: RRCResumeComplete | - | - |
| 5Ab5A | The SS transmits an OPEN UE TEST LOOP message. | <-- | NR RRC: *DLInformationTransfer*  TC: OPEN UE TEST LOOP | - | - |
| 5Ab5B | The UE transmits an OPEN UE TEST LOOP COMPLETE message. | --> | NR RRC: *ULInformationTransfer*  TC: OPEN UE TEST LOOP COMPLETE | - | - |
| 5Ab5C | The SS transmits a CLOSE UE TEST LOOP message. using the message condition UE TEST LOOP MODE B with IP PDU delay = 2 second | <-- | NR RRC: *DLInformationTransfer*  TC: CLOSE UE TEST LOOP | - | - |
| 5Ab5D | The UE transmits a CLOSE UE TEST LOOP COMPLETE message. | --> | NR RRC: *ULInformationTransfer*  TC: CLOSE UE TEST LOOP COMPLETE | - | - |
| 5Ab6 | The SS transmits one IP PDU. | - | - | - | - |
| 5Ab7 | The SS transmits an *RRCRelease* message with *suspendConfig* IE and move the UE to RRC\_Inactive state. | <-- | NR RRC: RRCRelease | - | - |
| 5Ab8 | The UE transmits *RRCResumeRequest* message including *mo-Data* as resume cause. | --> | NR RRC: RRCResumeRequest | - | - |
| 6-12 | Void | - | - | - | - |
| 13 | SS transmits an NR *RRCResume* message | <-- | NR RRC: RRCResume | - | - |
| - | EXCEPTION: Steps 14 and 15 can happen in any order | - | - | - | - |
| 14 | The UE transmits an NR *RRCResumeComplete* message to confirm the successful completion of the connection resumption. | --> | NR RRC: RRCResumeComplete | - | - |
| 15 | The UE loops back the IP PDU | - | - | - | - |
| 16 | The SS transmits DEACTIVATE TEST MODE message. | <-- | DEACTIVATE TEST MODE | - | - |
| 17 | The UE transmits DEACTIVATE TEST MODE COMPLETE message. | --> | DEACTIVATE TEST MODE COMPLETE | - | - |
| 18 | The SS transmits an *RRCRelease* message to release RRC connection and move the UE to RRC\_IDLE. | <-- | NR RRC: RRCRelease | - | - |
| Note 1: T390 is a random value between (0.7 + 0.6 \* 0) \* uac-BarringTime(16s) = 11.2s and (0.7 + 0.6 \* 1) \* uac-BarringTime(16s) = 20.8s.  Note 2: The wait time 30s is selected to cover (0.7 + 0.6 \* *rand*) \* uac-BarringTime(16s) = 20.8s + 2s (IP PDU delay timer) + 5.12s (modification period) = 27.92s rounded up to 28s when ‘*rand’* takes the maximum value of 1. | | | | | |

11.3.1a.3.3 Specific message contents

Table 11.3.1a.3.3-1: *SIB1* of NR Cell 1 (All steps, Table 11.3.1a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-28 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| uac-BarringInfo SEQUENCE { |  |  |  |
| uac-BarringForCommon SEQUENCE (SIZE (1..maxAccessCat-1)) OF UAC-BarringPerCat { | 1 entry |  |  |
| UAC-BarringPerCat[1] SEQUENCE { |  | entry 1 |  |
| accessCategory | 7 | (= MO\_data) | Step 1 |
|  | 4 | (= MO MMTel voice) | Step 5 |
| uac-barringInfoSetIndex | 1 | Value 1 corresponds to the first entry in uac-BarringInfoSetList |  |
| } |  |  |  |
| } |  |  |  |
| uac-BarringPerPLMN-List | Not present |  |  |
| uac-BarringInfoSetList SEQUENCE (SIZE(1..maxBarringInfoSet)) OF UAC-BarringInfoSet { | 1 entry |  |  |
| UAC-BarringInfoSet[1] SEQUENCE { |  | entry 1 |  |
| uac-BarringFactor | p00 | 0% access probability |  |
| uac-BarringTime | s16 | 16 s |  |
| uac-BarringForAccessIdentity | '0000000'B |  |  |
| } |  |  |  |
| } |  |  |  |
| uac-AccessCategory1-SelectionAssistanceInfo | Not Present |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.3.1a.3.3-2: *RRCResumeRequest* (All steps, Table 11.3.1a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-19 | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCResumeRequest ::= SEQUENCE { |  |  |  |
| rrcResumeRequest SEQUENCE { |  |  |  |
| resumeCause | mo-Data |  | Step 4, 5Aa1 and 5Ab8 |
|  | mt-Access |  | Step 5Ab3 |
| } |  |  |  |
| } |  |  |  |

Table 11.3.1a.3.3-3:REGISTRATION ACCEPT (preamble, Table 11.3.1a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS network feature support |  |  |  |
| IMS-VoPS-3GPP | '0'B | IMS voice over PS session not supported over 3GPP access |  |

Table 11.3.1a.3.3-4:CLOSE UE TEST LOOP (Table 11.3.1a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7A-3, condition UE TEST LOOP MODE B | | | |
| Information Element | Value/remark | Comment | Condition |
| UE test loop mode B LB setup |  |  |  |
| IP PDU delay | '0000 0010'B | 2 seconds |  |

### 11.3.2 UAC / Access Identity 0 / 0% access probability / Paging for MT access/Emergency call

11.3.2.1 Test Purpose (TP)

(1)

**with** { UE not configured for special AIs (1,2,11-15) having received a SIB1 message indicating 0% accessibility for all Access Categories in NR RRC\_Idle state }

**ensure** **that** {

**when** { UE is paged for MT access }

**then** { UE does not consider the access as barred and initiates RRC Connection }

}

(2)

**with** { UE not configured for special AIs (1,2,11-15) having received a SIB1 message including UAC Info set to 0% accessibility for Access Category 2 in NR RRC\_Idle state }

**ensure** **that** {

**when** { UE attempts emergency call }

**then** { UE does not initiate emergency call }

}

(3)

**with** { UE not configured for special AIs (1,2,11-15) with T302 running but T390 expired for Access Category 2 and with SIB1 including UAC Info indicating 100% accessibility for Access Category 2 in NR RRC\_IDLE state }

**ensure** **that** {

**when** { UE attempts emergency call }

**then** { UE does not consider the access attempt as barred and initiates the emergency call }

}

11.3.2.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in TS 24.501: clause 4.5.2, 4.5.4.1 and 4.5.6 and TS 38.331: clause 5.3.14.1, 5.3.14.2, 5.3.14.4 and 5.3.14.5. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 4.5.2]

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

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

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

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

Table 4.5.2.1: Access identities

|  |  |
| --- | --- |
| Access Identity number | UE configuration |
| 0 | UE is not configured with any parameters from this table |
| 1 (NOTE 1) | UE is configured for multimedia priority service (MPS). |
| 2 (NOTE 2) | UE is configured for mission critical service (MCS). |
| 3-10 | Reserved for future use |
| 11 (NOTE 3) | Access Class 11 is configured in the UE. |
| 12 (NOTE 3) | Access Class 12 is configured in the UE. |
| 13 (NOTE 3) | Access Class 13 is configured in the UE. |
| 14 (NOTE 3) | Access Class 14 is configured in the UE. |
| 15 (NOTE 3) | Access Class 15 is configured in the UE. |
| NOTE 1: Access identity 1 is valid when: - the USIM file EFUAC\_AIC indicates the UE is configured for access identity 1 and the RPLMN is the HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present), or a visited PLMN of the home country (see the definition of home country in 3GPP TS 24.301 [15]); or - the UE receives the 5GS network feature support IE with the MPS indicator bit set to "Access identity 1 valid in RPLMN or equivalent PLMN" from the RPLMN as described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4.  NOTE 2: Access identity 2 is used by UEs configured for MCS and is valid when: - the USIM file EFUAC\_AIC indicates the UE is configured for access identity 2 and the RPLMN is the HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present), or a visited PLMN of the home country (see 3GPP TS 23.122 [5]); or - the UE receives the 5GS network feature support IE with the MCS indicator bit set to "Access identity 2 valid in RPLMN or equivalent PLMN" from the RPLMN as described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4.  NOTE 3: Access identities 11 and 15 are valid in HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present). Access Identities 12, 13 and 14 are valid in HPLMN and visited PLMNs of home country only (see the definition of home country in 3GPP TS 24.301 [15]). | |

The UE uses the MPS indicator bit of the 5GS network feature support IE to determine if access identity 1 is valid. Processing of the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message is described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4. The UE shall not consider access identity 1 to be valid when the UE is not in the country of its HPLMN prior to receiving the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message being set to "Access identity 1 valid in RPLMN or equivalent PLMN".

When the UE is in the country of its HPLMN, the contents of the USIM files EFUAC\_AIC and EFACC as specified in 3GPP TS 31.102 [22] and the rules specified in table 4.5.2.1 are used to determine the applicability of access identity 1 and access classes 11 - 15. When the UE is in the country of its HPLMN, and the USIM file EFUAC\_AIC does not indicate the UE is configured for access identity 1, the UE uses the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message to determine if access identity 1 is valid. When the UE is in the country of its HPLMN, and the USIM file EFUAC\_AIC indicates the UE is configured for access identity 1, the MPS indicator bit of the 5GS network feature support IE is not applicable. When the UE is not in the country of its HPLMN, the contents of the USIM files EFUAC\_AIC and EFACC are not applicable.

The UE uses the MCS indicator bit of the 5GS network feature support IE to determine if access identity 2 is valid. Processing of the MCS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message is described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4. The UE shall not consider access identity 2 to be valid when the UE is not in the country of its HPLMN prior to receiving the MCS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message being set to "Access identity 2 valid in RPLMN or equivalent PLMN".

When the UE is in the country of its HPLMN, the contents of the USIM files EFUAC\_AIC and EFACC as specified in 3GPP TS 31.102 [22] and the rules specified in table 4.5.2.1 are used to determine the applicability of access identity 2 and access classes 11 - 15. When the UE is in the country of its HPLMN, and the USIM file EFUAC\_AIC does not indicate the UE is configured for access identity 2, the UE uses the MCS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message to determine if access identity 2 is valid. When the UE is in the country of its HPLMN, and the USIM file EFUAC\_AIC indicates the UE is configured for access identity 2, the MCS indicator bit of the 5GS network feature support IE is not applicable. When the UE is not in the country of its HPLMN, the contents of the USIM files EFUAC\_AIC and EFACC are not applicable.

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

NOTE: The case when an access attempt matches more than one rule includes the case when multiple events trigger an access attempt at the same time.

Table 4.5.2.2: Mapping table for access categories

|  |  |  |  |
| --- | --- | --- | --- |
| Rule # | Type of access attempt | Requirements to be met | Access Category |
| 1 | Response to paging or NOTIFICATION over non-3GPP access;  5GMM connection management procedure initiated for the purpose of transporting an LPP message | Access attempt is for MT access | 0 (= MT\_acc) |
| 2 | Emergency | UE is attempting access for an emergency session (NOTE 1, NOTE 2) | 2 (= emergency) |
| 3 | Access attempt for operator-defined access category | UE stores operator-defined access category definitions valid in the current PLMN as specified in subclause 4.5.3, and access attempt is matching criteria of an operator-defined access category definition | 32-63  (= based on operator classification) |
| 4 | Access attempt for delay tolerant service | (a) UE is configured for NAS signalling low priority or UE supporting S1 mode is configured for EAB (see the "ExtendedAccessBarring" leaf of NAS configuration MO in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22]) where "EAB override" does not apply, and  (b). the UE received one of the categories a, b or c as part of the parameters for unified access control in the broadcast system information, and the UE is a member of the broadcasted category in the selected PLMN or RPLMN/equivalent PLMN  (NOTE 3, NOTE 5, NOTE 6, NOTE 7, NOTE 8) | 1 (= delay tolerant) |
| 5 | MO MMTel voice call | Access attempt is for MO MMTel voice call  or for NAS signalling connection recovery during ongoing MO MMTel voice call (NOTE 2) | 4 (= MO MMTel voice) |
| 6 | MO MMTel video call | Access attempt is for MO MMTel video call  or for NAS signalling connection recovery during ongoing MO MMTel video call (NOTE 2) | 5 (= MO MMTel video) |
| 7 | MO SMS over NAS or MO SMSoIP | Access attempt is for MO SMS over NAS (NOTE 4) or MO SMS over SMSoIP transfer  or for NAS signalling connection recovery during ongoing MO SMS or SMSoIP transfer (NOTE 2) | 6 (= MO SMS and SMSoIP) |
| 8 | UE NAS initiated 5GMM specific procedures | Access attempt is for MO signalling | 3 (= MO\_sig) |
| 9 | UE NAS initiated 5GMM connection management procedure or 5GMM NAS transport procedure | Access attempt is for MO data | 7 (= MO\_data) |
| 10 | An uplink user data packet is to be sent for a PDU session with suspended user-plane resources | No further requirement is to be met | 7 (= MO\_data) |
| NOTE 1: This includes 5GMM specific procedures while the service is ongoing and 5GMM connection management procedures required to establish a PDU session with request type = "initial emergency request" or "existing emergency PDU session", or to re-establish user-plane resources for such a PDU session. This further includes the service request procedure initiated with a SERVICE REQUEST message with the Service type IE set to "emergency services fallback".<  NOTE 2: Access for the purpose of NAS signalling connection recovery during an ongoing service, or for the purpose of NAS signalling connection establishment following fallback indication from lower layers during an ongoing service, is mapped to the access category of the ongoing service in order to derive an RRC establishment cause, but barring checks will be skipped for this access attempt.  NOTE 3: If the UE selects a new PLMN, then the selected PLMN is used to check the membership; otherwise the UE uses the RLPMN or a PLMN equivalent to the RPLMN.  NOTE 4: This includes the 5GMM connection management procedures triggered by the UE-initiated NAS transport procedure for transporting the MO SMS.  NOTE 5: The UE configured for NAS signalling low priority is not supported in this release of specification. If a UE supporting both S1 mode and N1 mode is configured for NAS signalling low priority in S1 mode as specified in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22], the UE shall ignore the configuration for NAS signalling low priority when in N1 mode.  NOTE 6: If the access category applicable for the access attempt is 1, then the UE shall additionally determine a second access category from the range 3 to 7. If more than one access category matches, the access category of the lowest rule number shall be chosen. The UE shall use the second access category only to derive an RRC establishment cause for the access attempt.  NOTE 7: "EAB override" does not apply, if the UE is not configured to allow overriding EAB (see the "Override\_ExtendedAccessBarring" leaf of NAS configuration MO in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22]), or if NAS has not received an indication from the upper layers to override EAB and the UE does not have a PDU session that was established with EAB override.  NOTE 8: For the definition of categories a, b and c associated with access category 1, see 3GPP TS 22.261 [3]. The categories associated with access category 1 are distinct from the categories a, b and c associated with EAB (see 3GPP TS 22.011 [1A]). | | | |

[TS 24.501, clause 4.5.4.1]

When the UE is in 5GMM-IDLE mode, upon receiving a request from the upper layers for an access attempt, the NAS shall categorize the access attempt into access identities and an access category following subclause 4.5.2, table 4.5.2.1 and table 4.5.2.2, and subclause 4.5.3, and provide the applicable access identities and the access category to the lower layers for the purpose of access control checking. In this request to the lower layer the NAS can also provide to the lower layer the RRC establishment cause determined as specified in subclause 4.5.6 of this specification.

NOTE 1: The access barring check is performed by the lower layers.

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

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

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

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

If the lower layers indicate that the access attempt is barred, the NAS shall not initiate the procedure to send the initial NAS message for the access attempt. Additionally:

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

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

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

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

b) if the event which triggered the access attempt was an MO-SMSoIP-attempt-started indication:

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

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

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

NOTE 4: Barring timers, on a per access category basis, are run by the lower layers. At expiry of barring timers, the indication of alleviation of access barring is indicated to the NAS on a per access category basis.

[TS 24.501, clause 4.5.6]

When 5GMM requests the establishment of a NAS-signalling connection, the RRC establishment cause used by the UE shall be selected according to one or more access identities (see subclause 4.5.2) and the determined access category as specified in table 4.5.6.1 and table 4.5.6.2. If the determined access category is an operator-defined access category, then the RRC establishment cause used by the UE shall be selected according to table 4.5.6.1 and table 4.5.6.2 based on one or more access identities (see subclause 4.5.2) and the standardized access category determined for the operator-defined access category as described in subclause 4.5.3.

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

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

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

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

[TS 38.331, clause 5.3.14.1]

The purpose of this procedure is to perform access barring check for an access attempt associated with a given Access Category and one or more Access Identities upon request from upper layers according to TS 24.501 [23] or the RRC layer.

After a handover resulting in change of PCell in RRC\_CONNECTED the UE shall defer access barring checks until it has obtained valid UAC information (from *SIB1*) from the target cell.

[TS 38.331, clause 5.3.14.2]

Upon initiation of the procedure, the UE shall:

1> if timer T390 is running for the Access Category:

2> consider the access attempt as barred;

1> else if timer T302 is running and the Access Category is neither '2' nor '0':

2> consider the access attempt as barred;

1> else:

2> if the Access Category is '0':

3> consider the access attempt as allowed;

2> else:

3> if *SIB1* includes *uac-BarringPerPLMN-List* and the *uac-BarringPerPLMN-List* contains an *UAC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to the PLMN selected by upper layers (see TS 24.501 [23]):

4> select the *UAC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to the PLMN selected by upper layers;

4> in the remainder of this procedure, use the selected *UAC-BarringPerPLMN* entry (i.e. presence or absence of access barring parameters in this entry) irrespective of the *uac-BarringForCommon* included in *SIB1*;

3> else if SIB1 includes *uac-BarringForCommon*:

4> in the remainder of this procedure use the *uac-BarringForCommon* (i.e. presence or absence of these parameters) included in *SIB1*;

3> else:

4> consider the access attempt as allowed;

…

1> if the access barring check was requested by upper layers:

2> if the access attempt is considered as barred:

3> if timer T302 is running:

4> inform the upper layer that access barring is applicable for all access categories except categories '0' and '2', upon which the procedure ends;

3> else:

4> inform upper layers that the access attempt for the Access Category is barred, upon which the procedure ends;

2> else:

3> inform upper layers that the access attempt for the Access Category is allowed, upon which the procedure ends;

1> else:

2> the procedure ends.

[TS 38.331, clause 5.3.14.4]

The UE shall:

1> if timer T302 expires or is stopped, and if timer T390 corresponding to an Access Category is not running; or

1> if timer T390 corresponding to an Access Category other than '2' expires or is stopped, and if timer T302 is not running; or

1> if timer T390 corresponding to the Access Category '2' expires or is stopped:

2> consider the barring for this Access Category to be alleviated;

1> when barring for an Access Category is considered being alleviated:

2> if the Access Category was informed to upper layers as barred:

3> inform upper layers about barring alleviation for the Access Category.

2> if barring is alleviated for Access Category '8':

3> perform actions specified in 5.3.13.8;

[TS 38.331, clause 5.3.14.5]

The UE shall:

1> if one or more Access Identities are indicated according to TS 24.501 [23], and

1> if for at least one of these Access Identities the corresponding bit in the *uac-BarringForAccessIdentity* contained in "UAC barring parameter" is set to *zero*:

2> consider the access attempt as allowed;

1> else:

2> draw a random number '*rand*' uniformly distributed in the range: 0 ≤ *rand* < 1;

2> if '*rand*' is lower than the value indicated by *uac-BarringFactor* included in "UAC barring parameter":

3> consider the access attempt as allowed;

2> else:

3> consider the access attempt as barred;

1> if the access attempt is considered as barred:

2> draw a random number '*rand*' that is uniformly distributed in the range 0 ≤ *rand* < 1;

2> start timer T390 for the Access Category with the timer value calculated as follows, using the *uac-BarringTime* included in"AC barring parameter":

T390 = (0.7+ 0.6 \* *rand*) \* *uac-BarringTime.*

11.3.2.3 Test description

11.3.2.3.1 Pre-test conditions

System Simulator:

- NR Cell 1.

- System information combination NR-1 as defined in TS 38.508-1 [4] Table 4.4.3.1.2-1 is used in NR cell 1 with SIB 1 modified as per Table 11.3.2.3.3-1.

UE:

- None.

Preamble:

- The UE is brought to state 1N-A, RRC\_IDLE Connectivity (NR), in accordance with the procedure described in TS 38.508-1 [4], Table 4.5.2.2-2.

11.3.2.3.2 Test procedure sequence

Table 11.3.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Make the UE attempt an emergency call dialling a number which is stored on the ME (e.g. 112 or 911). (Note 1) | - | - | - | - |
| 2 | Check: Does the UE transmit an *RRCSetupRequest* message with *establishmentCause* set to 'emergency’ within 30 s'? | --> | NR RRC: RRCSetupRequest | 2 | F |
| 2A1 | IF pc\_SwitchOnOff THEN switch off UE, ELSE IF pc\_USIM\_Removal THEN remove the USIM, ELSE power off UE in which case steps 2A2 to 2A4 are not performed. | - | - | - | - |
| 2A2 | SS starts timer T\_Delay=15 sec. | - | - | - | - |
| - | EXCEPTION: Steps 2A3a1-2A3b1 describes optional behaviour that depends on the UE implementation; the "lower case letter" identifies a step sequence that take place if a particular implementation is under test. | - | - | - | - |
| 2A3a1 | Steps 1a2-1a4 of the Switch off procedure in RRC\_IDLE in table 4.9.6.1-1 in TS 38.508-1 [4] are performed. | - | - | - | - |
| 2A3a2 | Stop timer T\_Delay. | - | - | - | - |
| 2A3a3 | The SS transmits an *RRCRelease* message. | <-- | NR RRC: RRCRelease | - | - |
| 2A3b1 | Timer T\_Delay expires. | - | - | - | - |
| 2A4 | Void | - | - | - | - |
| 2A5 | Switch on the UE. | - | - | - | - |
| 2A6 | The UE performs Registration procedure as specified in TS 38.508-1 [4] subclause 4.5.2. | - | - | - | - |
| 3 | SS changes *SIB1* according to Table 11.3.2.3.3-2 and sends Short Message on PDCCH using P-RNTI. Wait for 2.1\* modification period to allow the new system information to take effect and T390 expire. (Note 1) | <-- | PDCCH (DCI 1\_0): Short Message | - | - |
| 4 | The SS transmits a *Paging* message including a matched ng-5G-S-TMSI. | <-- | NR RRC: *Paging* | - | - |
| 5 | Check: Does the UE transmit an *RRCSetupRequest* message with *establishmentCause* set to 'mt-access’? | --> | NR RRC: RRCSetupRequest | 1 | P |
| 6-12 | Steps 3 to 9a1 of the generic test procedure in TS 38.508-1 [4] Table 4.9.4.2.2-1 are performed on NR Cell 1. | - | - | - | - |
| 13 | SS changes *SIB1* according to 38.508-1 [4] Table 4.6.1-28 and sends Short Message on PDCCH using P-RNTI. Wait for 2.1\* modification period to allow the new system information to take effect. | <-- | PDCCH (DCI 1\_0): Short Message | - | - |
| 14-15 | Steps 1-2 of the NR RRC\_CONNECTED procedure in table 4.5.4.2-3 in TS 38.508-1 [4] are performed. | - | - | - | - |
| 16 | The SS responds with *RRCReject* message with IE *waitTime* set to 16s(T302). | <-- | NR RRC: RRCReject | - | - |
| 17 | Make the UE attempt an emergency call dialling a number which is stored on the ME (e.g. 112 or 911), before the T302 timer expires. | - | - | - | - |
| 18 | Check: Does the UE transmit an *RRCSetupRequest* message with *establishmentCause* set to 'emergency’ (Note 2)? | --> | NR RRC: RRCSetupRequest | 3 | P |
| 19 | Void | - | - | - | - |
| 20 | Void | - | - | - | - |
| - | EXCEPTION: Steps 21a1 – 21b6 describe the UE behaviour that depends on UE capability; the “lower case letter” identifies a step sequence that takes place if a capability is supported | - | - | - | - |
| 21a1-21a12 | IF pc\_NR\_5GC\_EmergencyServices THEN Step 2-13 for IMS Emergency call establishment are performed as specified in TS 38.508-1 [4], subclause 4.9.11 on NR Cell 1. | - | - | - | - |
| 21a13 | Make the UE release the emergency call. (NOTE 3) | - | - | - | - |
| 21a14 | Test procedure for IMS MO Emergency call release is performed as specified in TS 38.508-1 [4], subclause 4.9.12A on NR Cell 1. | - | - | - | - |
| 21b1 – 21b4 | ELSE Step 2- 5 for IMS Emergency call establishment are performed as specified in TS 38.508-1 [4], subclause 4.9.11 on NR Cell 1. | - | - | - | - |
| 21b5 | IF pc\_SwitchOnOff THEN switch off UE, IF pc\_USIM\_Removal THEN remove the USIM. | - | - | - | - |
| 21b6 | SS starts timer1 = 15 sec to see if UE performs optional Step 21b6a1 | - | - | - | - |
| - | EXCEPTION: Steps 21b6a1-21b6b1 describes optional behaviour that depends on the UE implementation; the "lower case letter" identifies a step sequence that take place if a particular implementation is under test. | - | - | - | - |
| 21b6a1 | The UE transmits a DEREGISTRATION REQUEST message. | --> | NR RRC: ULInformationTransfer  5GMM: DEREGISTRATION REQUEST | - | - |
| 21b6a2 | The SS transmits an *RRCRelease* message. | <-- | NR RRC: RRCRelease |  |  |
| 21b6b1 | ELSE power off UE. | - | - | - | - |
| Note 1: T390 is a random value between (0.7 + 0.6 \* 0) \* uac-BarringTime(4s) = 2.8s and (0.7 + 0.6 \* 1) \* uac-BarringTime(4s) = 5.2s, which will start after UE attempts an emergency call.  Note2: The emergency call dialling and UE *RRCsetupRequest* message should be initiated before T302 timer expires.  Note 3: This could be done by e.g. MMI or AT command. | | | | | |

11.3.2.3.3 Specific message contents

Table 11.3.2.3.3-1: *SIB1* for NR Cell 1 (Preamble, table 11.3.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-28 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| uac-BarringInfo SEQUENCE { |  |  |  |
| uac-BarringForCommon SEQUENCE (SIZE (1..maxAccessCat-1)) OF UAC-BarringPerCat { | 1 entry |  |  |
| UAC-BarringPerCat[1] SEQUENCE { |  | entry 1 |  |
| accessCategory | 2 |  |  |
| uac-barringInfoSetIndex | 1 |  |  |
| } |  |  |  |
| } |  |  |  |
| uac-BarringPerPLMN-List | Not present |  |  |
| uac-BarringInfoSetList SEQUENCE (SIZE(1..maxBarringInfoSet)) OF UAC-BarringInfoSet { | 1 entry |  |  |
| UAC-BarringInfoSet[1] SEQUENCE { |  | entry 1 |  |
| uac-BarringFactor | p00 |  |  |
| uac-BarringTime | s4 |  |  |
| uac-BarringForAccessIdentity | '0000000'B |  |  |
| } |  |  |  |
| } |  |  |  |
| uac-AccessCategory1-SelectionAssistanceInfo | Not Present |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.3.2.3.3-2: *SIB1* for NR Cell 1 (Step3, Table 11.3.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-28 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| uac-BarringInfo SEQUENCE { |  |  |  |
| uac-BarringForCommon SEQUENCE (SIZE (1..maxAccessCat-1)) OF UAC-BarringPerCat { | 8 entries |  |  |
| UAC-BarringPerCat[1] SEQUENCE { |  | entry 1 |  |
| UAC-BarringPerCat[2] SEQUENCE { |  | entry 2 |  |
| accessCategory | 1 | (= delay tolerant) |  |
| uac-barringInfoSetIndex | 1 |  |  |
| } |  |  |  |
| UAC-BarringPerCat[3] SEQUENCE { |  | entry 3 |  |
| accessCategory | 2 | (= emergency) |  |
| uac-barringInfoSetIndex | 1 |  |  |
| } |  |  |  |
| UAC-BarringPerCat[4] SEQUENCE { |  | entry 4 |  |
| accessCategory | 3 | (= MO\_sig) |  |
| uac-barringInfoSetIndex | 1 |  |  |
| } |  |  |  |
| UAC-BarringPerCat[5] SEQUENCE { |  | entry 5 |  |
| accessCategory | 4 | (= MO MMTel voice) |  |
| uac-barringInfoSetIndex | 1 |  |  |
| } |  |  |  |
| UAC-BarringPerCat[6] SEQUENCE { |  | entry 6 |  |
| accessCategory | 5 | (= MO MMTel video) |  |
| uac-barringInfoSetIndex | 1 |  |  |
| } |  |  |  |
| UAC-BarringPerCat[7] SEQUENCE { |  | entry 7 |  |
| accessCategory | 6 | (= MO SMS and SMSoIP) |  |
| uac-barringInfoSetIndex | 1 |  |  |
| } |  |  |  |
| UAC-BarringPerCat[8] SEQUENCE { |  | entry 8 |  |
| accessCategory | 7 | (= MO\_data) |  |
| uac-barringInfoSetIndex | 1 |  |  |
| } |  |  |  |
| } |  |  |  |
| uac-BarringPerPLMN-List | Not present |  |  |
| uac-BarringInfoSetList ::= SEQUENCE (SIZE(1..maxBarringInfoSet)) OF UAC-BarringInfoSet { | 1 entry |  |  |
| UAC-BarringInfoSet[1] SEQUENCE { |  | entry 1 |  |
| uac-BarringFactor | p00 |  |  |
| uac-BarringTime | s4 |  |  |
| uac-BarringForAccessIdentity | '0000000'B |  |  |
| } |  |  |  |
| } |  |  |  |
| uac-AccessCategory1-SelectionAssistanceInfo | Not Present |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.3.2.3.3-3: *RRCReject* (step 16, table 11.3.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.6.1-15 | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCReject ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcReject SEQUENCE { |  |  |  |
| waitTime | 16 | 16 seconds |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.3.2.3.3-4:SERVICE REQUEST (step 21b2, Table 11.3.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: Table 4.7.1-16. | | | |
| Information Element | Value/remark | Comment | Condition |
| Service type | ‘0100’B | emergency services fallback |  |

### 11.3.3 UAC / Access Identity 0 / AC8 / RRC\_INACTIVE / RNA update / RRC resume

11.3.3.1 Test Purpose (TP)

(1)

**with** { UE not configured for special AIs (1,2,11-15) having received SIB1 indicating UAC info containing 0% accessibility for Access category 8 in NR RRC\_INACTIVE state }

**ensure that** {

**when** { RRC connection is to be resumed due to an RNA update with no emergency services ongoing }

**then** { UE resume attempt is barred and UE does not attempt the connection }

}

(2)

**with** { SIB1 indicating UAC info containing 100% accessibility for Access category 8 in NR RRC\_INACTIVE state }

**ensure that** {

**when** { Access Barring is alleviated for Access Category 8 & upper layers do not request resumption of an RRC connection & variable pendingRnaUpdate is set to true }

**then** { UE initiates RRC connection resume procedure with resumeCause value set to rna-Update }

}

11.3.3.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 38.331, clause 5.3.13.2, 5.3.13.8, 5.3.14.2, 5.3.14.4 and 5.3.14.5. Unless otherwise stated these are Rel-15 requirements.

[TS 38.331, clause 5.3.13.2]

The UE initiates the procedure when upper layers or AS (when responding to RAN paging or upon triggering RNA updates while the UE is in RRC\_INACTIVE) requests the resume of a suspended RRC connection.

The UE shall ensure having valid and up to date essential system information as specified in clause 5.2.2.2 before initiating this procedure.

Upon initiation of the procedure, the UE shall:

…

1> else if the resumption of the RRC connection is triggered due to an RNA update as specified in 5.3.13.8:

2> if an emergency service is ongoing:

NOTE: How the RRC layer in the UE is aware of an ongoing emergency service is up to UE implementation.

3> select '2' as the Access Category;

3> set the resumeCause to emergency;

2> else:

3> select '8' as the Access Category;

2> perform the unified access control procedure as specified in 5.3.14 using the selected Access Category and one or more Access Identities to be applied as specified in TS 24.501 [23];

3> if the access attempt is barred:

4> set the variable *pendingRnaUpdate* to *true*;

4> the procedure ends;

[TS 38.331, clause 5.3.13.8]

In RRC\_INACTIVE state, the UE shall:

1> if T380 expires; or

1> if RNA Update is triggered at reception of SIB1, as specified in 5.2.2.4.2:

2> initiate RRC connection resume procedure in 5.3.13.2 with *resumeCause* set to *rna-Update*;

1> if barring is alleviated for Access Category '8', as specified in 5.3.14.4:

2> if upper layers do not request RRC the resumption of an RRC connection, and

2> if the variable *pendingRnaUpdate* is set to *true*:

3> initiate RRC connection resume procedure in 5.3.13.2 with *resumeCause* value set to *rna-Update*.

[TS 38.331, clause 5.3.14.2]

Upon initiation of the procedure, the UE shall:

1> if timer T390 is running for the Access Category:

2> consider the access attempt as barred;

1> else if timer T302 is running and the Access Category is neither '2' nor '0':

2> consider the access attempt as barred;

1> else:

2> if the Access Category is '0':

3> consider the access attempt as allowed;

2> else:

…

3> else if SIB1 includes *uac-BarringForCommon*:

4> in the remainder of this procedure use the *uac-BarringForCommon* (i.e. presence or absence of these parameters) included in *SIB1*;

3> else:

4> consider the access attempt as allowed;

3> if uac-BarringForCommon is applicable or the uac-ACBarringListType indicates that uac-ExplicitACBarringList is used:

4> if the corresponding *UAC-BarringPerCatList* contains a *UAC-BarringPerCat* entry corresponding to the Access Category:

5> select the *UAC-BarringPerCat* entry;

5> if the uac-BarringInfoSetList contains a UAC-BarringInfoSet entry corresponding to the selected uac-barringInfoSetIndex in the UAC-BarringPerCat:

6> select the *UAC-BarringInfoSet* entry;

6> perform access barring check for the Access Category as specified in 5.3.14.5, using the selected *UAC-BarringInfoSet* as "UAC barring parameter";

5> else:

6> consider the access attempt as allowed;

4> else:

5> consider the access attempt as allowed;

[TS 38.331, clause 5.3.14.4]

The UE shall:

…

1> else if timer T390 corresponding to an Access Category other than '2' expires or is stopped, and if timer T302 is not running:

2> consider the barring for this Access Category to be alleviated;

…

1> when barring for an Access Category is considered being alleviated:

2> if the Access Category was informed to upper layers as barred:

3> inform upper layers about barring alleviation for the Access Category.

2> if barring is alleviated for Access Category '8':

3> perform actions specified in 5.3.13.8;

[TS 38.331, clause 5.3.14.5]

The UE shall:

1> if one or more Access Identities are indicated according to TS 24.501 [23], and

1> if for at least one of these Access Identities the corresponding bit in the *uac-BarringForAccessIdentity* contained in "UAC barring parameter" is set to *zero*:

2> consider the access attempt as allowed;

1> else:

2> draw a random number '*rand*' uniformly distributed in the range: 0 ≤ *rand* < 1;

2> if '*rand*' is lower than the value indicated by *uac-BarringFactor* included in "UAC barring parameter":

3> consider the access attempt as allowed;

2> else:

3> consider the access attempt as barred;

1> if the access attempt is considered as barred:

2> draw a random number '*rand*' that is uniformly distributed in the range 0 ≤ *rand* < 1;

2> start timer T390 for the Access Category with the timer value calculated as follows, using the *uac-BarringTime* included in"AC barring parameter":

T390 = (0.7+ 0.6 \* *rand*) \* *uac-BarringTime.*

11.3.3.3 Test description

11.3.3.3.1 Pre-test conditions

System Simulator:

- NR Cell 1

- System information combination NR-1 as defined in TS 38.508-1 [4] clause 4.4.3.1.2 is used in NR cells.

UE:

- None.

Preamble:

- The UE is in state 2N-A on NR cell 1 according to TS 38.508-1 [4] Table 4.4A.2-2.

11.3.3.3.2 Test procedure sequence

Table 11.3.3.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Wait for 5 minute to make the timer T380 expire and trigger the RNA update procedure in UE. |  |  |  |  |
| 2 | Check: Does the UE transmit an *RRCResumeRequest* message with resumeCause value set to rna-Update on NR Cell 1 within 60s? | --> | NR RRC: RRCResumeRequest | 1 | F |
| 3 | The SS changes the SIB1 according to 38.508-1 [4] Table 4.6.1-28 and transmits a Short message on PDCCH using P-RNTI indicating a systemInfoModification. | <-- | PDCCH (DCI 1\_0): Short Message | - | - |
| 4 | Check: Does the UE transmit an *RRCResumeRequest* message with resumeCause value set to rna-Update on NR Cell 1? | --> | NR RRC: RRCResumeRequest | 2 | P |
| 5 | The SS transmits an *RRCResume* message. | <-- | NR RRC: RRCResume | - | - |
| 6 | The UE transmits an *RRCResumeComplete* message. | --> | NR RRC: RRCResumeComplete | - | - |

11.3.3.3.3 Specific message contents

Table 11.3.3.3.3-1: *SIB1* for NR Cell 1 (preamble, Table 11.3.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-28 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| uac-BarringInfo SEQUENCE { |  |  |  |
| uac-BarringForCommon SEQUENCE (SIZE (1..maxAccessCat-1)) OF UAC-BarringPerCat { | 1 entry |  |  |
| UAC-BarringPerCat[1] SEQUENCE { |  | entry 1 |  |
| accessCategory | 8 |  |  |
| uac-barringInfoSetIndex | 1 |  |  |
| } |  |  |  |
| } |  |  |  |
| uac-BarringPerPLMN-List | Not present |  |  |
| uac-BarringInfoSetList SEQUENCE (SIZE(1..maxBarringInfoSet)) OF UAC-BarringInfoSet { | 1 entry |  |  |
| UAC-BarringInfoSet[1] SEQUENCE { |  | entry 1 |  |
| uac-BarringFactor | p00 |  |  |
| uac-BarringTime | s64 |  |  |
| uac-BarringForAccessIdentity | '0000000'B |  |  |
| } |  |  |  |
| } |  |  |  |
| uac-AccessCategory1-SelectionAssistanceInfo | Not Present |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.3.3.3.3-2: *RRCRelease* (preamble, Table 11.3.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-16 | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCRelease ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcRelease SEQUENCE { |  |  |  |
| suspendConfig SEQUENCE { |  |  | NR\_RRC\_INACTIVE |
| t380 | min5 | 5 minutes |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.3.3.3.3-3: *RRCResumeRequest* (step 2 and step 5, Table 11.3.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-19 | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCResumeRequest ::= SEQUENCE { |  |  |  |
| rrcResumeRequest SEQUENCE { |  |  |  |
| resumeCause | rna-Update |  |  |
| } |  |  |  |
| } |  |  |  |

### 11.3.4 UAC / Access Identity 0 / Registration procedure for mobility and periodic registration update / Barring per PLMN / Implicit AC barring list

11.3.4.1 Test Purpose (TP)

(1)

**with** { UE in NR RRC\_IDLE not configured for special AIs (1,2,11-15) having received a SIB1 message including UAC set to 0% accessibility for Access Category 3 }

**ensure that** {

**when** { UE finds a new cell (AC 3) with SIB1 containing UAC Barring Info Per PLMN with Implicit AC Barring List }

**then** { UE does not access the new cell until access barring is alleviated }

}

11.3.4.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501 clause 4.5.2, 4.5.2A, 4.5.4.1 and 5.5.1.3.7, TS 38.331 clause 5.3.14.2, 5.3.14.4 and 5.3.14.5. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 4.5.2]

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

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

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

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

Table 4.5.2.1: Access identities

|  |  |
| --- | --- |
| Access Identity number | UE configuration |
| 0 | UE is not configured with any parameters from this table |
| 1 (NOTE 1) | UE is configured for multimedia priority service (MPS). |
| 2 (NOTE 2) | UE is configured for mission critical service (MCS). |
| 3-10 | Reserved for future use |
| 11 (NOTE 3) | Access Class 11 is configured in the UE. |
| 12 (NOTE 3) | Access Class 12 is configured in the UE. |
| 13 (NOTE 3) | Access Class 13 is configured in the UE. |
| 14 (NOTE 3) | Access Class 14 is configured in the UE. |
| 15 (NOTE 3) | Access Class 15 is configured in the UE. |
| NOTE 1: Access identity 1 is valid when: - the USIM file EFUAC\_AIC indicates the UE is configured for access identity 1 and the RPLMN is the HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present), or a visited PLMN of the home country (see the definition of home country in 3GPP TS 24.301 [15]); or - the UE receives the 5GS network feature support IE with the MPS indicator bit set to "Access identity 1 valid in RPLMN or equivalent PLMN" from the RPLMN as described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4.  NOTE 2: Access identity 2 is used by UEs configured for MCS and is valid when: - the USIM file EFUAC\_AIC indicates the UE is configured for access identity 2 and the RPLMN is the HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present), or a visited PLMN of the home country (see 3GPP TS 23.122 [5]); or - the UE receives the 5GS network feature support IE with the MCS indicator bit set to "Access identity 2 valid in RPLMN or equivalent PLMN" from the RPLMN as described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4.  NOTE 3: Access identities 11 and 15 are valid in HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present). Access Identities 12, 13 and 14 are valid in HPLMN and visited PLMNs of home country only (see the definition of home country in 3GPP TS 24.301 [15]). | |

…

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

NOTE: The case when an access attempt matches more than one rule includes the case when multiple events trigger an access attempt at the same time.

Table 4.5.2.2: Mapping table for access categories

|  |  |  |  |
| --- | --- | --- | --- |
| Rule # | Type of access attempt | Requirements to be met | Access Category |
| 1 | Response to paging or NOTIFICATION over non-3GPP access;  5GMM connection management procedure initiated for the purpose of transporting an LPP message | Access attempt is for MT access | 0 (= MT\_acc) |
| 2 | Emergency | UE is attempting access for an emergency session (NOTE 1, NOTE 2) | 2 (= emergency) |
| 3 | Access attempt for operator-defined access category | UE stores operator-defined access category definitions valid in the current PLMN as specified in subclause 4.5.3, and access attempt is matching criteria of an operator-defined access category definition | 32-63  (= based on operator classification) |
| 4 | Access attempt for delay tolerant service | (a) UE is configured for NAS signalling low priority or UE supporting S1 mode is configured for EAB (see the "ExtendedAccessBarring" leaf of NAS configuration MO in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22]) where "EAB override" does not apply, and  (b). the UE received one of the categories a, b or c as part of the parameters for unified access control in the broadcast system information, and the UE is a member of the broadcasted category in the selected PLMN or RPLMN/equivalent PLMN  (NOTE 3, NOTE 5, NOTE 6, NOTE 7, NOTE 8) | 1 (= delay tolerant) |
| 5 | MO MMTel voice call | Access attempt is for MO MMTel voice call  or for NAS signalling connection recovery during ongoing MO MMTel voice call (NOTE 2) | 4 (= MO MMTel voice) |
| 6 | MO MMTel video call | Access attempt is for MO MMTel video call  or for NAS signalling connection recovery during ongoing MO MMTel video call (NOTE 2) | 5 (= MO MMTel video) |
| 7 | MO SMS over NAS or MO SMSoIP | Access attempt is for MO SMS over NAS (NOTE 4) or MO SMS over SMSoIP transfer  or for NAS signalling connection recovery during ongoing MO SMS or SMSoIP transfer (NOTE 2) | 6 (= MO SMS and SMSoIP) |
| 8 | UE NAS initiated 5GMM specific procedures | Access attempt is for MO signalling | 3 (= MO\_sig) |
| 9 | UE NAS initiated 5GMM connection management procedure or 5GMM NAS transport procedure | Access attempt is for MO data | 7 (= MO\_data) |
| 10 | An uplink user data packet is to be sent for a PDU session with suspended user-plane resources | No further requirement is to be met | 7 (= MO\_data) |
| NOTE 1: This includes 5GMM specific procedures while the service is ongoing and 5GMM connection management procedures required to establish a PDU session with request type = "initial emergency request" or "existing emergency PDU session", or to re-establish user-plane resources for such a PDU session. This further includes the service request procedure initiated with a SERVICE REQUEST message with the Service type IE set to "emergency services fallback".<  NOTE 2: Access for the purpose of NAS signalling connection recovery during an ongoing service, or for the purpose of NAS signalling connection establishment following fallback indication from lower layers during an ongoing service, is mapped to the access category of the ongoing service in order to derive an RRC establishment cause, but barring checks will be skipped for this access attempt.  NOTE 3: If the UE selects a new PLMN, then the selected PLMN is used to check the membership; otherwise the UE uses the RLPMN or a PLMN equivalent to the RPLMN.  NOTE 4: This includes the 5GMM connection management procedures triggered by the UE-initiated NAS transport procedure for transporting the MO SMS.  NOTE 5: The UE configured for NAS signalling low priority is not supported in this release of specification. If a UE supporting both S1 mode and N1 mode is configured for NAS signalling low priority in S1 mode as specified in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22], the UE shall ignore the configuration for NAS signalling low priority when in N1 mode.  NOTE 6: If the access category applicable for the access attempt is 1, then the UE shall additionally determine a second access category from the range 3 to 7. If more than one access category matches, the access category of the lowest rule number shall be chosen. The UE shall use the second access category only to derive an RRC establishment cause for the access attempt.  NOTE 7: "EAB override" does not apply, if the UE is not configured to allow overriding EAB (see the "Override\_ExtendedAccessBarring" leaf of NAS configuration MO in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22]), or if NAS has not received an indication from the upper layers to override EAB and the UE does not have a PDU session that was established with EAB override.  NOTE 8: For the definition of categories a, b and c associated with access category 1, see 3GPP TS 22.261 [3]. The categories associated with access category 1 are distinct from the categories a, b and c associated with EAB (see 3GPP TS 22.011 [1A]). | | | |

[TS 24.501, clause 4.5.2A]

[Rel-16]

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

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

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

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

Table 4.5.2A.1: Access identities

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

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

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

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

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

NOTE: The case when an access attempt matches more than one rule includes the case when multiple events trigger an access attempt at the same time.

Table 4.5.2A.2: Mapping table for access categories

|  |  |  |  |
| --- | --- | --- | --- |
| Rule # | Type of access attempt | Requirements to be met | Access Category |
| 1 | Response to paging or NOTIFICATION over non-3GPP access (NOTE 11);  5GMM connection management procedure initiated for the purpose of transporting an LPP message without an ongoing 5GC-MO-LR procedure;  Access attempt to handover of MMTEL voice call, MMTEL video call or SMSoIP from non-3GPP access;  Access attempt upon receipt of "call-pull-initiated" indication from the upper layers (see 3GPP TS 24.174 [13D]) | Access attempt is for MT access, handover of ongoing MMTEL voice call, MMTEL video call or SMSoIP from non-3GPP access; or  Access attempt is made upon receipt of "call-pull-initiated" indication (3GPP TS 24.174 [13D]) | 0 (= MT\_acc) |
| 2 | Emergency | UE is attempting access for an emergency session (NOTE 1, NOTE 2) | 2 (= emergency) |
| 3 | Access attempt for operator-defined access category | UE stores operator-defined access category definitions valid in the SNPN as specified in subclause 4.5.3, and access attempt is matching criteria of an operator-defined access category definition | 32-63  (= based on operator classification) |
| 4 | Access attempt for delay tolerant service | (a) UE is configured for NAS signalling low priority, and  (b) the UE received one of the categories a, b or c as part of the parameters for unified access control in the broadcast system information, and the UE is a member of the broadcasted category in the selected SNPN or RSNPN  (NOTE 3, NOTE 5, NOTE 6, NOTE 7, NOTE 8) | 1 (= delay tolerant) |
| 5 | MO MMTel voice call | Access attempt is for MO MMTel voice call  or for NAS signalling connection recovery during ongoing MO MMTel voice call (NOTE 2) | 4 (= MO MMTel voice) |
| 6 | MO MMTel video call | Access attempt is for MO MMTel video call  or for NAS signalling connection recovery during ongoing MO MMTel video call (NOTE 2) | 5 (= MO MMTel video) |
| 7 | MO SMS over NAS or MO SMSoIP | Access attempt is for MO SMS over NAS (NOTE 4) or MO SMS over SMSoIP transfer  or for NAS signalling connection recovery during ongoing MO SMS or SMSoIP transfer (NOTE 2) | 6 (= MO SMS and SMSoIP) |
| 7.1 | MO IMS registration related signalling | Access attempt is for MO IMS registration related signalling (e.g. IMS initial registration, re-registration, subscription refresh)  or for NAS signalling connection recovery during ongoing procedure for MO IMS registration related signalling (NOTE 2a) | 9 (= MO IMS registration related signalling) |
| 8 | UE NAS initiated 5GMM specific procedures | Access attempt is for MO signalling | 3 (= MO\_sig) |
| 8.1 | Mobile originated location request | Access attempt is for mobile originated location request (NOTE 9) | 3 (= MO\_sig) |
| 8.2 | Mobile originated signalling transaction towards the PCF | Access attempt is for mobile originated signalling transaction towards the PCF (NOTE 10) | 3 (= MO\_sig) |
| 9 | UE NAS initiated 5GMM connection management procedure or 5GMM NAS transport procedure | Access attempt is for MO data | 7 (= MO\_data) |
| 10 | An uplink user data packet is to be sent for a PDU session with suspended user-plane resources | No further requirement is to be met | 7 (= MO\_data) |
| NOTE 1: Void  NOTE 2: Access for the purpose of NAS signalling connection recovery during an ongoing service as defined in subclause 4.5.5, or for the purpose of NAS signalling connection establishment following fallback indication from lower layers during an ongoing service as defined in subclause 4.5.5, is mapped to the access category of the ongoing service in order to derive an RRC establishment cause, but barring checks will be skipped for this access attempt.  NOTE 2a: Access for the purpose of NAS signalling connection recovery during an ongoing MO IMS registration related signalling as defined in subclause 4.5.5, or for the purpose of NAS signalling connection establishment following fallback indication from lower layers during an ongoing MO IMS registration related signalling as defined in subclause 4.5.5, is mapped to the access category of the MO IMS registration related signalling in order to derive an RRC establishment cause, but barring checks will be skipped for this access attempt.  NOTE 3: If the UE selects a new SNPN, then the selected SNPN is used to check the membership; otherwise the UE uses the RSNPN.  NOTE 4: This includes the 5GMM connection management procedures triggered by the UE-initiated NAS transport procedure for transporting the MO SMS.  NOTE 5: The UE configured for NAS signalling low priority is not supported in this release of specification.  NOTE 6: If the access category applicable for the access attempt is 1, then the UE shall additionally determine a second access category from the range 3 to 7. If more than one access category matches, the access category of the lowest rule number shall be chosen. The UE shall use the second access category only to derive an RRC establishment cause for the access attempt.  NOTE 7: Void.  NOTE 8: For the definition of categories a, b and c associated with access category 1, see 3GPP TS 22.261 [3]. The categories associated with access category 1 are distinct from the categories a, b and c associated with EAB (see 3GPP TS 22.011 [1A]).  NOTE 9: This includes: a) the UE-initiated NAS transport procedure for transporting a mobile originated location  request; b) the 5GMM connection management procedure triggered by a) above; and c) NAS signalling connection recovery during an ongoing 5GC-MO-LR procedure.  NOTE 10: This includes: a) the UE-initiated NAS transport procedure for transporting a mobile originated signalling  transaction towards the PCF; b) the 5GMM connection management procedure triggered by a) above; and c) NAS signalling connection recovery during an ongoing UE-requested policy provisioning procedure for V2XP or both (see 3GPP TS 24.587 [19B]).  NOTE 11: The term "non-3GPP access" refers to the case when the UE is accessing SNPN services via a PLMN. | | | |

[TS 24.501, clause 4.5.4.1]

[Rel-15]

When the UE is in 5GMM-IDLE mode, upon receiving a request from the upper layers for an access attempt, the NAS shall categorize the access attempt into access identities and an access category following subclause 4.5.2, table 4.5.2.1 and table 4.5.2.2, and subclause 4.5.3, and provide the applicable access identities and the access category to the lower layers for the purpose of access control checking. In this request to the lower layer the NAS can also provide to the lower layer the RRC establishment cause determined as specified in subclause 4.5.6 of this specification.

NOTE 1: The access barring check is performed by the lower layers.

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

…

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

If the lower layers indicate that the access attempt is barred, the NAS shall not initiate the procedure to send the initial NAS message for the access attempt. Additionally:

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

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

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

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

b) if the event which triggered the access attempt was an MO-SMSoIP-attempt-started indication:

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

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

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

NOTE 4: Barring timers, on a per access category basis, are run by the lower layers. At expiry of barring timers, the indication of alleviation of access barring is indicated to the NAS on a per access category basis.

[Rel-16]

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

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

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

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

NOTE 1: The access barring check is performed by the lower layers.

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

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

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

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

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

[TS 24.501, clause 5.5.1.3.7]

b) The lower layers indicate that the access attempt is barred.

The UE shall not start the registration procedure for mobility and periodic registration update. The UE stays in the current serving cell and applies the normal cell reselection process.

The registration procedure for mobility and periodic registration update is started, if still needed, when the lower layers indicate that the barring is alleviated for the access category with which the access attempt was associated.

ba) The lower layers indicate that access barring is applicable for all access categories except categories 0 and 2 and the access category with which the access attempt was associated is other than 0 and 2.

If the REGISTRATION REQUEST message has not been sent, the UE shall proceed as specified for case b. If the REGISTRATION REQUEST message has been sent, the UE shall proceed as specified for case e and, additionally, the registration procedure for mobility and periodic registration update is started, if still needed, when the lower layers indicate that the barring is alleviated for the access category with which the access attempt was associated. For additional UE requirements for both cases see subclause 4.5.5.

[TS 38.331, clause 5.3.14.2]

Upon initiation of the procedure, the UE shall:

1> if timer T390 is running for the Access Category:

2> consider the access attempt as barred;

1> else if timer T302 is running and the Access Category is neither '2' nor '0':

2> consider the access attempt as barred;

1> else:

2> if the Access Category is '0':

3> consider the access attempt as allowed;

2> else:

3> if *SIB1* includes *uac-BarringPerPLMN-List* that contains a *UAC-BarringPerPLMN* for the selected PLMN or SNPN:

4> if the procedure in 5.2.2.4.2 for a selected PLMN resulted in use of information in *npn-IdentityInfoList* and *UAC-BarringPerPLMN* has an entry with the *plmn-IdentityIndex* corresponding to used information in this list:

5> select the *UAC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to used information in the *npn-IdentityInfoList*;

4> else:

5> select the *UAC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to the selected PLMN and the *PLMN-IdentityInfo, if any,* or the selected SNPN and the *npn-IdentityInfoList*;

3> if any *UAC-BarringPerPLMN* entry is selected:

4> in the remainder of this procedure, use the selected *UAC-BarringPerPLMN* entry (i.e. presence or absence of access barring parameters in this entry) irrespective of the *uac-BarringForCommon* included in *SIB1*;

3> else if SIB1 includes *uac-BarringForCommon*:

4> in the remainder of this procedure use the *uac-BarringForCommon* (i.e. presence or absence of these parameters) included in *SIB1*;

3> else:

4> consider the access attempt as allowed;

3> if *uac-BarringForCommon* is applicable or the *uac-ACBarringListType* indicates that *uac-ExplicitACBarringList* is used:

4> if the corresponding *UAC-BarringPerCatList* contains a *UAC-BarringPerCat* entry corresponding to the Access Category:

5> select the *UAC-BarringPerCat* entry;

5> if the *uac-BarringInfoSetList* contains a *UAC-BarringInfoSet* entry corresponding to the selected *uac-barringInfoSetIndex* in the *UAC-BarringPerCat*:

6> select the *UAC-BarringInfoSet* entry;

6> perform access barring check for the Access Category as specified in 5.3.14.5, using the selected *UAC-BarringInfoSet* as "UAC barring parameter";

5> else:

6> consider the access attempt as allowed;

4> else:

5> consider the access attempt as allowed;

3> else if the *uac-ACBarringListType* indicates that *uac-ImplicitACBarringList* is used:

4> select the *uac-BarringInfoSetIndex* corresponding to the Access Category in the *uac-ImplicitACBarringList*;

4> if the *uac-BarringInfoSetList* contains the *UAC-BarringInfoSet* entry corresponding to the selected *uac-BarringInfoSetIndex*:

5> select the *UAC-BarringInfoSet* entry;

5> perform access barring check for the Access Category as specified in 5.3.14.5, using the selected *UAC-BarringInfoSet* as "UAC barring parameter";

4> else:

5> consider the access attempt as allowed;

3> else:

4> consider the access attempt as allowed;

1> if the access barring check was requested by upper layers:

2> if the access attempt is considered as barred:

3> if timer T302 is running:

4> if timer T390 is running for Access Category '2':

5> inform the upper layer that access barring is applicable for all access categories except categories '0', upon which the procedure ends;

4> else

5> inform the upper layer that access barring is applicable for all access categories except categories '0' and '2', upon which the procedure ends;

3> else:

4> inform upper layers that the access attempt for the Access Category is barred, upon which the procedure ends;

2> else:

3> inform upper layers that the access attempt for the Access Category is allowed, upon which the procedure ends;

1> else:

2> the procedure ends.

[TS 38.331, clause 5.3.14.4]

The UE shall:

…

1> else if timer T390 corresponding to an Access Category other than '2' expires or is stopped, and if timer T302 is not running:

2> consider the barring for this Access Category to be alleviated;

…

1> when barring for an Access Category is considered being alleviated:

2> if the Access Category was informed to upper layers as barred:

3> inform upper layers about barring alleviation for the Access Category.

[TS 38.331, clause 5.3.14.5]

The UE shall:

1> if one or more Access Identities are indicated according to TS 24.501 [23], and

1> if for at least one of these Access Identities the corresponding bit in the *uac-BarringForAccessIdentity* contained in "UAC barring parameter" is set to *zero*:

2> consider the access attempt as allowed;

1> else:

2> draw a random number '*rand*' uniformly distributed in the range: 0 ≤ *rand* < 1;

2> if '*rand*' is lower than the value indicated by *uac-BarringFactor* included in "UAC barring parameter":

3> consider the access attempt as allowed;

2> else:

3> consider the access attempt as barred;

1> if the access attempt is considered as barred:

2> draw a random number '*rand*' that is uniformly distributed in the range 0 ≤ *rand* < 1;

2> start timer T390 for the Access Category with the timer value calculated as follows, using the *uac-BarringTime* included in"AC barring parameter":

T390 = (0.7+ 0.6 \* *rand*) \* *uac-BarringTime.*

11.3.4.3 Test description

11.3.4.3.1 Pre-test conditions

System Simulator:

- NR Cell 1 and NR Cell 11 have different tracking areas according to TS 38.508-1 [4] Table 4.4.2-3.

- System information combination NR-2 as defined in TS 38.508-1 [4] clause 4.4.3.1.2 is used in NR Cells.

UE:

- None.

Preamble:

- The UE is in state 1N-A on NR cell 1 according to TS 38.508-1 [4] Table 4.4A.2-1.

11.3.4.3.2 Test procedure sequence

Table 11.3.4.3.2-1/2 illustrate the downlink power levels and other changing parameters to be applied for the cell at various time instants of the test execution. The exact instants on which these values shall be applied are described in the texts in this clause. The configuration T0 indicates the initial conditions for preamble. Configurations marked "T1" is applied at the points indicated in the Main behaviour description in Table 11.3.4.3.2-3.

Table 11.3.4.3.2-1: Time instances of cell power level and parameter changes for FR1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter | Unit | NR Cell 1 | NR Cell 11 | Remark |
| T0 | SS/PBCH  SSS EPRE | dBm/SCS | -88 | Off |  |
| T1 | SS/PBCH  SSS EPRE | dBm/SCS | -88 | -80 | The power level values are assigned to satisfy RNRCell 1 < RNRCell 11 |

Table 11.3.4.3.2-2: Time instances of cell power level and parameter changes for FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter | Unit | NR Cell 1 | NR Cell 11 | Remark |
| T0 | SS/PBCH  SSS EPRE | dBm/SCS | -91 | Off |  |
| T1 | SS/PBCH  SSS EPRE | dBm/SCS | -91 | -82 | The power level values are assigned to satisfy RNRCell 1 < RNRCell 11 |

Table 11.3.4.3.2-3: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Void |  |  |  |  |
| 2 | The SS adjusts the SS/PBCH EPRE levels and according to row "T1" in table 11.3.4.3.2-1/2. | - | - | - | - |
| 3 | Wait for 34s for FR1 or 130s for FR2 to allow UE to recognise the change.(Note 1) |  |  |  |  |
| 3A | Wait for 84s for T390 to expire (Note 2) | - | - | - | - |
| 4 | Check: Does the UE transmit an RRCSetupRequest message on NR cell 11? | --> | NR RRC: RRCSetupRequest | 1 | F |
| 5 | The SS changes the SIB1 according to 38.508-1 [4] Table 4.6.1-28 and transmits a Short message on PDCCH using P-RNTI indicating a systemInfoModification. | <-- | PDCCH (DCI 1\_0): Short Message | - | - |
| 6 | Wait for one paging cycle. |  |  |  |  |
| 7 | Void |  |  |  |  |
| 8 | Check: Does UE transmit RRCSetupRequest message on NR cell 11? | --> | NR RRC: RRCSetupRequest | 1 | P |
| 9-12 | Steps 2 to 5 of the generic test procedure in TS 38.508-1 Table 4.9.5.2.2-1 with condition MOBILITY are performed on NR cell 11.  NOTE: The UE performs a " REGISTRATION REQUEST procedure with type "mobility registration updating”. | - | - | - | - |
| Note 1: The wait time for reselection to a newly detected intra frequency cell is selected to cover Tdetect,NR\_Intra (25\*1280ms=32s for FR1 and 25\*4\*1280ms=128s for FR2) + TSI-NR (11280ms= fo FR2 1.28s for FR1 and FR2) = 33.28s rounded up to 34s for FR1 and 129.28s rounded up to 130s for FR2.  Note 2: T390 timer value is derived from 38.331 [12] T390 = (0.7 + 0.6\*rand)\*uac-BarringTime where the uac-BarringTime value of 64s is provided in 38.523 Table 11.3.4.3.3-1 and where the value of rand is chosen to be 1 as to arrive at the maximum value for T390 of 83.2s rounded up to 84s | | | | | |

11.3.4.3.3 Specific message contents

Table 11.3.4.3.3-1: SIB1 for NR Cell 11 (Preamble, Table 11.3.4.3.3-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-28 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| cellAccessRelatedInfo SEQUENCE { |  |  |  |
| PLMN-IdentityInfoList SEQUENCE (SIZE (1..maxPLMN)) OF PLMN-IdentityInfo { | 1 entry |  |  |
| PLMN-IdentityInfo[1] SEQUENCE { |  | entry 1 |  |
| plmn-IdentityList SEQUENCE (SIZE (1..maxPLMN)) OF PLMN-Identity { | 1 entry |  |  |
| plmn-Identity[1] |  | entry 1  PLMN ID of NR Cell 11 |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| uac-BarringInfo SEQUENCE { |  |  |  |
| uac-BarringForCommon | Not present |  |  |
| uac-BarringPerPLMN-List SEQUENCE (SIZE (1.. maxPLMN)) OF UAC-BarringPerPLMN { |  |  |  |
| UAC-BarringPerPLMN SEQUENCE { |  |  |  |
| plmn-IdentityIndex | 1 |  |  |
| uac-ACBarringListType CHOICE { |  |  |  |
| uac-ImplicitACBarringList SEQUENCE (SIZE(maxAccessCat-1)) OF UAC-BarringInfoSetIndex { | 63 entries |  |  |
| UAC-BarringInfoSetIndex[1] | 2 | entry 1 |  |
| UAC-BarringInfoSetIndex[2] | 2 | entry 2 |  |
| UAC-BarringInfoSetIndex[3] | 1 | entry 3 |  |
| UAC-BarringInfoSetIndex[4] | 2 | entry 4 |  |
| UAC-BarringInfoSetIndex[5] | 2 | entry 5 |  |
| UAC-BarringInfoSetIndex[6] | 2 | entry 6 |  |
| UAC-BarringInfoSetIndex[7] | 2 | entry 7 |  |
| UAC-BarringInfoSetIndex[8] | 2 | entry 8 |  |
| UAC-BarringInfoSetIndex[9] | 2 | entry 9 |  |
| UAC-BarringInfoSetIndex[10] | 2 | entry 10 |  |
| UAC-BarringInfoSetIndex[11] | 2 | entry 11 |  |
| UAC-BarringInfoSetIndex[12] | 2 | entry 12 |  |
| UAC-BarringInfoSetIndex[13] | 2 | entry 13 |  |
| UAC-BarringInfoSetIndex[14] | 2 | entry 14 |  |
| UAC-BarringInfoSetIndex[15] | 2 | entry 15 |  |
| UAC-BarringInfoSetIndex[16] | 2 | entry 16 |  |
| UAC-BarringInfoSetIndex[17] | 2 | entry 17 |  |
| UAC-BarringInfoSetIndex[18] | 2 | entry 18 |  |
| UAC-BarringInfoSetIndex[19] | 2 | entry 19 |  |
| UAC-BarringInfoSetIndex[20] | 2 | entry 20 |  |
| UAC-BarringInfoSetIndex[21] | 2 | entry 21 |  |
| UAC-BarringInfoSetIndex[22] | 2 | entry 22 |  |
| UAC-BarringInfoSetIndex[23] | 2 | entry 23 |  |
| UAC-BarringInfoSetIndex[24] | 2 | entry 24 |  |
| UAC-BarringInfoSetIndex[25] | 2 | entry 25 |  |
| UAC-BarringInfoSetIndex[26] | 2 | entry 26 |  |
| UAC-BarringInfoSetIndex[27] | 2 | entry 27 |  |
| UAC-BarringInfoSetIndex[28] | 2 | entry 28 |  |
| UAC-BarringInfoSetIndex[29] | 2 | entry 29 |  |
| UAC-BarringInfoSetIndex[30] | 2 | entry 30 |  |
| UAC-BarringInfoSetIndex[31] | 2 | entry 31 |  |
| UAC-BarringInfoSetIndex[32] | 2 | entry 32 |  |
| UAC-BarringInfoSetIndex[33] | 2 | entry 33 |  |
| UAC-BarringInfoSetIndex[34] | 2 | entry 34 |  |
| UAC-BarringInfoSetIndex[35] | 2 | entry 35 |  |
| UAC-BarringInfoSetIndex[36] | 2 | entry 36 |  |
| UAC-BarringInfoSetIndex[37] | 2 | entry 37 |  |
| UAC-BarringInfoSetIndex[38] | 2 | entry 38 |  |
| UAC-BarringInfoSetIndex[39] | 2 | entry 39 |  |
| UAC-BarringInfoSetIndex[40] | 2 | entry 40 |  |
| UAC-BarringInfoSetIndex[41] | 2 | entry 41 |  |
| UAC-BarringInfoSetIndex[42] | 2 | entry 42 |  |
| UAC-BarringInfoSetIndex[43] | 2 | entry 43 |  |
| UAC-BarringInfoSetIndex[44] | 2 | entry 44 |  |
| UAC-BarringInfoSetIndex[45] | 2 | entry 45 |  |
| UAC-BarringInfoSetIndex[46] | 2 | entry 46 |  |
| UAC-BarringInfoSetIndex[47] | 2 | entry 47 |  |
| UAC-BarringInfoSetIndex[48] | 2 | entry 48 |  |
| UAC-BarringInfoSetIndex[49] | 2 | entry 49 |  |
| UAC-BarringInfoSetIndex[50] | 2 | entry 50 |  |
| UAC-BarringInfoSetIndex[51] | 2 | entry 51 |  |
| UAC-BarringInfoSetIndex[52] | 2 | entry 52 |  |
| UAC-BarringInfoSetIndex[53] | 2 | entry 53 |  |
| UAC-BarringInfoSetIndex[54] | 2 | entry 54 |  |
| UAC-BarringInfoSetIndex[55] | 2 | entry 55 |  |
| UAC-BarringInfoSetIndex[56] | 2 | entry 56 |  |
| UAC-BarringInfoSetIndex[57] | 2 | entry 57 |  |
| UAC-BarringInfoSetIndex[58] | 2 | entry 58 |  |
| UAC-BarringInfoSetIndex[59] | 2 | entry 59 |  |
| UAC-BarringInfoSetIndex[60] | 2 | entry 60 |  |
| UAC-BarringInfoSetIndex[61] | 2 | entry 61 |  |
| UAC-BarringInfoSetIndex[62] | 2 | entry 62 |  |
| UAC-BarringInfoSetIndex[63] | 2 | entry 63 |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| uac-BarringInfoSetList SEQUENCE (SIZE(1..maxBarringInfoSet)) OF UAC-BarringInfoSet { | 1 entry |  |  |
| UAC-BarringInfoSet[1] SEQUENCE { |  | entry 1 |  |
| uac-BarringFactor | p00 |  |  |
| uac-BarringTime | s64 |  |  |
| uac-BarringForAccessIdentity | '0000000'B |  |  |
| } |  |  |  |
| uac-AccessCategory1-SelectionAssistanceInfo | Not Present |  |  |
| } |  |  |  |
| } |  |  |  |
| Note：UAC-BarringInfoSetIndex value 2 referring to an entry not included in uac-BarringInfoSetList indicates no barring for the Access Category. | | | |

### 11.3.5 UAC / Access Identity 1 / New cell not in the country of its HPLMN/EHPLMN 0% access probability / MPS indicator / HPLMN/0%/100% accessibility AC5 / MMTEL-Video call

11.3.5.1 Test Purpose (TP)

(1)

**with** { UE configured for Access Identity 1 }

**ensure** **that** {

**when** { UE moves to a new cell which is not in the country of its HPLMN or in an EHPLMN (if the EHPLMN list is present) having received SIB1 message including UAC set to 0% accessibility for Access Category 7 and Access Identity 1 is exempted from the access barring check }

**then** { UE does not consider Access Identity 1 as valid and does not initiate RRC connection since Access Identity 0 is not exempted from the access barring check until barring for Access Category 7 is removed }

}

(2)

**with** { UE configured for Access Identity 1 }

**ensure** **that** {

**when** { UE moves to a new cell which is not in the country of its HPLMN or in an EHPLMN (if the EHPLMN list is present) but receives the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message being set to ""Access identity 1 valid"" }

**then** { UE does consider Access Identity 1 as valid }

}

(3)

**with** { UE configured for Access Identity 1 having received SIB1 containing UAC Barring Info indicating 0% accessibility for Access Category 5 in NR RRC\_IDLE state on HPLMN }

**ensure** **that** {

**when** { User initiates MMTEL-Video call }

**then** { UE does not attempt to initiate connection on the NR Cell }

}

(4)

**with** { UE configured for Access Identity 1 having received SIB1 containing UAC Info indicating 100% accessibility for Access Category 5 while camped on HPLMN in NR RRC\_IDLE state }

**ensure** **that** {

**when** { User initiates MMTEL-Video call and Access Barring check indicates Barring is alleviated }

**then** { UE initiates RRC Connection Setup procedure with establishmentCause set to mps-PriorityAccess }

}

11.3.5.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in TS 24.501: clause 4.5.2, 4.5.4.1 and 4.5.6 and TS 38.331: clause 5.3.14.1, 5.3.14.2, 5.3.14.4 and 5.3.14.5. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 4.5.2]

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

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

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

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

Table 4.5.2.1: Access identities

|  |  |
| --- | --- |
| Access Identity number | UE configuration |
| 0 | UE is not configured with any parameters from this table |
| 1 (NOTE 1) | UE is configured for multimedia priority service (MPS). |
| 2 (NOTE 2) | UE is configured for mission critical service (MCS). |
| 3-10 | Reserved for future use |
| 11 (NOTE 3) | Access Class 11 is configured in the UE. |
| 12 (NOTE 3) | Access Class 12 is configured in the UE. |
| 13 (NOTE 3) | Access Class 13 is configured in the UE. |
| 14 (NOTE 3) | Access Class 14 is configured in the UE. |
| 15 (NOTE 3) | Access Class 15 is configured in the UE. |
| NOTE 1: Access identity 1 is valid when: - the USIM file EFUAC\_AIC indicates the UE is configured for access identity 1 and the RPLMN is the HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present), or a visited PLMN of the home country (see the definition of home country in 3GPP TS 24.301 [15]); or - the UE receives the 5GS network feature support IE with the MPS indicator bit set to "Access identity 1 valid in RPLMN or equivalent PLMN" from the RPLMN as described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4.  NOTE 2: Access identity 2 is used by UEs configured for MCS and is valid when: - the USIM file EFUAC\_AIC indicates the UE is configured for access identity 2 and the RPLMN is the HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present), or a visited PLMN of the home country (see 3GPP TS 23.122 [5]); or - the UE receives the 5GS network feature support IE with the MCS indicator bit set to "Access identity 2 valid in RPLMN or equivalent PLMN" from the RPLMN as described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4.  NOTE 3: Access identities 11 and 15 are valid in HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present). Access Identities 12, 13 and 14 are valid in HPLMN and visited PLMNs of home country only (see the definition of home country in 3GPP TS 24.301 [15]). | |

The UE uses the MPS indicator bit of the 5GS network feature support IE to determine if access identity 1 is valid. Processing of the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message is described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4. The UE shall not consider access identity 1 to be valid when the UE is not in the country of its HPLMN prior to receiving the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message being set to "Access identity 1 valid in RPLMN or equivalent PLMN".

When the UE is in the country of its HPLMN, the contents of the USIM files EFUAC\_AIC and EFACC as specified in 3GPP TS 31.102 [22] and the rules specified in table 4.5.2.1 are used to determine the applicability of access identity 1 and access classes 11 - 15. When the UE is in the country of its HPLMN, and the USIM file EFUAC\_AIC does not indicate the UE is configured for access identity 1, the UE uses the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message to determine if access identity 1 is valid. When the UE is in the country of its HPLMN, and the USIM file EFUAC\_AIC indicates the UE is configured for access identity 1, the MPS indicator bit of the 5GS network feature support IE is not applicable. When the UE is not in the country of its HPLMN, the contents of the USIM files EFUAC\_AIC and EFACC are not applicable.

The UE uses the MCS indicator bit of the 5GS network feature support IE to determine if access identity 2 is valid. Processing of the MCS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message is described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4. The UE shall not consider access identity 2 to be valid when the UE is not in the country of its HPLMN prior to receiving the MCS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message being set to "Access identity 2 valid in RPLMN or equivalent PLMN".

When the UE is in the country of its HPLMN, the contents of the USIM files EFUAC\_AIC and EFACC as specified in 3GPP TS 31.102 [22] and the rules specified in table 4.5.2.1 are used to determine the applicability of access identity 2 and access classes 11 - 15. When the UE is in the country of its HPLMN, and the USIM file EFUAC\_AIC does not indicate the UE is configured for access identity 2, the UE uses the MCS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message to determine if access identity 2 is valid. When the UE is in the country of its HPLMN, and the USIM file EFUAC\_AIC indicates the UE is configured for access identity 2, the MCS indicator bit of the 5GS network feature support IE is not applicable. When the UE is not in the country of its HPLMN, the contents of the USIM files EFUAC\_AIC and EFACC are not applicable.

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

NOTE: The case when an access attempt matches more than one rule includes the case when multiple events trigger an access attempt at the same time.

Table 4.5.2.2: Mapping table for access categories

|  |  |  |  |
| --- | --- | --- | --- |
| Rule # | Type of access attempt | Requirements to be met | Access Category |
| 1 | Response to paging or NOTIFICATION over non-3GPP access;  5GMM connection management procedure initiated for the purpose of transporting an LPP message | Access attempt is for MT access | 0 (= MT\_acc) |
| 2 | Emergency | UE is attempting access for an emergency session (NOTE 1, NOTE 2) | 2 (= emergency) |
| 3 | Access attempt for operator-defined access category | UE stores operator-defined access category definitions valid in the current PLMN as specified in subclause 4.5.3, and access attempt is matching criteria of an operator-defined access category definition | 32-63  (= based on operator classification) |
| 4 | Access attempt for delay tolerant service | (a) UE is configured for NAS signalling low priority or UE supporting S1 mode is configured for EAB (see the "ExtendedAccessBarring" leaf of NAS configuration MO in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22]) where "EAB override" does not apply, and  (b). the UE received one of the categories a, b or c as part of the parameters for unified access control in the broadcast system information, and the UE is a member of the broadcasted category in the selected PLMN or RPLMN/equivalent PLMN  (NOTE 3, NOTE 5, NOTE 6, NOTE 7, NOTE 8) | 1 (= delay tolerant) |
| 5 | MO MMTel voice call | Access attempt is for MO MMTel voice call  or for NAS signalling connection recovery during ongoing MO MMTel voice call (NOTE 2) | 4 (= MO MMTel voice) |
| 6 | MO MMTel video call | Access attempt is for MO MMTel video call  or for NAS signalling connection recovery during ongoing MO MMTel video call (NOTE 2) | 5 (= MO MMTel video) |
| 7 | MO SMS over NAS or MO SMSoIP | Access attempt is for MO SMS over NAS (NOTE 4) or MO SMS over SMSoIP transfer  or for NAS signalling connection recovery during ongoing MO SMS or SMSoIP transfer (NOTE 2) | 6 (= MO SMS and SMSoIP) |
| 8 | UE NAS initiated 5GMM specific procedures | Access attempt is for MO signalling | 3 (= MO\_sig) |
| 9 | UE NAS initiated 5GMM connection management procedure or 5GMM NAS transport procedure | Access attempt is for MO data | 7 (= MO\_data) |
| 10 | An uplink user data packet is to be sent for a PDU session with suspended user-plane resources | No further requirement is to be met | 7 (= MO\_data) |
| NOTE 1: This includes 5GMM specific procedures while the service is ongoing and 5GMM connection management procedures required to establish a PDU session with request type = "initial emergency request" or "existing emergency PDU session", or to re-establish user-plane resources for such a PDU session. This further includes the service request procedure initiated with a SERVICE REQUEST message with the Service type IE set to "emergency services fallback".<  NOTE 2: Access for the purpose of NAS signalling connection recovery during an ongoing service, or for the purpose of NAS signalling connection establishment following fallback indication from lower layers during an ongoing service, is mapped to the access category of the ongoing service in order to derive an RRC establishment cause, but barring checks will be skipped for this access attempt.  NOTE 3: If the UE selects a new PLMN, then the selected PLMN is used to check the membership; otherwise the UE uses the RLPMN or a PLMN equivalent to the RPLMN.  NOTE 4: This includes the 5GMM connection management procedures triggered by the UE-initiated NAS transport procedure for transporting the MO SMS.  NOTE 5: The UE configured for NAS signalling low priority is not supported in this release of specification. If a UE supporting both S1 mode and N1 mode is configured for NAS signalling low priority in S1 mode as specified in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22], the UE shall ignore the configuration for NAS signalling low priority when in N1 mode.  NOTE 6: If the access category applicable for the access attempt is 1, then the UE shall additionally determine a second access category from the range 3 to 7. If more than one access category matches, the access category of the lowest rule number shall be chosen. The UE shall use the second access category only to derive an RRC establishment cause for the access attempt.  NOTE 7: "EAB override" does not apply, if the UE is not configured to allow overriding EAB (see the "Override\_ExtendedAccessBarring" leaf of NAS configuration MO in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22]), or if NAS has not received an indication from the upper layers to override EAB and the UE does not have a PDU session that was established with EAB override.  NOTE 8: For the definition of categories a, b and c associated with access category 1, see 3GPP TS 22.261 [3]. The categories associated with access category 1 are distinct from the categories a, b and c associated with EAB (see 3GPP TS 22.011 [1A]). | | | |

[TS 24.501, clause 4.5.4.1]

When the UE is in 5GMM-IDLE mode, upon receiving a request from the upper layers for an access attempt, the NAS shall categorize the access attempt into access identities and an access category following subclause 4.5.2, table 4.5.2.1 and table 4.5.2.2, and subclause 4.5.3, and provide the applicable access identities and the access category to the lower layers for the purpose of access control checking. In this request to the lower layer the NAS can also provide to the lower layer the RRC establishment cause determined as specified in subclause 4.5.6 of this specification.

NOTE 1: The access barring check is performed by the lower layers.

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

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

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

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

If the lower layers indicate that the access attempt is barred, the NAS shall not initiate the procedure to send the initial NAS message for the access attempt. Additionally:

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

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

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

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

b) if the event which triggered the access attempt was an MO-SMSoIP-attempt-started indication:

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

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

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

NOTE 4: Barring timers, on a per access category basis, are run by the lower layers. At expiry of barring timers, the indication of alleviation of access barring is indicated to the NAS on a per access category basis.

[TS 24.501, clause 4.5.6]

When 5GMM requests the establishment of a NAS-signalling connection, the RRC establishment cause used by the UE shall be selected according to one or more access identities (see subclause 4.5.2) and the determined access category as specified in table 4.5.6.1 and table 4.5.6.2. If the determined access category is an operator-defined access category, then the RRC establishment cause used by the UE shall be selected according to table 4.5.6.1 and table 4.5.6.2 based on one or more access identities (see subclause 4.5.2) and the standardized access category determined for the operator-defined access category as described in subclause 4.5.3.

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

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

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

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

[TS 38.331, clause 5.3.14.1]

The purpose of this procedure is to perform access barring check for an access attempt associated with a given Access Category and one or more Access Identities upon request from upper layers according to TS 24.501 [23] or the RRC layer.

After a handover resulting in change of PCell in RRC\_CONNECTED the UE shall defer access barring checks until it has obtained valid UAC information (from *SIB1*) from the target cell.

[TS 38.331, clause 5.3.14.2]

Upon initiation of the procedure, the UE shall:

1> if timer T390 is running for the Access Category:

2> consider the access attempt as barred;

1> else if timer T302 is running and the Access Category is neither '2' nor '0':

2> consider the access attempt as barred;

1> else:

2> if the Access Category is '0':

3> consider the access attempt as allowed;

2> else:

3> if *SIB1* includes *uac-BarringPerPLMN-List* and the *uac-BarringPerPLMN-List* contains an *UAC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to the PLMN selected by upper layers (see TS 24.501 [23]):

4> select the *UAC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to the PLMN selected by upper layers;

4> in the remainder of this procedure, use the selected *UAC-BarringPerPLMN* entry (i.e. presence or absence of access barring parameters in this entry) irrespective of the *uac-BarringForCommon* included in *SIB1*;

3> else if SIB1 includes *uac-BarringForCommon*:

4> in the remainder of this procedure use the *uac-BarringForCommon* (i.e. presence or absence of these parameters) included in *SIB1*;

3> else:

4> consider the access attempt as allowed;

3> if uac-BarringForCommon is applicable or the uac-ACBarringListType indicates that uac-ExplicitACBarringList is used:

4> if the corresponding *UAC-BarringPerCatList* contains a *UAC-BarringPerCat* entry corresponding to the Access Category:

5> select the *UAC-BarringPerCat* entry;

5> if the uac-BarringInfoSetList contains a UAC-BarringInfoSet entry corresponding to the selected uac-barringInfoSetIndex in the UAC-BarringPerCat:

6> select the UAC-BarringInfoSet entry;

6> perform access barring check for the Access Category as specified in 5.3.14.5, using the selected UAC-BarringInfoSet as "UAC barring parameter";

5> else:

6> consider the access attempt as allowed;

4> else:

5> consider the access attempt as allowed;

3> else if the uac-ACBarringListType indicates that uac-ImplicitACBarringList is used:

4> select the *uac-BarringInfoSetIndex* corresponding to the Access Category in the *uac-ImplicitACBarringList*;

4> if the uac-BarringInfoSetList contains the UAC-BarringInfoSet entry corresponding to the selected uac-BarringInfoSetIndex:

5> select the *UAC-BarringInfoSet* entry;

5> perform access barring check for the Access Category as specified in 5.3.14.5, using the selected *UAC-BarringInfoSet* as "UAC barring parameter";

4> else:

5> consider the access attempt as allowed;

3> else:

4> consider the access attempt as allowed;

1> if the access barring check was requested by upper layers:

2> if the access attempt is considered as barred:

3> if timer T302 is running:

4> inform the upper layer that access barring is applicable for all access categories except categories '0' and '2', upon which the procedure ends;

3> else:

4> inform upper layers that the access attempt for the Access Category is barred, upon which the procedure ends;

2> else:

3> inform upper layers that the access attempt for the Access Category is allowed, upon which the procedure ends;

1> else:

2> the procedure ends.

[TS 38.331, clause 5.3.14.4]

The UE shall:

1> if timer T302 expires or is stopped, and if timer T390 corresponding to an Access Category is not running; or

1> if timer T390 corresponding to an Access Category other than '2' expires or is stopped, and if timer T302 is not running; or

1> if timer T390 corresponding to the Access Category '2' expires or is stopped:

2> consider the barring for this Access Category to be alleviated;

1> when barring for an Access Category is considered being alleviated:

2> if the Access Category was informed to upper layers as barred:

3> inform upper layers about barring alleviation for the Access Category.

2> if barring is alleviated for Access Category '8':

3> perform actions specified in 5.3.13.8;

[TS 38.331, clause 5.3.14.5]

The UE shall:

1> if one or more Access Identities are indicated according to TS 24.501 [23], and

1> if for at least one of these Access Identities the corresponding bit in the *uac-BarringForAccessIdentity* contained in "UAC barring parameter" is set to *zero*:

2> consider the access attempt as allowed;

1> else:

2> draw a random number '*rand*' uniformly distributed in the range: 0 ≤ *rand* < 1;

2> if '*rand*' is lower than the value indicated by *uac-BarringFactor* included in "UAC barring parameter":

3> consider the access attempt as allowed;

2> else:

3> consider the access attempt as barred;

1> if the access attempt is considered as barred:

2> draw a random number '*rand*' that is uniformly distributed in the range 0 ≤ *rand* < 1;

2> start timer T390 for the Access Category with the timer value calculated as follows, using the *uac-BarringTime* included in"AC barring parameter":

T390 = (0.7+ 0.6 \* *rand*) \* *uac-BarringTime.*

11.3.5.3 Test description

11.3.5.3.1 Pre-test conditions

System Simulator:

- 2 NR cells: NR Cell 1 and 12 as specified in TS 38.508-1 [4] table 4.4.2-3 are configured as shown in Table 11.3.5.3.1–1. PLMN settings are defined in TS 36.523-1 [13] table 6.0.1-1.

Table 11.3.5.3.1–1: PLMN identifiers

|  |  |
| --- | --- |
| NR Cell | PLMN names |
| NR Cell 1 | PLMN1 |
| NR Cell 12 | PLMN2 |

- System information combination NR-1 as defined in TS 38.508-1 [4] Table 4.4.3.1.2-1 is used in NR cells.

UE:

- The UE is equipped with USIM configuration 18 as defined in TS 38.508-1 [4] Table 6.4.1-18.

Preamble:

- The UE is in state 1N-A, RRC\_IDLE Connectivity (NR), in accordance with the procedure described in TS 38.508-1 [4], clause 4.5.2.

11.3.5.3.2 Test procedure sequence

Table 11.3.5.3.2-1 for FR1 and Table 11.3.5.3.2-2 for FR2 illustrates the downlink power levels and other changing parameters to be applied for the cells at various time instants of the test execution. Row marked "T0" denotes the initial conditions in preamble, while columns marked "T1", "T2" and "T3" are to be applied subsequently in the Main behaviour. The exact instants on which these values shall be applied are described in the texts in this clause.

Table 11.3.5.3.2-1: Time instances of cell power level and parameter changes for FR1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter | Unit | NR Cell 1 | NR Cell 12 | Remarks |
| T0 | SS/PBCH  SSS EPRE | dBm/SCS | -88 | Off | The power level values are assigned to ensure UE registered on NR Cell 1. |
| T1 | SS/PBCH  SSS EPRE | dBm/SCS | Off | -80 | The power level values are assigned to ensure UE registered on NR Cell 12. |
| T2 | SS/PBCH  SSS EPRE | dBm/SCS | -80 | Off | The power level values are assigned to ensure UE registered on NR Cell 1. |
| Note 1: Power level “Off” is defined in TS 38.508-1 [4] Table 6.2.2.1-3. | | | | | |

Table 11.3.5.3.2-2: Time instances of cell power level and parameter changes for FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter | Unit | NR Cell 1 | NR Cell 12 | Remarks |
| T0 | SS/PBCH  SSS EPRE | dBm/SCS | -82 | Off | The power level values are assigned to ensure UE registered on NR Cell 1. |
| T1 | SS/PBCH  SSS EPRE | dBm/SCS | Off | -82 | The power level values are assigned to ensure UE registered on NR Cell 12. |
| T2 | SS/PBCH  SSS EPRE | dBm/SCS | -82 | Off | The power level values are assigned to ensure UE registered on NR Cell 1. |
| Note 1: Power level “Off” is defined in TS 38.508-1 [4] Table 6.2.2.2-2. | | | | | |

Table 11.3.5.3.2-3: Main behaviour

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| St | | Procedure | | Message Sequence | | | | TP | | Verdict | |
|  | |  | | U - S | | Message | |  | |  | |
| 1 | | The SS adjusts the NR Cells power levels according to row "T1" in table 11.3.5.3.2-1/2. | | - | | - | | - | | - | |
| 1A | | Void | | - | | - | | - | | - | |
| 1B | | Void | | - | | - | | - | | - | |
| 2 | | The UE transmits *RRCSetupRequest* message on NR cell 12.  Check: Does the *RRCSetupRequest* message includes the *establishmentCause* which is any value except *mps-PriorityAccess*? | | --> | | NR RRC: RRCSetupRequest | | 1 | | P | |
| 2A-2B | | Steps 3-4 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed on NR Cell 12. (Note 2) | | - | | - | | - | | - | |
| - | | EXCEPTION: Steps 2Ca1 to 2Cb3a1 describe behaviour that depends on events happening prior to their execution; the "lower case letter" identifies a step sequence that take place if a specific prior event takes place. | | - | | - | | - | | - | |
| 2Ca1-2Ca15 | | IF 5GS registration type is set as Initial Registration in step 2B, THEN Steps 5 to 19 of the generic test procedure in TS 38.508-1 Table 4.5.2.2-2 are performed without RRC release on NR Cell 12. | | - | | - | | - | | - | |
| 2Cb1-2Cb2 | | IF 5GS registration type is set as Mobility Registration in step 2B, THEN Steps 4 to 5 of the generic test procedure in TS 38.508-1 Table 4.9.5.2.2-1 are performed without RRC release on NR Cell 12. | | - | | - | | - | | - | |
| 3-10 | | Void | | - | | - | | - | | - | |
| 10A | | The SS transmits an RRCRelease message and move the UE to RRC\_IDLE. | | <-- | | NR RRC: RRCRelease | | - | | - | |
| 10B | | Make the UE attempt to establish a PDU session. This can be done by an AT/MMI command. | | - | | - | | - | | - | |
| 10C | | Check: Does the UE transmit an RRCSetupRequest message within 21s on NR Cell 12? (Note3) | | --> | | NR RRC: RRCSetupRequest | | 1 | | F | |
| 10D | | SS changes SIB1 of NR Cell 12 according to Table 11.3.5.3.3-2 and sends Short Message on PDCCH using P-RNTI. | | - | | - | | - | | - | |
| 10E | | Start Timer=28 sec. (Note4) | | - | | - | | - | | - | |
| - | | EXCEPTION: Steps 10Ea1-10Eb3 describes optional behaviour that depends on the UE implementation. | | - | | - | | - | | - | |
| 10Ea1 | | Check: Does the UE transmit an RRCSetupRequest message and establishmentCause is set to mo-Data? | | --> | | NR RRC: RRCSetupRequest | | 1 | | P | |
| 10Ea2 | | Stop Timer=28 sec. | | - | | - | | - | | - | |
| 10eb1 | | Timer=28 sec expires | | - | | - | | - | | - | |
| 10Eb2 | | Make the UE attempt to establish a PDU session. This can be done by an AT/MMI command. | | - | | - | | - | | - | |
| 10Eb3 | | Check: Does the UE transmit an RRCSetupRequest message and establishmentCause is set to mo-Data? | | --> | | NR RRC: RRCSetupRequest | | 1 | | P | |
| 10Fa1-10Fa8 | | Steps 3-8 of the generic procedure for  NR RRC\_Connected specified in TS 38.508-1  Table 4.5.2.2-4 are performed without RRC release. | | - | | - | | - | | - | |
| 10H | | The UE is switched off by executing generic procedure in Table 4.9.6.3-1 in TS 38.508-1 [4] | | - | | - | | - | | - | |
| 11 | | Void | | - | | - | | - | | - | |
| 11A | | The SS adjusts the NR Cells power levels according to row "T2" in table 11.3.5.3.2-1/2. | | - | | - | | - | | - | |
| 11B | | The UE is Switched ON. The generic test procedure in TS 38.508-1 [4] Table 4.5.2.2-2 indicate that the UE performs registration on NR Cell 1. | | - | | - | | - | | - | |
| 11C | | The SS adjusts the NR Cells power levels according to row "T1" in table 11.3.5.3.2-1/2. | | - | | - | | - | | - | |
| 11D-11F | | Steps 2-4 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed on NR Cell 12. (Note 2) | | - | | - | | - | | - | |
| - | | EXCEPTION: Steps 11Fa1 to 11Fb3a1 describe behaviour that depends on events happening prior to their execution; the "lower case letter" identifies a step sequence that take place if a specific prior event takes place. | | - | | - | | - | | - | |
| 11Fa1-11Fa16a1 | | IF 5GS registration type is set as Initial Registration in step 11F, THEN Steps 5 to 20a1of the generic test procedure in TS 38.508-1 Table 4.5.2.2-2 are performed on NR Cell 12. | | - | | - | | - | | - | |
| 11Fb1-11Fb3a1 | | IF 5GS registration type is set as Mobility Registration in step 211F, THEN Steps 4 to 6a1 of the generic test procedure in TS 38.508-1 Table 4.9.5.2.2-1 are performed on NR Cell 12. | | - | | - | | - | | - | |
| 12 | | The SS transmits a *Paging* message. | | <-- | | NR RRC: *Paging* | | - | | - | |
| 13 | | Void | | - | | - | | - | | - | |
| 14 | | Check: Does the UE transmit a *RRCSetupRequest* message including establishmentCause equal to *mps*-*PriorityAccess* within 10 s? | | --> | | NR RRC: RRCSetupRequest | | 2 | | P | |
| 15-20 | | Steps 3 to 8 of the NR RRC\_CONNECTED procedure in TS 38.508-1 [4] Table 4.5.4.2-3 are performed. | | - | | - | | - | | - | |
| 21-23 | | Void | | - | | - | | - | | - | |
| 24 | | The SS transmits an *RRCRelease* message to release RRC connection and moves the UE to RRC\_IDLE. | | <-- | | NR RRC: RRCRelease | | - | | - | |
| 25 | | SS changes SIB1 of NR cell 1 according to Table 11.3.5.3.3-1. | | - | | - | | - | | - | |
| 26 | | The SS adjusts the NR Cells power levels according to row "T2" in table 11.3.5.3.2-1/2. | | - | | - | | - | | - | |
| 26A-26C | | Steps 2-4 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. (Note 2) | | - | | - | | - | | - | |
| - | | EXCEPTION: Steps 26Da1 to 26Db3a1 describe behaviour that depends on events happening prior to their execution; the "lower case letter" identifies a step sequence that take place if a specific prior event takes place. | | - | | - | | - | | - | |
| 26Da1-26Da16a1 | | IF 5GS registration type is set as Initial Registration in step 26C, THEN Steps 5 to 20a1of the generic test procedure in TS 38.508-1 Table 4.5.2.2-2 are performed on NR Cell 1. | | - | | - | | - | | - | |
| 26Db1-26Db3a1 | | IF 5GS registration type is set as Mobility Registration in step 26C, THEN Steps 4 to 6a1 of the generic test procedure in TS 38.508-1 Table 4.9.5.2.2-1 are performed on NR Cell 1. | | - | | - | | - | | - | |
| 27-32a1 | | Void | | - | | - | | - | | - | |
| 33 | | AT command to make the UE attempt MMTEL-Video call. | | - | | - | | - | | - | |
| 34 | | Check: Does the UE transmit an *RRCSetupRequest* message including establishmentCause equal to *mps-PriorityAccess* within 30s? | | --> | | NR RRC: RRCSetupRequest | | 3 | | F | |
| 35 | | SS changes *SIB1* of NR cell 1 according to Table 11.3.5.3.3-1 and notifies the UE of change of System Information on NR Cell 1 by send Short Message on PDCCH using P-RNTI. | | <-- | | PDCCH (DCI 1\_0): Short Message | | - | | - | |
| 35A | | SS starts timer T\_Delay=26 sec. | | - | | - | | - | | - | |
| - | | EXCEPTION: Steps 35Aa1 to 35Ab3 describe behaviour that depends on the UE implementation; the "lower case letter" identifies a step sequence that take place depending on the UE implementation. | | - | | - | | - | | - | |
| 35Aa1 | | Check: Does the UE transmit an *RRCSetupRequest* message including establishmentCause equal to *mps-PriorityAccess*? | | --> | | NR RRC: RRCSetupRequest | | 4 | | P | |
| 35Aa2 | | SS stops timer T\_Delay=26 sec. | | - | | - | | - | | - | |
| 35Ab1 | | timer T\_Delay=26 sec expires. | | - | | - | | - | | - | |
| 35Ab2 | | Make the UE attempt another MMTEL-Video call. | | - | | - | | - | | - | |
| 35Ab3 | | Check: Does the UE transmit an *RRCSetupRequest* message including establishmentCause equal to *mps-PriorityAccess* within 10 s? | | --> | | NR RRC: RRCSetupRequest | | 4 | | P | |
| 36-38 | | Void | | - | | - | | - | | - | |
| 39-49b3 | | Steps 3-13b3 of generic test procedure for IMS MO Video call establishment in 5GC as specified in 38.508-1 [4] Table 4.9.24.2.2-1 are performed. | | - | | - | | - | | - | |
| 50 | | The generic test procedure for IMS MT call release in 5GC as specified in TS 38.508-1 [4] Table 4.9.18.2.2-1 takes place. | | - | | - | | - | | - | |
| Note 1: The SS includes a 5GS network feature support IE in the REGISTRATION ACCEPT message configured as Table 11.3.5.3.3-3.  Note 2: The 5GS registration type shall be only set as Mobility Registration for R16 UEs according to TS 24.501 subclause 5.2.3.2.5 specified in Release 16. The EXCEPTION description applies only to R15 UEs.  Note 3: The wait time 21s is selected to be more than T390 maximum = (0.7 + 0.6 \* rand) \* uac-BarringTime(16s) = 20.7s when ‘rand’ takes the maximum value of 0.99.  Note 4: The wait time 28s is selected to cover 20.7s ((0.7 + 0.6 \* rand) \* uac-BarringTime(16s)) + 5.12s (modification period) + 2s (extra wait timer for UE to trigger RRCSetupRequest) = 27.82s rounded up to 28s when ‘rand’ takes the maximum value of 0.99. | | | | | | | | | | | |

11.3.5.3.3 Specific message contents

Table 11.3.5.3.3-1: *SIB1* of NR Cell 1 (step 25 and step 35, Table 11.3.5.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-28 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| uac-BarringInfo SEQUENCE { |  |  | step 25 |
| uac-BarringForCommon SEQUENCE (SIZE (1..maxAccessCat-1)) OF UAC-BarringPerCat { | 1 entry |  |  |
| UAC-BarringPerCat[1] SEQUENCE { |  | entry 1 |  |
| accessCategory | 5 | (= MO MMTel video) |  |
| uac-barringInfoSetIndex | 1 | Value 1 corresponds to the first entry in uac-BarringInfoSetList |  |
| } |  |  |  |
| } |  |  |  |
| uac-BarringPerPLMN-List | Not present |  |  |
| uac-BarringInfoSetList SEQUENCE (SIZE(1..maxBarringInfoSet)) OF UAC-BarringInfoSet { | 1 entry |  |  |
| UAC-BarringInfoSet[1] SEQUENCE { |  | entry 1 |  |
| uac-BarringFactor | p00 | 0% access probability |  |
| uac-BarringTime | s16 | 16 s |  |
| uac-BarringForAccessIdentity | ‘1111111’B | Value 1 means that access attempt is not allowed for the corresponding access identity.  The leftmost bit, bit 0 in the bit string corresponds to Access Identity 1. |  |
| } |  |  |  |
| } |  |  |  |
| uac-AccessCategory1-SelectionAssistanceInfo | Not Present |  |  |
| } |  |  |  |
| uac-BarringInfo | Not present |  | Step 35 |
| } |  |  |  |

Table 11.3.5.3.3-2: *SIB1* of NR Cell 12 (Step 1 and step 10D, Table 11.3.5.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-28 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| uac-BarringInfo SEQUENCE { |  |  | Step 1 |
| uac-BarringForCommon SEQUENCE (SIZE (1..maxAccessCat-1)) OF UAC-BarringPerCat { | 1 entry |  |  |
| UAC-BarringPerCat[1] SEQUENCE { |  | entry 1 |  |
| accessCategory | 7 | (= MO\_data) |  |
| uac-barringInfoSetIndex | 1 | Value 1 corresponds to the first entry in uac-BarringInfoSetList |  |
| } |  |  |  |
| } |  |  |  |
| uac-BarringPerPLMN-List | Not present |  |  |
| uac-BarringInfoSetList SEQUENCE (SIZE(1..maxBarringInfoSet)) OF UAC-BarringInfoSet { | 1 entry |  |  |
| UAC-BarringInfoSet[1] SEQUENCE { |  | entry 1 |  |
| uac-BarringFactor | p00 | 0% access probability |  |
| uac-BarringTime | s16 | 16 s |  |
| uac-BarringForAccessIdentity | 0111111’B | Value 1 means that access attempt is not allowed for the corresponding access identity.  The leftmost bit, bit 0 in the bit string corresponds to Access Identity 1. |  |
| } |  |  |  |
| } |  |  |  |
| uac-AccessCategory1-SelectionAssistanceInfo | Not Present |  |  |
|  |  |  |  |
| } |  |  |  |
| uac-BarringInfo | Not present |  | Step 10D |
| } |  |  |  |

Table 11.3.5.3.3-3: REGISTRATION ACCEPT (step 11Fa10 and step 11Fb2, Table 11.3.5.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508 [4], Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS network feature support | ‘1000 0001 0000 0000 0000 0000’B | Access identity 1 valid in RPLMN or equivalent PLMN.  IMS voice over PS session supported over 3GPP access.  All other features set to "not supported" including the  'Interworking without N26 interface not supported'. |  |

### 11.3.6 UAC / Access Identity 2 / New cell not in the country of its HPLMN/EHPLMN 0% access probability / MCS indicator / HPLMN/0%/100% accessibility AC7 / RRC\_INACTIVE

11.3.6.1 Test Purpose (TP)

(1)

**with** { UE configured for Access Identity 2 }

**ensure** **that** {

**when** { UE moves to a new cell which is not in the country of its HPLMN or in an EHPLMN (if the EHPLMN list is present) having received SIB1 message including UAC set to 0% accessibility for Access Category 7 and Access Identity 2 is exempted from the access barring check }

**then** { UE does not consider Access Identity 2 as valid and does not initiate RRC connection since Access Identity 0 is not exempted from the access barring check until barring for Access Category 7 is removed }

}

(2)

**with** { UE configured for Access Identity 2 }

**ensure** **that** {

**when** { UE moves to a new cell which is not in the country of its HPLMN or in an EHPLMN (if the EHPLMN list is present) but receives the MCS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message being set to ""Access identity 2 valid"" }

**then** { UE does consider Access Identity 2 as valid }

}

(3)

**with** { UE configured for Access Identity 2 having received SIB1 containing UAC Info indicating 0% accessibility for Access Category 7 camped in NR RRC\_INACTIVE state on HPLMN }

**ensure** **that** {

**when** { UE attempts to send uplink user data packet for a PDU session with suspended user-plane resources }

**then** { UE does not attempt to initiate connection on the NR Cell until barring is alleviated }

(4)

**with** { UE configured for Access Identity 2 having received SIB1 containing UAC Info indicating 100% accessibility for Access Category 7 while camped on HPLMN in NR RRC\_INACTIVE state }

**ensure** **that** {

**when** { UE attempts to send uplink user data packet for a PDU session with suspended user-plane resources }

**then** { UE initiates RRC Resume procedure with establishmentCause set to mcs-PriorityAccess }

}

11.3.6.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in TS 24.501: clause 4.5.2, 4.5.4.1 and 4.5.6 and TS 38.331: clause 5.3.14.1, 5.3.14.2, 5.3.14.4 and 5.3.14.5. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 4.5.2]

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

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

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

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

Table 4.5.2.1: Access identities

|  |  |
| --- | --- |
| Access Identity number | UE configuration |
| 0 | UE is not configured with any parameters from this table |
| 1 (NOTE 1) | UE is configured for multimedia priority service (MPS). |
| 2 (NOTE 2) | UE is configured for mission critical service (MCS). |
| 3-10 | Reserved for future use |
| 11 (NOTE 3) | Access Class 11 is configured in the UE. |
| 12 (NOTE 3) | Access Class 12 is configured in the UE. |
| 13 (NOTE 3) | Access Class 13 is configured in the UE. |
| 14 (NOTE 3) | Access Class 14 is configured in the UE. |
| 15 (NOTE 3) | Access Class 15 is configured in the UE. |
| NOTE 1: Access identity 1 is valid when: - the USIM file EFUAC\_AIC indicates the UE is configured for access identity 1 and the RPLMN is the HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present), or a visited PLMN of the home country (see the definition of home country in 3GPP TS 24.301 [15]); or - the UE receives the 5GS network feature support IE with the MPS indicator bit set to "Access identity 1 valid in RPLMN or equivalent PLMN" from the RPLMN as described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4.  NOTE 2: Access identity 2 is used by UEs configured for MCS and is valid when: - the USIM file EFUAC\_AIC indicates the UE is configured for access identity 2 and the RPLMN is the HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present), or a visited PLMN of the home country (see 3GPP TS 23.122 [5]); or - the UE receives the 5GS network feature support IE with the MCS indicator bit set to "Access identity 2 valid in RPLMN or equivalent PLMN" from the RPLMN as described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4.  NOTE 3: Access identities 11 and 15 are valid in HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present). Access Identities 12, 13 and 14 are valid in HPLMN and visited PLMNs of home country only (see the definition of home country in 3GPP TS 24.301 [15]). | |

The UE uses the MPS indicator bit of the 5GS network feature support IE to determine if access identity 1 is valid. Processing of the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message is described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4. The UE shall not consider access identity 1 to be valid when the UE is not in the country of its HPLMN prior to receiving the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message being set to "Access identity 1 valid in RPLMN or equivalent PLMN".

When the UE is in the country of its HPLMN, the contents of the USIM files EFUAC\_AIC and EFACC as specified in 3GPP TS 31.102 [22] and the rules specified in table 4.5.2.1 are used to determine the applicability of access identity 1 and access classes 11 - 15. When the UE is in the country of its HPLMN, and the USIM file EFUAC\_AIC does not indicate the UE is configured for access identity 1, the UE uses the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message to determine if access identity 1 is valid. When the UE is in the country of its HPLMN, and the USIM file EFUAC\_AIC indicates the UE is configured for access identity 1, the MPS indicator bit of the 5GS network feature support IE is not applicable. When the UE is not in the country of its HPLMN, the contents of the USIM files EFUAC\_AIC and EFACC are not applicable.

The UE uses the MCS indicator bit of the 5GS network feature support IE to determine if access identity 2 is valid. Processing of the MCS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message is described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4. The UE shall not consider access identity 2 to be valid when the UE is not in the country of its HPLMN prior to receiving the MCS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message being set to "Access identity 2 valid in RPLMN or equivalent PLMN".

When the UE is in the country of its HPLMN, the contents of the USIM files EFUAC\_AIC and EFACC as specified in 3GPP TS 31.102 [22] and the rules specified in table 4.5.2.1 are used to determine the applicability of access identity 2 and access classes 11 - 15. When the UE is in the country of its HPLMN, and the USIM file EFUAC\_AIC does not indicate the UE is configured for access identity 2, the UE uses the MCS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message to determine if access identity 2 is valid. When the UE is in the country of its HPLMN, and the USIM file EFUAC\_AIC indicates the UE is configured for access identity 2, the MCS indicator bit of the 5GS network feature support IE is not applicable. When the UE is not in the country of its HPLMN, the contents of the USIM files EFUAC\_AIC and EFACC are not applicable.

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

NOTE: The case when an access attempt matches more than one rule includes the case when multiple events trigger an access attempt at the same time.

Table 4.5.2.2: Mapping table for access categories

|  |  |  |  |
| --- | --- | --- | --- |
| Rule # | Type of access attempt | Requirements to be met | Access Category |
| 1 | Response to paging or NOTIFICATION over non-3GPP access;  5GMM connection management procedure initiated for the purpose of transporting an LPP message | Access attempt is for MT access | 0 (= MT\_acc) |
| 2 | Emergency | UE is attempting access for an emergency session (NOTE 1, NOTE 2) | 2 (= emergency) |
| 3 | Access attempt for operator-defined access category | UE stores operator-defined access category definitions valid in the current PLMN as specified in subclause 4.5.3, and access attempt is matching criteria of an operator-defined access category definition | 32-63  (= based on operator classification) |
| 4 | Access attempt for delay tolerant service | (a) UE is configured for NAS signalling low priority or UE supporting S1 mode is configured for EAB (see the "ExtendedAccessBarring" leaf of NAS configuration MO in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22]) where "EAB override" does not apply, and  (b). the UE received one of the categories a, b or c as part of the parameters for unified access control in the broadcast system information, and the UE is a member of the broadcasted category in the selected PLMN or RPLMN/equivalent PLMN  (NOTE 3, NOTE 5, NOTE 6, NOTE 7, NOTE 8) | 1 (= delay tolerant) |
| 5 | MO MMTel voice call | Access attempt is for MO MMTel voice call  or for NAS signalling connection recovery during ongoing MO MMTel voice call (NOTE 2) | 4 (= MO MMTel voice) |
| 6 | MO MMTel video call | Access attempt is for MO MMTel video call  or for NAS signalling connection recovery during ongoing MO MMTel video call (NOTE 2) | 5 (= MO MMTel video) |
| 7 | MO SMS over NAS or MO SMSoIP | Access attempt is for MO SMS over NAS (NOTE 4) or MO SMS over SMSoIP transfer  or for NAS signalling connection recovery during ongoing MO SMS or SMSoIP transfer (NOTE 2) | 6 (= MO SMS and SMSoIP) |
| 8 | UE NAS initiated 5GMM specific procedures | Access attempt is for MO signalling | 3 (= MO\_sig) |
| 9 | UE NAS initiated 5GMM connection management procedure or 5GMM NAS transport procedure | Access attempt is for MO data | 7 (= MO\_data) |
| 10 | An uplink user data packet is to be sent for a PDU session with suspended user-plane resources | No further requirement is to be met | 7 (= MO\_data) |
| NOTE 1: This includes 5GMM specific procedures while the service is ongoing and 5GMM connection management procedures required to establish a PDU session with request type = "initial emergency request" or "existing emergency PDU session", or to re-establish user-plane resources for such a PDU session. This further includes the service request procedure initiated with a SERVICE REQUEST message with the Service type IE set to "emergency services fallback".<  NOTE 2: Access for the purpose of NAS signalling connection recovery during an ongoing service, or for the purpose of NAS signalling connection establishment following fallback indication from lower layers during an ongoing service, is mapped to the access category of the ongoing service in order to derive an RRC establishment cause, but barring checks will be skipped for this access attempt.  NOTE 3: If the UE selects a new PLMN, then the selected PLMN is used to check the membership; otherwise the UE uses the RLPMN or a PLMN equivalent to the RPLMN.  NOTE 4: This includes the 5GMM connection management procedures triggered by the UE-initiated NAS transport procedure for transporting the MO SMS.  NOTE 5: The UE configured for NAS signalling low priority is not supported in this release of specification. If a UE supporting both S1 mode and N1 mode is configured for NAS signalling low priority in S1 mode as specified in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22], the UE shall ignore the configuration for NAS signalling low priority when in N1 mode.  NOTE 6: If the access category applicable for the access attempt is 1, then the UE shall additionally determine a second access category from the range 3 to 7. If more than one access category matches, the access category of the lowest rule number shall be chosen. The UE shall use the second access category only to derive an RRC establishment cause for the access attempt.  NOTE 7: "EAB override" does not apply, if the UE is not configured to allow overriding EAB (see the "Override\_ExtendedAccessBarring" leaf of NAS configuration MO in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22]), or if NAS has not received an indication from the upper layers to override EAB and the UE does not have a PDU session that was established with EAB override.  NOTE 8: For the definition of categories a, b and c associated with access category 1, see 3GPP TS 22.261 [3]. The categories associated with access category 1 are distinct from the categories a, b and c associated with EAB (see 3GPP TS 22.011 [1A]). | | | |

[TS 24.501, clause 4.5.4.1]

When the UE is in 5GMM-IDLE mode, upon receiving a request from the upper layers for an access attempt, the NAS shall categorize the access attempt into access identities and an access category following subclause 4.5.2, table 4.5.2.1 and table 4.5.2.2, and subclause 4.5.3, and provide the applicable access identities and the access category to the lower layers for the purpose of access control checking. In this request to the lower layer the NAS can also provide to the lower layer the RRC establishment cause determined as specified in subclause 4.5.6 of this specification.

NOTE 1: The access barring check is performed by the lower layers.

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

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

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

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

If the lower layers indicate that the access attempt is barred, the NAS shall not initiate the procedure to send the initial NAS message for the access attempt. Additionally:

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

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

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

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

b) if the event which triggered the access attempt was an MO-SMSoIP-attempt-started indication:

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

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

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

NOTE 4: Barring timers, on a per access category basis, are run by the lower layers. At expiry of barring timers, the indication of alleviation of access barring is indicated to the NAS on a per access category basis.

[TS 24.501, clause 4.5.6]

When 5GMM requests the establishment of a NAS-signalling connection, the RRC establishment cause used by the UE shall be selected according to one or more access identities (see subclause 4.5.2) and the determined access category as specified in table 4.5.6.1 and table 4.5.6.2. If the determined access category is an operator-defined access category, then the RRC establishment cause used by the UE shall be selected according to table 4.5.6.1 and table 4.5.6.2 based on one or more access identities (see subclause 4.5.2) and the standardized access category determined for the operator-defined access category as described in subclause 4.5.3.

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

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

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

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

[TS 38.331, clause 5.3.14.1]

The purpose of this procedure is to perform access barring check for an access attempt associated with a given Access Category and one or more Access Identities upon request from upper layers according to TS 24.501 [23] or the RRC layer.

After a handover resulting in change of PCell in RRC\_CONNECTED the UE shall defer access barring checks until it has obtained valid UAC information (from *SIB1*) from the target cell.

[TS 38.331, clause 5.3.14.2]

Upon initiation of the procedure, the UE shall:

1> if timer T390 is running for the Access Category:

2> consider the access attempt as barred;

1> else if timer T302 is running and the Access Category is neither '2' nor '0':

2> consider the access attempt as barred;

1> else:

2> if the Access Category is '0':

3> consider the access attempt as allowed;

2> else:

3> if *SIB1* includes *uac-BarringPerPLMN-List* and the *uac-BarringPerPLMN-List* contains an *UAC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to the PLMN selected by upper layers (see TS 24.501 [23]):

4> select the *UAC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to the PLMN selected by upper layers;

4> in the remainder of this procedure, use the selected *UAC-BarringPerPLMN* entry (i.e. presence or absence of access barring parameters in this entry) irrespective of the *uac-BarringForCommon* included in *SIB1*;

3> else if SIB1 includes *uac-BarringForCommon*:

4> in the remainder of this procedure use the *uac-BarringForCommon* (i.e. presence or absence of these parameters) included in *SIB1*;

3> else:

4> consider the access attempt as allowed;

3> if uac-BarringForCommon is applicable or the uac-ACBarringListType indicates that uac-ExplicitACBarringList is used:

4> if the corresponding *UAC-BarringPerCatList* contains a *UAC-BarringPerCat* entry corresponding to the Access Category:

5> select the *UAC-BarringPerCat* entry;

5> if the uac-BarringInfoSetList contains a UAC-BarringInfoSet entry corresponding to the selected uac-barringInfoSetIndex in the UAC-BarringPerCat:

6> select the UAC-BarringInfoSet entry;

6> perform access barring check for the Access Category as specified in 5.3.14.5, using the selected UAC-BarringInfoSet as "UAC barring parameter";

5> else:

6> consider the access attempt as allowed;

4> else:

5> consider the access attempt as allowed;

3> else if the uac-ACBarringListType indicates that uac-ImplicitACBarringList is used:

4> select the *uac-BarringInfoSetIndex* corresponding to the Access Category in the *uac-ImplicitACBarringList*;

4> if the uac-BarringInfoSetList contains the UAC-BarringInfoSet entry corresponding to the selected uac-BarringInfoSetIndex:

5> select the *UAC-BarringInfoSet* entry;

5> perform access barring check for the Access Category as specified in 5.3.14.5, using the selected *UAC-BarringInfoSet* as "UAC barring parameter";

4> else:

5> consider the access attempt as allowed;

3> else:

4> consider the access attempt as allowed;

1> if the access barring check was requested by upper layers:

2> if the access attempt is considered as barred:

3> if timer T302 is running:

4> inform the upper layer that access barring is applicable for all access categories except categories '0' and '2', upon which the procedure ends;

3> else:

4> inform upper layers that the access attempt for the Access Category is barred, upon which the procedure ends;

2> else:

3> inform upper layers that the access attempt for the Access Category is allowed, upon which the procedure ends;

1> else:

2> the procedure ends.

[TS 38.331, clause 5.3.14.4]

The UE shall:

1> if timer T302 expires or is stopped, and if timer T390 corresponding to an Access Category is not running; or

1> if timer T390 corresponding to an Access Category other than '2' expires or is stopped, and if timer T302 is not running; or

1> if timer T390 corresponding to the Access Category '2' expires or is stopped:

2> consider the barring for this Access Category to be alleviated;

1> when barring for an Access Category is considered being alleviated:

2> if the Access Category was informed to upper layers as barred:

3> inform upper layers about barring alleviation for the Access Category.

2> if barring is alleviated for Access Category '8':

3> perform actions specified in 5.3.13.8;

[TS 38.331, clause 5.3.14.5]

The UE shall:

1> if one or more Access Identities are indicated according to TS 24.501 [23], and

1> if for at least one of these Access Identities the corresponding bit in the *uac-BarringForAccessIdentity* contained in "UAC barring parameter" is set to *zero*:

2> consider the access attempt as allowed;

1> else:

2> draw a random number '*rand*' uniformly distributed in the range: 0 ≤ *rand* < 1;

2> if '*rand*' is lower than the value indicated by *uac-BarringFactor* included in "UAC barring parameter":

3> consider the access attempt as allowed;

2> else:

3> consider the access attempt as barred;

1> if the access attempt is considered as barred:

2> draw a random number '*rand*' that is uniformly distributed in the range 0 ≤ *rand* < 1;

2> start timer T390 for the Access Category with the timer value calculated as follows, using the *uac-BarringTime* included in"AC barring parameter":

T390 = (0.7+ 0.6 \* *rand*) \* *uac-BarringTime.*

11.3.6.3 Test description

11.3.6.3.1 Pre-test conditions

System Simulator:

- 2 NR cells: NR Cell 1 and 12 as specified in TS 38.508-1 [4] table 4.4.2-3 are configured as shown in Table 11.3.6.3.1–1.

Table 11.3.6.3.1–1: PLMN identifiers

|  |  |  |  |
| --- | --- | --- | --- |
| NR Cell | PLMN names | MCC | MNC |
| NR Cell 1 | PLMN1 | 001 | 01 |
| NR Cell 12 | PLMN2 | 002 | 11 |

- System information combination NR-1 as defined in TS 38.508-1 [4] Table 4.4.3.1.2-1 is used in NR cells.

UE:

- The UE is equipped with a USIM configuration as defined in TS 38.508-1 [4] Table 6.4.1-19.

Preamble:

- The UE is in state 1N-A on NR Cell 1(serving cell) according to TS 38.508-1 [4] Table 4.4A.2-1 and using the message condition UE TEST LOOP MODE B prepared according to TS 38.508-1 [4].

11.3.6.3.2 Test procedure sequence

Table 11.3.6.3.2-1 for FR1 and Table 11.3.6.3.2-2 for FR2 illustrates the downlink power levels and other changing parameters to be applied for the cells at various time instants of the test execution. Row marked "T0" denotes the initial conditions in preamble, while columns marked "T1", "T2" and "T3" are to be applied subsequently in the Main behaviour. The exact instants on which these values shall be applied are described in the texts in this clause.

Table 11.3.6.3.2-1: Cell configuration changes over time for FR1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter | Unit | NR Cell 1 | NR Cell 12 | Remarks |
| T0 | SS/PBCH  SSS EPRE | dBm/SCS | -88 | Off | The power level values are assigned to ensure UE registered on NR Cell 1. |
| T1 | SS/PBCH  SSS EPRE | dBm/SCS | Off | -80 | The power level values are assigned to ensure UE registered on NR Cell 12. |
| T2 | SS/PBCH  SSS EPRE | dBm/SCS | -80 | Off | The power level values are assigned to ensure UE registered on NR Cell 1. |
| Note 1: Power level “Off” is defined in TS 38.508-1 [4] Table 6.2.2.1-3. | | | | | |

Table 11.3.6.3.2-2: Cell configuration changes over time for FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter | Unit | NR Cell 1 | NR Cell 12 | Remarks |
| T0 | SS/PBCH  SSS EPRE | dBm/SCS | -82 | Off | The power level values are assigned to ensure UE registered on NR Cell 1. |
| T1 | SS/PBCH  SSS EPRE | dBm/SCS | Off | -82 | The power level values are assigned to ensure UE registered on NR Cell 12. |
| T2 | SS/PBCH  SSS EPRE | dBm/SCS | -82 | Off | The power level values are assigned to ensure UE registered on NR Cell 1. |
| Note 1: Power level “Off” is defined in TS 38.508-1 [4] Table 6.2.2.2-2. | | | | | |

Table 11.3.6.3.2-3: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS adjusts the NR Cells power levels according to row "T1" in table 11.3.6.3.2-1/2. | - | - | - | - |
| 1A | Void | - | - | - | - |
| 1AA | Check: Does the UE transmit a *RRCSetupRequest* message on NR cell 12 including the *establishmentCause* which is any value except *mcs-PriorityAccess*? | --> | NR RRC: RRCSetupRequest | 1 | P |
| 1AB-1AE | Steps 2 to 5 of the mobility registration updating procedure described in TS 38.508-1 [4] Table 4.9.5.2.2-1 are performed on NR Cell 12. | - | - | - | - |
| 1AF-1AI | Steps 5 to 8 of the NR RRC\_CONNECTED procedure in TS 38.508-1 Table 4.5.4.2-3 are performed. | - | - | - | - |
| 1AJ | The SS transmits a CLOSE UE TEST LOOP message. | <-- | NR RRC: DLInformationTransfer  TC: CLOSE UE TEST LOOP | - | - |
| 1AK | The UE transmits a CLOSE UE TEST LOOP COMPLETE message. | --> | NR RRC: ULInformationTransfer  TC: CLOSE UE TEST LOOP COMPLETE | - | - |
| 1AL | The SS transmits one IP PDU. | - | - | - | - |
| 1AM | The SS transmits an RRCRelease message and move the UE to RRC\_IDLE. | <-- | NR RRC: RRCRelease | - | - |
| 1AN | Check: Does the UE transmit an RRCSetupRequest message within 21s on NR Cell 12? (Note 4) | --> | NR RRC: RRCSetupRequest | 1 | F |
| 1B | SS changes SIB1 of NR Cell 12 according to 38.508-1 [4] Table 4.6.1-28 and sends Short Message on PDCCH using P-RNTI. | - | - | - | - |
| 1C | Start Timer=30 sec. (Note 3) | - | - | - | - |
| - | EXCEPTION: Steps 1Da1-1Db16 describe optional behaviour that depends on the UE implementation. | - | - | - | - |
| 1Da1 | Check: Does the UE transmit an RRCSetupRequest message and establishmentCause is set to mo-Data? | --> | NR RRC: RRCSetupRequest | 1 | P |
| 1Da2 | Stop Timer=30 sec | - | - | - | - |
| 1Db1 | Timer=30 sec expires | - | - | - | - |
| 1Db2-1Db9 | Steps 1-8 of the generic procedure for  NR RRC Connected specified in TS 38.508-1 Table 4.5.4.2-3 are performed. | - | - | - | - |
| 1Db10 | The SS transmits an OPEN UE TEST LOOP message. | <-- | NR RRC: DLInformationTransfer  TC: OPEN UE TEST LOOP | - | - |
| 1Db11 | The UE transmits an OPEN UE TEST LOOP COMPLETE message. | --> | NR RRC: ULInformationTransfer  TC: OPEN UE TEST LOOP COMPLETE | - | - |
| 1Db12 | The SS transmits a CLOSE UE TEST LOOP message. | <-- | NR RRC: DLInformationTransfer  TC: CLOSE UE TEST LOOP | - | - |
| 1Db13 | The UE transmits a CLOSE UE TEST LOOP COMPLETE message. | --> | NR RRC: ULInformationTransfer  TC: CLOSE UE TEST LOOP COMPLETE | - | - |
| 1Db14 | The SS transmits one IP PDU. | - | - | - | - |
| 1Db15 | The SS transmits an *RRCRelease* message and move the UE to RRC\_IDLE. | <-- | NR RRC: RRCRelease | - | - |
| 1Db16 | Check: Does the UE transmit an RRCSetupRequest message and establishmentCause is set to mo-Data? | --> | NR RRC: RRCSetupRequest | 1 | P |
| 1E-1I | Steps 3-7 of the generic procedure for  NR RRC Connected specified in TS 38.508-1 Table 4.5.4.2-3 are performed. | - | - | - | - |
| - | EXCEPTION: Steps 1J and 1K can occur in any order. | - | - | - | - |
| 1J | The UE transmits an RRCReconfigurationComplete message. | --> | NR RRC: RRCReconfigurationComplete | - | - |
| 1K | The UE loops back the IP PDU | - | - | - | - |
| 1L | The UE is switched off by executing generic procedure in Table 4.9.6.3-1 in TS 38.508-1 [4] | - | - | - | - |
| 1M | The SS adjusts the NR Cells power levels according to row "T2" in table 11.3.6.3.2-1/2. | - | - | - | - |
| 1N | The UE is Switched ON. The generic test procedure in TS 38.508-1 [4] Table 4.5.2.2-2 indicate that the UE performs registration on NR Cell 1 with condition Test Mode = *On*. | - | - | - | - |
| - | EXCEPTION: Step 1O is performed in p pc\_noOf\_PDUsNewConnection > 0. | - | - | - | - |
| 1O | The generic procedure in TS 38.508-1 [4] Table 4.5.2.2-4 for UE-requested PDU session establishment performs registration on NR Cell 1 and then release the RRC Connection. | - | - | - | - |
| 1P | The SS adjusts the NR Cells power levels according to row "T1" in table 11.3.6.3.2-1/2. | - | - | - | - |
| 2 | Check: Does the UE transmit an *RRCSetupRequest* message on NR cell 12 including the establishmentCause which is any value except mcs-PriorityAccess. | --> | NR RRC: RRCSetupRequest | 1 | P |
| 3-6 | Steps 2 to 5 of the mobility registration updating procedure described in TS 38.508-1 [4] Table 4.9.5.2.2-1 are performed on NR Cell 12. (Note 1) | - | - | - | - |
| 6A-6D | Steps 5 to 8 of the NR RRC\_CONNECTED procedure in TS 38.508-1 Table 4.5.4.2-3 are performed. | - | - | - | - |
| 6E | The SS transmits a CLOSE UE TEST LOOP message. | <-- | NR RRC: DLInformationTransfer  TC: CLOSE UE TEST LOOP | - | - |
| 6F | The UE transmits a CLOSE UE TEST LOOP COMPLETE message. | --> | NR RRC: ULInformationTransfer  TC: CLOSE UE TEST LOOP COMPLETE | - | - |
| 7 | The SS transmits one IP PDU. | - | - | - | - |
| 8 | The SS transmits an *RRCRelease* message and move the UE to RRC\_IDLE. | <-- | NR RRC: RRCRelease | - | - |
| 9 | Check: Does the UE transmit an *RRCSetupReques*t message including *establishmentCause* of *mcs-PriorityAccess* within 10 s? | --> | NR RRC: RRCSetupRequest | 2 | P |
| 10 | SS transmit an *RRCSetup* message. | <-- | NR RRC: *RRCSetup* | - | - |
| 11 | The UE transmits an *RRCSetupComplete* message to confirm the successful completion of the connection establishment. | --> | NR RRC: RRCSetupComplete  5GMM: SERVICE REQUEST | - | - |
| 11A-11C | Steps 5 to 7 of the NR RRC\_CONNECTED procedure in TS 38.508-1 Table 4.5.4.2-3 are performed. | - | - | - | - |
| - | EXCEPTION: Steps 11D and 12 can occur in any order. | - | - | - | - |
| 11D | The UE transmits an RRCReconfigurationComplete message. | --> | NR RRC: RRCReconfigurationComplete | - | - |
| 12 | The UE loops back the IP PDU. | - | - | - | - |
| 13 | Void | - | - | - | - |
| - | EXCEPTION: Steps 14a1A1-14a19 describe behaviour that depends on UE configuration; the "lower case letter" identifies a step sequence that takes place if inactiveState is configured | - | - | - | - |
| 14a1A1 | IF pc\_inactiveState THEN the SS transmits an *RRCRelease* message to release RRC connection and move the UE to RRC\_IDLE. | <-- | NR RRC: RRCRelease | - | - |
| 14a1A2 | The SS changes the SIB1 of NR Cell 1 according to Table 11.3.6.3.3-4 to set the uac-BarringInfo and adjusts the NR Cells power levels according to row "T2" in table 11.3.6.3.2-1/2. | - | - | - | - |
| 14a2-14a6 | Steps 1 to 5 of the mobility registration updating procedure described in TS 38.508-1 [4] Table 4.9.5.2.2-1 are performed on NR Cell 1. (Note 2) | - | - | - | - |
| 14a7-14a10 | Steps 5 to 8 of the NR RRC\_CONNECTED procedure in TS 38.508-1 Table 4.5.4.2-3 are performed. | - | - | - | - |
| 14a10A | The SS transmits an OPEN UE TEST LOOP message. | <-- | NR RRC: DLInformationTransfer  TC: OPEN UE TEST LOOP | - | - |
| 14a10B | The UE transmits an OPEN UE TEST LOOP COMPLETE message. | --> | NR RRC: ULInformationTransfer  TC: OPEN UE TEST LOOP COMPLETE | - | - |
| 14a10C | The SS transmits a CLOSE UE TEST LOOP message. | <-- | NR RRC: DLInformationTransfer  TC: CLOSE UE TEST LOOP | - | - |
| 14a10D | The UE transmits a CLOSE UE TEST LOOP COMPLETE message. | --> | NR RRC: ULInformationTransfer  TC: CLOSE UE TEST LOOP COMPLETE | - | - |
| 14a11 | The SS transmits one IP PDU. | - | - | - | - |
| 14a12 | The SS transmits an *RRCRelease* message with suspend configuration and move the UE to RRC\_INACTIVE. | <-- | NR RRC: RRCRelease | - | - |
| 14a13 | Check: Does the UE transmit an *RRCResumeRequest* message including *resumeCause* of *mcs-PriorityAccess* within 21 s? (Note 4) | --> | NR RRC: RRCResumeRequest | 3 | F |
| 14a14 | SS changes SIB1 according to Table 11.3.6.3.3-6 and the SS notifies the UE of change of System Information on NR Cell 1 by send Short Message on PDCCH using P-RNTI. | <-- | NR RRC: *Paging* | - | - |
| 14a15 | Start Timer=30 sec. (Note 3)  NOTE: This is an arbitrary value to wait for UE initiated RRC resume procedure. | - | - | - | - |
| - | EXCEPTION: Steps 14a15a1-14a15b8 describes optional behaviour that depends on the UE implementation. | - | - | - | - |
| 14a15a1 | Check: Does the UE transmit an RRCResumeRequest message including resumeCause of mcs-PriorityAccess? | --> | NR RRC: RRCResumeRequest | 4 | P |
| 14a15a2 | Stop Timer=30. | - | - | - | - |
| 14a15b1 | Timer=30 sec expires | - | - | - | - |
| 14a15b2 | The SS transmits a Paging message including a matched identity (correct fullI-RNTI). | <-- | NR RRC: Paging | - | - |
| 14a15b3 | The UE transmit an RRCResumeRequest message. | --> | NR RRC: RRCResumeRequest |  |  |
| 14a15b4 | The SS transmits an RRCResume message. | <-- | NR RRC: RRCResume | - | - |
| 14a15b5 | The UE transmits an RRCResumeComplete message. | --> | NR RRC: RRCResumeComplete | - | - |
| 14a15b5A | The SS transmits an OPEN UE TEST LOOP message. | <-- | NR RRC: DLInformationTransfer  TC: OPEN UE TEST LOOP | - | - |
| 14a15b5B | The UE transmits an OPEN UE TEST LOOP COMPLETE message. | --> | NR RRC: ULInformationTransfer  TC: OPEN UE TEST LOOP COMPLETE | - | - |
| 14a15b5C | The SS transmits a CLOSE UE TEST LOOP message. | <-- | NR RRC: DLInformationTransfer  TC: CLOSE UE TEST LOOP | - | - |
| 14a15b5D | The UE transmits a CLOSE UE TEST LOOP COMPLETE message. | --> | NR RRC: ULInformationTransfer  TC: CLOSE UE TEST LOOP COMPLETE | - | - |
| 14a15b6 | The SS transmits one IP PDU. | - | - | - | - |
| 14a15b7 | The SS transmits an RRCRelease message with suspendConfig IE and move the UE to RRC\_Inactive state. | <-- | NR RRC: RRCRelease | - | - |
| 14a15b8 | Check: Does the UE transmit an *RRCResumeRequest* message including *resumeCause* of *mcs-PriorityAccess*? | --> | NR RRC: RRCResumeRequest | 4 | P |
| 14a16 | SS transmit an *RRCResume* message. | <-- | NR RRC: RRCResume | - | - |
| - | EXCEPTION: Steps 14a17 and 14a18 can occur in any order. | - | - | - | - |
| 14a17 | The UE transmits an *RRCResumeComplete* message to confirm the successful completion of the connection establishment. | --> | NR RRC: RRCResumeComplete | - | - |
| 14a18 | The UE loops back the IP PDU. | - | - | - | - |
| 14a19 | Void | - | - | - | - |
| 15-28 | Void | - | - | - | - |
| Note 1: The SS includes a 5GS network feature support IE in the REGISTRATION ACCEPT message configured as Table 11.3.6.3.3-3.  Note 2: The UE performs registration and the RRC connection is released.  Note 3: The wait time 30s is selected to cover (0.7 + 0.6 \* *rand*) \* uac-BarringTime(16s) = 20.7s + 2s (IP PDU delay timer) + 5.12s (modification period) = 27.92s rounded up to 28s when ‘*rand’* takes the maximum value of 0.99.  Note 4: The wait time 21s is selected to be more than T390 maximum = (0.7 + 0.6 \* *rand*) \* uac-BarringTime(16s) = 20.7s when ‘*rand’* takes the maximum value of 0.99. | | | | | |

11.3.6.3.3 Specific message contents

Table 11.3.6.3.3-1: *SIB1* of NR Cell 12 (preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-28 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| uac-BarringInfo SEQUENCE { |  |  |  |
| uac-BarringForCommon SEQUENCE (SIZE (1..maxAccessCat-1)) OF UAC-BarringPerCat { | 1 entry |  |  |
| UAC-BarringPerCat[1] SEQUENCE { |  | entry 1 |  |
| accessCategory | 7 | (= MO\_data) |  |
| uac-barringInfoSetIndex | 1 | Value 1 corresponds to the first entry in uac-BarringInfoSetList |  |
| } |  |  |  |
| } |  |  |  |
| uac-BarringPerPLMN-List | Not present |  |  |
| uac-BarringInfoSetList SEQUENCE (SIZE(1..maxBarringInfoSet)) OF UAC-BarringInfoSet { | 1 entry |  |  |
| UAC-BarringInfoSet[1] SEQUENCE { |  | entry 1 |  |
| uac-BarringFactor | p00 | 0% access probability |  |
| uac-BarringTime | s16 | 16 s |  |
| uac-BarringForAccessIdentity | ‘1011111’B | Value 1 means that access attempt is not allowed for the corresponding access identity.  The leftmost bit, bit 0 in the bit string corresponds to Access Identity 1. |  |
| } |  |  |  |
| } |  |  |  |
| uac-AccessCategory1-SelectionAssistanceInfo | Not present |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.3.6.3.3-2: *RRCSetupRequest* (step1AA, step 2 and step 9, Table 11.3.6.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-23: | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCSetupRequest ::= SEQUENCE { |  |  |  |
| rrcSetupRequest SEQUENCE { |  |  |  |
| establishmentCause | Any allowed value other than mcs-PriorityAccess |  | Step 2, Step 1AA |
|  | mcs-PriorityAccess |  | Step 9 |
| } |  |  |  |
| } |  |  |  |

Table 11.3.6.3.3-3: REGISTRATION ACCEPT(step 5, Table 11.3.6.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508 [4] Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS network feature support | ‘0000 0001 0000 0010’B | Access identity 2 valid in RPLMN or equivalent PLMN.  IMS voice over PS session supported over 3GPP access.  All other features set to "not supported" including the  'Interworking without N26 interface not supported'. |  |

Table 11.3.6.3.3-3A: *RRCReconfiguration* (step 6C and step 14a9 in Table 11.3.6.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.6.1-13 condition NR and SRB2 and DRB1 | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCReconfiguration ::= SEQUENCE { |  |  |  |
| dedicatedNAS-MessageList | Not present |  |  |
| } |  |  |  |

Table 11. 3.6.3.3-3B: SERVICE REQUEST (preamble and step 11 in Table 11.3.6.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-16 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Service type | ‘0101’B | high priority access |  |

Table 11. 3.6.3.3-3C: CLOSE UE TEST LOOP (step1AJ, step 1Db12, step 6E, step 14a10C and step 14a15b15C Table 11.3.6.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7A-3, condition UE TEST LOOP MODE B | | | |
| Information Element | Value/remark | Comment | Condition |
| UE test loop mode B LB setup |  |  |  |
| IP PDU delay | '0000 0010'B | 2 seconds |  |

Table 11.3.6.3.3-4: *SIB1* of NR Cell 1 (step 14a1A2, Table 11.3.6.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-28 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| uac-BarringInfo SEQUENCE { |  |  |  |
| uac-BarringForCommon SEQUENCE (SIZE (1..maxAccessCat-1)) OF UAC-BarringPerCat { | 1 entry |  |  |
| UAC-BarringPerCat[1] SEQUENCE { |  | entry 1 |  |
| accessCategory | 7 | (= MO\_data) |  |
| uac-barringInfoSetIndex | 1 | Value 1 corresponds to the first entry in uac-BarringInfoSetList |  |
| } |  |  |  |
| } |  |  |  |
| uac-BarringPerPLMN-List | Not present |  |  |
| uac-BarringInfoSetList SEQUENCE (SIZE(1..maxBarringInfoSet)) OF SEQUENCE { | 1 entry |  |  |
| UAC-BarringInfoSet[1] SEQUENCE { |  | entry 1 |  |
| uac-BarringFactor | P00 | 0% access probability |  |
| uac-BarringTime | s16 | 16 s |  |
| uac-BarringForAccessIdentity | 1111111 | Value 1 means that access attempt is not allowed for the corresponding access identity.  The leftmost bit, bit 0 in the bit string corresponds to Access Identity 1. |  |
| } |  |  |  |
| } |  |  |  |
| uac-AccessCategory1-SelectionAssistanceInfo | Not present |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.3.6.3.3-5: *RRCResumeRequest* (step 14a13, 14a15a1, 14a15b3 and step 14a15b8, Table 11.3.6.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-19: | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCResumeRequest ::= SEQUENCE { |  |  |  |
| rrcResumeRequest SEQUENCE { |  |  |  |
| resumeCause | mcs-PriorityAccess |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.3.6.3.3-6: *SIB1* of NR Cell 1 (step 14a14, Table 11.3.6.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-28 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| uac-BarringInfo | Not present |  |  |
| } |  |  |  |

### 11.3.6a UAC / Access Identity 2 / MCS indicator / SNPN / 0% / 100% accessibility AC7 / RRC\_INACTIVE

11.3.6a.1 Test Purpose (TP)

(1)

**with** { UE configured for Access Identity 2 }

**ensure** **that** {

**when** { UE moves to a new SNPN cell where UE is not configured for access identity 2 having received SIB1 message including UAC set to 0% accessibility for Access Category 7 and Access Identity 2 is exempted from the access barring check }

**then** { UE does not consider Access Identity 2 as valid and does not initiate RRC connection since Access Identity 0 is not exempted from the access barring check until barring for Access Category 7 is removed }

}

(2)

**with** { UE configured for Access Identity 2 }

**ensure** **that** {

**when** { UE moves to a new SNPN cell where UE is not configured for access identity 2 but receives the MCS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message being set to ""Access identity 2 valid"" }

**then** { UE does consider Access Identity 2 as valid }

}

(3)

**with** { UE configured for Access Identity 2 having received SIB1 containing UAC Info indicating 0% accessibility for Access Category 7 camped in NR RRC\_INACTIVE state on RSNPN configured for access identity 2 }

**ensure** **that** {

**when** { UE attempts to send uplink user data packet for a PDU session with suspended user-plane resources }

**then** { UE does not attempt to initiate connection on the NR Cell until barring is alleviated }

(4)

**with** { UE configured for Access Identity 2 having received SIB1 containing UAC Info indicating 100% accessibility for Access Category 7 while camped on RSNPN configured for access identity 2 in NR RRC\_INACTIVE state }

**ensure** **that** {

**when** { UE attempts to send uplink user data packet for a PDU session with suspended user-plane resources }

**then** { UE initiates RRC Resume procedure with establishmentCause set to mcs-PriorityAccess }

}

11.3.6a.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in TS 24.501: clause 4.5.2A, 4.5.4.1 and 4.5.6 and TS 38.331: clause 5.3.14.1, 5.3.14.2, 5.3.14.4 and 5.3.14.5. Unless otherwise stated these are Rel-16 requirements.

[TS 24.501, clause 4.5.2A]

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

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

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

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

Table 4.5.2A.1: Access identities

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

The contents of the unified access control configuration in the "list of subscriber data" stored in the ME (see 3GPP TS 23.122 [5]) and the rules specified in table 4.5.2A.1 are used to determine the applicability of access identity 1 in the SNPN. When the contents of the unified access control configuration in the "list of subscriber data" stored in the ME (see 3GPP TS 23.122 [5]) do not indicate the UE is configured for access identity 1 for the SNPN, the UE uses the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message to determine if access identity 1 is valid.

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

The contents of the unified access control configuration in the "list of subscriber data" stored in the ME (see 3GPP TS 23.122 [5]) and the rules specified in table 4.5.2A.1 are used to determine the applicability of access classes 11 to 15 in the SNPN.

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

NOTE: The case when an access attempt matches more than one rule includes the case when multiple events trigger an access attempt at the same time.

Table 4.5.2A.2: Mapping table for access categories

|  |  |  |  |
| --- | --- | --- | --- |
| Rule # | Type of access attempt | Requirements to be met | Access Category |
| 1 | Response to paging or NOTIFICATION over non-3GPP access (NOTE 11);  5GMM connection management procedure initiated for the purpose of transporting an LPP message without an ongoing 5GC-MO-LR procedure;  Access attempt to handover of MMTEL voice call, MMTEL video call or SMSoIP from non-3GPP access | Access attempt is for MT access, or handover of ongoing MMTEL voice call, MMTEL video call or SMSoIP from non-3GPP access | 0 (= MT\_acc) |
| 2 | Emergency | UE is attempting access for an emergency session (NOTE 1, NOTE 2) | 2 (= emergency) |
| 3 | Access attempt for operator-defined access category | UE stores operator-defined access category definitions valid in the SNPN as specified in subclause 4.5.3, and access attempt is matching criteria of an operator-defined access category definition | 32-63  (= based on operator classification) |
| 4 | Access attempt for delay tolerant service | (a) UE is configured for NAS signalling low priority, and  (b) the UE received one of the categories a, b or c as part of the parameters for unified access control in the broadcast system information, and the UE is a member of the broadcasted category in the selected SNPN or RSNPN  (NOTE 3, NOTE 5, NOTE 6, NOTE 7, NOTE 8) | 1 (= delay tolerant) |
| 4.1 | MO IMS registration related signalling | Access attempt is for MO IMS registration related signalling (e.g. IMS initial registration, re-registration, subscription refresh)  or for NAS signalling connection recovery during ongoing procedure for MO IMS registration related signalling (NOTE 2a) | 9 (= MO IMS registration related signalling) |
| 5 | MO MMTel voice call | Access attempt is for MO MMTel voice call  or for NAS signalling connection recovery during ongoing MO MMTel voice call (NOTE 2) | 4 (= MO MMTel voice) |
| 6 | MO MMTel video call | Access attempt is for MO MMTel video call  or for NAS signalling connection recovery during ongoing MO MMTel video call (NOTE 2) | 5 (= MO MMTel video) |
| 7 | MO SMS over NAS or MO SMSoIP | Access attempt is for MO SMS over NAS (NOTE 4) or MO SMS over SMSoIP transfer  or for NAS signalling connection recovery during ongoing MO SMS or SMSoIP transfer (NOTE 2) | 6 (= MO SMS and SMSoIP) |
| 8 | UE NAS initiated 5GMM specific procedures | Access attempt is for MO signalling | 3 (= MO\_sig) |
| 8.1 | Mobile originated location request | Access attempt is for mobile originated location request (NOTE 9) | 3 (= MO\_sig) |
| 8.2 | Mobile originated signalling transaction towards the PCF | Access attempt is for mobile originated signalling transaction towards the PCF (NOTE 10) | 3 (= MO\_sig) |
| 9 | UE NAS initiated 5GMM connection management procedure or 5GMM NAS transport procedure | Access attempt is for MO data | 7 (= MO\_data) |
| 10 | An uplink user data packet is to be sent for a PDU session with suspended user-plane resources | No further requirement is to be met | 7 (= MO\_data) |
| NOTE 1: In this release of the specification, there is no support for establishing an emergency session in an SNPN.  NOTE 2: Access for the purpose of NAS signalling connection recovery during an ongoing service as defined in subclause 4.5.5, or for the purpose of NAS signalling connection establishment following fallback indication from lower layers during an ongoing service as defined in subclause 4.5.5, is mapped to the access category of the ongoing service in order to derive an RRC establishment cause, but barring checks will be skipped for this access attempt.  NOTE 2a: Access for the purpose of NAS signalling connection recovery during an ongoing MO IMS registration related signalling as defined in subclause 4.5.5, or for the purpose of NAS signalling connection establishment following fallback indication from lower layers during an ongoing MO IMS registration related signalling as defined in subclause 4.5.5, is mapped to the access category of the MO IMS registration related signalling in order to derive an RRC establishment cause, but barring checks will be skipped for this access attempt.  NOTE 3: If the UE selects a new SNPN, then the selected SNPN is used to check the membership; otherwise the UE uses the RSNPN.  NOTE 4: This includes the 5GMM connection management procedures triggered by the UE-initiated NAS transport procedure for transporting the MO SMS.  NOTE 5: The UE configured for NAS signalling low priority is not supported in this release of specification.  NOTE 6: If the access category applicable for the access attempt is 1, then the UE shall additionally determine a second access category from the range 3 to 7. If more than one access category matches, the access category of the lowest rule number shall be chosen. The UE shall use the second access category only to derive an RRC establishment cause for the access attempt.  NOTE 7: Void.  NOTE 8: For the definition of categories a, b and c associated with access category 1, see 3GPP TS 22.261 [3]. The categories associated with access category 1 are distinct from the categories a, b and c associated with EAB (see 3GPP TS 22.011 [1A]).  NOTE 9: This includes: a) the UE-initiated NAS transport procedure for transporting a mobile originated location  request; b) the 5GMM connection management procedure triggered by a) above; and c) NAS signalling connection recovery during an ongoing 5GC-MO-LR procedure.  NOTE 10: This includes: a) the UE-initiated NAS transport procedure for transporting a mobile originated signalling  transaction towards the PCF; b) the 5GMM connection management procedure triggered by a) above; and c) NAS signalling connection recovery during an ongoing UE triggered V2X policy provisioning  procedure.  NOTE 11: The term "non-3GPP access" refers to the case when the UE is accessing SNPN services via a PLMN. | | | |

[TS 24.501, clause 4.5.4.1]

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

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

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

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

NOTE 1: The access barring check is performed by the lower layers.

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

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

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

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

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

If the lower layers indicate that the access attempt is barred, the NAS shall not initiate the procedure to send the initial NAS message for the access attempt. Additionally:

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

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

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

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

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

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

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

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

c) if the access attempt is for emergency:

1) the NAS shall notify the upper layers that the access attempt is barred.

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

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

[TS 24.501, clause 4.5.6]

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

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

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

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

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

[TS 38.331, clause 5.3.14.1]

The purpose of this procedure is to perform access barring check for an access attempt associated with a given Access Category and one or more Access Identities upon request from upper layers according to TS 24.501 [23] or the RRC layer. This procedure does not apply to IAB-MT. This procedure does not apply to L2 U2N Relay UE initiating RRC connection establishment or RRC connection resume upon reception of any message from a L2 U2N remote UE via SL-RLC0 or SL-RLC1 in accordance to 5.3.3.1a or 5.3.13.1a.

After a PCell change in RRC\_CONNECTED the UE shall defer access barring checks until it has obtained *SIB1* (as specified in 5.2.2.2) from the target cell.

[TS 38.331, clause 5.3.14.2]

Upon initiation of the procedure, the UE shall:

1> if timer T390 is running for the Access Category:

2> consider the access attempt as barred;

1> else if timer T302 is running and the Access Category is neither '2' nor '0':

2> consider the access attempt as barred;

1> else:

2> if the Access Category is '0':

3> consider the access attempt as allowed;

2> else:

3> if *SIB1* includes *uac-BarringPerPLMN-List* that contains a *UAC-BarringPerPLMN* for the selected PLMN or SNPN:

4> if the procedure in 5.2.2.4.2 for a selected PLMN resulted in use of information in *npn-IdentityInfoList* and *UAC-BarringPerPLMN* has an entry with the *plmn-IdentityIndex* corresponding to used information in this list:

5> select the *UAC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to used information in the *npn-IdentityInfoList*;

4> else:

5> select the *UAC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to the selected PLMN and the *PLMN-IdentityInfo, if any,* or the selected SNPN and the *npn-IdentityInfoList*;

3> if any *UAC-BarringPerPLMN* entry is selected:

4> in the remainder of this procedure, use the selected *UAC-BarringPerPLMN* entry (i.e. presence or absence of access barring parameters in this entry) irrespective of the *uac-BarringForCommon* included in *SIB1*;

3> else if SIB1 includes *uac-BarringForCommon*:

4> in the remainder of this procedure use the *uac-BarringForCommon* (i.e. presence or absence of these parameters) included in *SIB1*;

3> else:

4> consider the access attempt as allowed;

3> if *uac-BarringForCommon* is applicable or the *uac-ACBarringListType* indicates that *uac-ExplicitACBarringList* is used:

4> if the corresponding *UAC-BarringPerCatList* contains a *UAC-BarringPerCat* entry corresponding to the Access Category:

5> select the *UAC-BarringPerCat* entry;

5> if the *uac-BarringInfoSetList* contains a *UAC-BarringInfoSet* entry corresponding to the selected *uac-barringInfoSetIndex* in the *UAC-BarringPerCat*:

6> select the *UAC-BarringInfoSet* entry;

6> perform access barring check for the Access Category as specified in 5.3.14.5, using the selected *UAC-BarringInfoSet* as "UAC barring parameter";

5> else:

6> consider the access attempt as allowed;

4> else:

5> consider the access attempt as allowed;

3> else if the *uac-ACBarringListType* indicates that *uac-ImplicitACBarringList* is used:

4> select the *uac-BarringInfoSetIndex* corresponding to the Access Category in the *uac-ImplicitACBarringList*;

4> if the *uac-BarringInfoSetList* contains the *UAC-BarringInfoSet* entry corresponding to the selected *uac-BarringInfoSetIndex*:

5> select the *UAC-BarringInfoSet* entry;

5> perform access barring check for the Access Category as specified in 5.3.14.5, using the selected *UAC-BarringInfoSet* as "UAC barring parameter";

4> else:

5> consider the access attempt as allowed;

3> else:

4> consider the access attempt as allowed;

1> if the access barring check was requested by upper layers:

2> if the access attempt is considered as barred:

3> if timer T302 is running:

4> if timer T390 is running for Access Category '2':

5> inform the upper layer that access barring is applicable for all access categories except categories '0', upon which the procedure ends;

4> else

5> inform the upper layer that access barring is applicable for all access categories except categories '0' and '2', upon which the procedure ends;

3> else:

4> inform upper layers that the access attempt for the Access Category is barred, upon which the procedure ends;

2> else:

3> inform upper layers that the access attempt for the Access Category is allowed, upon which the procedure ends;

1> else:

2> the procedure ends.

[TS 38.331, clause 5.3.14.4]

The UE shall:

1> if timer T302 expires or is stopped:

2> for each Access Category for which T390 is not running:

3> consider the barring for this Access Category to be alleviated:

1> else if timer T390 corresponding to an Access Category other than '2' expires or is stopped, and if timer T302 is not running:

2> consider the barring for this Access Category to be alleviated;

1> else if timer T390 corresponding to the Access Category '2' expires or is stopped:

2> consider the barring for this Access Category to be alleviated;

1> when barring for an Access Category is considered being alleviated:

2> if the Access Category was informed to upper layers as barred:

3> inform upper layers about barring alleviation for the Access Category.

2> if barring is alleviated for Access Category '8'; or

2> if barring is alleviated for Access Category '2':

3> perform actions specified in 5.3.13.8;

[TS 38.331, clause 5.3.14.5]

The UE shall:

1> if one or more Access Identities equal to 1, 2, 11, 12, 13, 14, or 15 are indicated according to TS 24.501 [23], and

1> if for at least one of these Access Identities the corresponding bit in the *uac-BarringForAccessIdentity* contained in "UAC barring parameter" is set to *zero*:

2> consider the access attempt as allowed;

1> else:

2> if the establishment of the RRC connection is the result of release with redirect with *mpsPriorityIndication* (either in NR or E-UTRAN)*;* and

2> if the bit corresponding to Access Identity 1 in the *uac-BarringForAccessIdentity* contained in the "UAC barring parameter" is set to *zero:*

3> consider the access attempt as allowed;

2> else if Access Identity 3 is indicated:

3> draw a random number '*rand*' uniformly distributed in the range: 0 ≤ rand < 1;

3> if '*rand*' is lower than the value indicated by *uac-BarringFactorForAI3* included in "UAC barring parameter":

4> consider the access attempt as allowed;

3> else:

4> consider the access attempt as barred;

2> else:

3> draw a random number '*rand*' uniformly distributed in the range: 0 ≤ *rand* < 1;

3> if '*rand*' is lower than the value indicated by *uac-BarringFactor* included in "UAC barring parameter":

4> consider the access attempt as allowed;

3> else:

4> consider the access attempt as barred;

1> if the access attempt is considered as barred:

2> draw a random number '*rand*' that is uniformly distributed in the range 0 ≤ *rand* < 1;

2> start timer T390 for the Access Category with the timer value calculated as follows, using the *uac-BarringTime* included in"UAC barring parameter":

T390 = (0.7+ 0.6 \* *rand*) \* *uac-BarringTime.*

11.3.6a.3 Test description

11.3.6a.3.1 Pre-test conditions

System Simulator:

- 2 SNPN cells NR Cell 1, NR Cell 12 are configured broadcasting default SNPN IDs as indicated in TS 38.508-1 [4] Table 4.4.2-4.

- System information combination NR-12 as defined in TS 38.508-1 [4] clause 4.4.3.1.2 is used in NR cells.

UE:

- The UE is provisioned with a “list of subscriber data” to allow access to SNPN identified by NR Cell 1 and NR Cell 12. The “list of subscriber data” also indicates that the UE is configured for access identitiy 2 for the SNPN identified by NR cell 1.

Preamble:

- The UE is in state 1N-A on NR Cell 1(serving cell) according to TS 38.508-1 [4] Table 4.4A.2-1 and using the message condition UE TEST LOOP MODE B prepared according to TS 38.508-1 [4].

11.3.6a.3.2 Test procedure sequence

Same as test case 11.3.6.

11.3.6a.3.3 Specific message contents

Same as test case 11.3.6.

### 11.3.7 UAC / Access Identity 11..15 / High priority access / HPLMN/0% accessibility AC2 / Emergency call

11.3.7.1 Test Purpose (TP)

(1)

**with** { UE configured for Access Identity 11..15 having received SIB1 containing UAC Info indicating 0% accessibility for Access Category 2 camped in NR RRC\_IDLE state on HPLMN }

**ensure that** {

**when** { User initiates MO emergency call }

**then** { UE does not initiate emergency call on NR Cell }

}

11.3.7.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501 clause 4.5.2, 4.5.4.1 and 4.5.6, TS 38.331 clause 5.3.14.2, 5.3.14.4 and 5.3.14.5, TS 22.101 clause 10.1.1. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 4.5.2]

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

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

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

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

Table 4.5.2.1: Access identities

|  |  |
| --- | --- |
| Access Identity number | UE configuration |
| 0 | UE is not configured with any parameters from this table |
| 1 (NOTE 1) | UE is configured for multimedia priority service (MPS). |
| 2 (NOTE 2) | UE is configured for mission critical service (MCS). |
| 3-10 | Reserved for future use |
| 11 (NOTE 3) | Access Class 11 is configured in the UE. |
| 12 (NOTE 3) | Access Class 12 is configured in the UE. |
| 13 (NOTE 3) | Access Class 13 is configured in the UE. |
| 14 (NOTE 3) | Access Class 14 is configured in the UE. |
| 15 (NOTE 3) | Access Class 15 is configured in the UE. |
| NOTE 1: Access identity 1 is valid when: - the USIM file EFUAC\_AIC indicates the UE is configured for access identity 1 and the selected PLMN, if a new PLMN is selected, or RPLMN is the HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present), or a visited PLMN of the home country (see the definition of home country in 3GPP TS 24.301 [15]); or - the UE receives the 5GS network feature support IE with the MPS indicator bit set to "Access identity 1 valid" from the RPLMN as described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4.  NOTE 2: Access identity 2 is used by UEs configured for MCS and is valid when: - the USIM file EFUAC\_AIC indicates the UE is configured for access identity 2 and the selected PLMN, if a new PLMN is selected, or RPLMN is the HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present), or a visited PLMN of the home country (see 3GPP TS 23.122 [5]); or - the UE receives the 5GS network feature support IE with the MCS indicator bit set to "Access identity 2 valid" from the RPLMN as described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4.  NOTE 3: Access identities 11 and 15 are valid in HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present). Access Identities 12, 13 and 14 are valid in HPLMN and visited PLMNs of home country only (see the definition of home country in 3GPP TS 24.301 [15]). | |

…

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

NOTE: The case when an access attempt matches more than one rule includes the case when multiple events trigger an access attempt at the same time.

Table 4.5.2.2: Mapping table for access categories

|  |  |  |  |
| --- | --- | --- | --- |
| Rule # | Type of access attempt | Requirements to be met | Access Category |
| 1 | Response to paging or NOTIFICATION over non-3GPP access;  5GMM connection management procedure initiated for the purpose of transporting an LPP message without an ongoing 5GC-MO-LR procedure;  Access attempt to handover of ongoing MMTEL voice call, MMTEL video call or SMSoIP from non-3GPP access | Access attempt is for MT access, or handover of ongoing MMTEL voice call, MMTEL video call or SMSoIP from non-3GPP access | 0 (= MT\_acc) |
| 2 | Emergency | UE is attempting access for an emergency session (NOTE 1, NOTE 2) | 2 (= emergency) |
| 3 | Access attempt for operator-defined access category | UE stores operator-defined access category definitions valid in the current PLMN as specified in subclause 4.5.3, and access attempt is matching criteria of an operator-defined access category definition | 32-63  (= based on operator classification) |
| 4 | Access attempt for delay tolerant service | (a) UE is configured for NAS signalling low priority or UE supporting S1 mode is configured for EAB (see the "ExtendedAccessBarring" leaf of NAS configuration MO in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22]) where "EAB override" does not apply, and  (b): the UE received one of the categories a, b or c as part of the parameters for unified access control in the broadcast system information, and the UE is a member of the broadcasted category in the selected PLMN or RPLMN/equivalent PLMN  (NOTE 3, NOTE 5, NOTE 6, NOTE 7, NOTE 8) | 1 (= delay tolerant) |
| 4.1 | MO IMS registration related signalling | Access attempt is for MO IMS registration related signalling (e.g. IMS initial registration, re-registration, subscription refresh)  or for NAS signalling connection recovery during ongoing procedure for MO IMS registration related signalling (NOTE 2a) | 9 (= MO IMS registration related signalling) |
| 5 | MO MMTel voice call | Access attempt is for MO MMTel voice call  or for NAS signalling connection recovery during ongoing MO MMTel voice call (NOTE 2) | 4 (= MO MMTel voice) |
| 6 | MO MMTel video call | Access attempt is for MO MMTel video call  or for NAS signalling connection recovery during ongoing MO MMTel video call (NOTE 2) | 5 (= MO MMTel video) |
| 7 | MO SMS over NAS or MO SMSoIP | Access attempt is for MO SMS over NAS (NOTE 4) or MO SMS over SMSoIP transfer  or for NAS signalling connection recovery during ongoing MO SMS or SMSoIP transfer (NOTE 2) | 6 (= MO SMS and SMSoIP) |
| 8 | UE NAS initiated 5GMM specific procedures | Access attempt is for MO signalling | 3 (= MO\_sig) |
| 8.1 | Mobile originated location request | Access attempt is for mobile originated location request (NOTE 9) | 3 (= MO\_sig) |
| 8.2 | Mobile originated signalling transaction towards the PCF | Access attempt is for mobile originated signalling transaction towards the PCF (NOTE 10) | 3 (= MO\_sig) |
| 9 | UE NAS initiated 5GMM connection management procedure or 5GMM NAS transport procedure | Access attempt is for MO data | 7 (= MO\_data) |
| 10 | An uplink user data packet is to be sent for a PDU session with suspended user-plane resources | No further requirement is to be met | 7 (= MO\_data) |
| NOTE 1: This includes 5GMM specific procedures while the service is ongoing and 5GMM connection management procedures required to establish a PDU session with request type = "initial emergency request" or "existing emergency PDU session", or to re-establish user-plane resources for such a PDU session. This further includes the service request procedure initiated with a SERVICE REQUEST message with the Service type IE set to "emergency services fallback".  NOTE 2: Access for the purpose of NAS signalling connection recovery during an ongoing service as defined in subclause 4.5.5, or for the purpose of NAS signalling connection establishment following fallback indication from lower layers during an ongoing service as defined in subclause 4.5.5, is mapped to the access category of the ongoing service in order to derive an RRC establishment cause, but barring checks will be skipped for this access attempt.  NOTE 2a: Access for the purpose of NAS signalling connection recovery during an ongoing procedure for MO IMS registration related signalling as defined in subclause 4.5.5, or for the purpose of NAS signalling connection establishment following fallback indication from lower layers during an ongoing procedure for MO IMS registration related signalling as defined in subclause 4.5.5, is mapped to the access category of the MO IMS registration related signalling in order to derive an RRC establishment cause, but barring checks will be skipped for this access attempt.  NOTE 3: If the UE selects a new PLMN, then the selected PLMN is used to check the membership; otherwise the UE uses the RLPMN or a PLMN equivalent to the RPLMN.  NOTE 4: This includes the 5GMM connection management procedures triggered by the UE-initiated NAS transport procedure for transporting the MO SMS.  NOTE 5: The UE configured for NAS signalling low priority is not supported in this release of specification. If a UE supporting both S1 mode and N1 mode is configured for NAS signalling low priority in S1 mode as specified in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22], the UE shall ignore the configuration for NAS signalling low priority when in N1 mode.  NOTE 6: If the access category applicable for the access attempt is 1, then the UE shall additionally determine a second access category from the range 3 to 7. If more than one access category matches, the access category of the lowest rule number shall be chosen. The UE shall use the second access category only to derive an RRC establishment cause for the access attempt.  NOTE 7: "EAB override" does not apply, if the UE is not configured to allow overriding EAB (see the "Override\_ExtendedAccessBarring" leaf of NAS configuration MO in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22]), or if NAS has not received an indication from the upper layers to override EAB and the UE does not have a PDU session that was established with EAB override.  NOTE 8: For the definition of categories a, b and c associated with access category 1, see 3GPP TS 22.261 [3]. The categories associated with access category 1 are distinct from the categories a, b and c associated with EAB (see 3GPP TS 22.011 [1A]).  NOTE 9: This includes: a) the UE-initiated NAS transport procedure for transporting a mobile originated location request; b) the 5GMM connection management procedure triggered by a) above; and c) NAS signalling connection recovery during an ongoing 5GC-MO-LR procedure.  NOTE 10: This includes: a) the UE-initiated NAS transport procedure for transporting a mobile originated signalling  transaction towards the PCF; b) the 5GMM connection management procedure triggered by a) above; and c) NAS signalling connection recovery during an ongoing UE triggered V2X policy provisioning procedure. | | | |

[TS 24.501, clause 4.5.4.1]

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

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

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

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

NOTE 1: The access barring check is performed by the lower layers.

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

…

If the lower layers indicate that the access attempt is barred, the NAS shall not initiate the procedure to send the initial NAS message for the access attempt. Additionally:

…

[TS 38.331, clause 5.3.14.2]

Upon initiation of the procedure, the UE shall:

…

1> else:

2> if the Access Category is '0':

3> consider the access attempt as allowed;

2> else:

3> if *SIB1* includes *uac-BarringPerPLMN-List* and the *uac-BarringPerPLMN-List* contains an *UAC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to the PLMN or SNPN selected by upper layers (see TS 24.501 [23]):

4> select the *UAC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to the PLMN or to the SNPN selected by upper layers;

4> in the remainder of this procedure, use the selected *UAC-BarringPerPLMN* entry (i.e. presence or absence of access barring parameters in this entry) irrespective of the *uac-BarringForCommon* included in *SIB1*;

3> else if SIB1 includes *uac-BarringForCommon*:

4> in the remainder of this procedure use the *uac-BarringForCommon* (i.e. presence or absence of these parameters) included in *SIB1*;

3> else:

4> consider the access attempt as allowed;

3> if uac-BarringForCommon is applicable or the uac-ACBarringListType indicates that uac-ExplicitACBarringList is used:

4> if the corresponding *UAC-BarringPerCatList* contains a *UAC-BarringPerCat* entry corresponding to the Access Category:

5> select the *UAC-BarringPerCat* entry;

5> if the uac-BarringInfoSetList contains a UAC-BarringInfoSet entry corresponding to the selected uac-barringInfoSetIndex in the UAC-BarringPerCat:

6> select the *UAC-BarringInfoSet* entry;

6> perform access barring check for the Access Category as specified in 5.3.14.5, using the selected *UAC-BarringInfoSet* as "UAC barring parameter";

5> else:

6> consider the access attempt as allowed;

4> else:

5> consider the access attempt as allowed;

3> else if the uac-ACBarringListType indicates that uac-ImplicitACBarringList is used:

4> select the *uac-BarringInfoSetIndex* corresponding to the Access Category in the *uac-ImplicitACBarringList*;

4> if the uac-BarringInfoSetList contains the UAC-BarringInfoSet entry corresponding to the selected uac-BarringInfoSetIndex:

5> select the *UAC-BarringInfoSet* entry;

5> perform access barring check for the Access Category as specified in 5.3.14.5, using the selected *UAC-BarringInfoSet* as "UAC barring parameter";

4> else:

5> consider the access attempt as allowed;

3> else:

4> consider the access attempt as allowed;

1> if the access barring check was requested by upper layers:

2> if the access attempt is considered as barred:

…

3> else:

4> inform upper layers that the access attempt for the Access Category is barred, upon which the procedure ends;

2> else:

3> inform upper layers that the access attempt for the Access Category is allowed, upon which the procedure ends;

1> else:

2> the procedure ends.

[TS 38.331, clause 5.3.14.5]

The UE shall:

1> if one or more Access Identities are indicated according to TS 24.501 [23], and

1> if for at least one of these Access Identities the corresponding bit in the *uac-BarringForAccessIdentity* contained in "UAC barring parameter" is set to *zero*:

2> consider the access attempt as allowed;

1> else:

2> draw a random number '*rand*' uniformly distributed in the range: 0 ≤ *rand* < 1;

2> if '*rand*' is lower than the value indicated by *uac-BarringFactor* included in "UAC barring parameter":

3> consider the access attempt as allowed;

2> else:

3> consider the access attempt as barred;

1> if the access attempt is considered as barred:

2> draw a random number '*rand*' that is uniformly distributed in the range 0 ≤ *rand* < 1;

2> start timer T390 for the Access Category with the timer value calculated as follows, using the *uac-BarringTime* included in"AC barring parameter":

T390 = (0.7+ 0.6 \* *rand*) \* *uac-BarringTime.*

[TS 22.101, subclause 10.1.1]

The ME shall identify an emergency number dialled by the end user as a valid emergency number and initiate emergency call establishment if it occurs under one or more of the following conditions. If it occurs outside of the following conditions, the ME should not initiate emergency call establishment but normal call establishment. Emergency number identification takes place before and takes precedence over any other (e.g. supplementary service related) number analysis.

a) 112 and 911 shall always be available. These numbers shall be stored on the ME.

11.3.7.3 Test description

11.3.7.3.1 Pre-test conditions

System Simulator:

- NR Cell 1

- NR Cell 1 as defined in TS 38.508-1 [4] Table 4.4.2-3 is configured as per table 11.3.7.3.1-1(PLMN1 is the HPLMN). System information combination NR-1 as defined in TS 38.508-1 [4], subclause 4.4.3.1.2.

Table 11.3.7.3.1-1: PLMN identifiers

|  |  |  |  |
| --- | --- | --- | --- |
| NR Cell | PLMN names | MCC | MNC |
| NR Cell 1 | PLMN1 | 001 | 01 |

UE:

- The UE is equipped with a USIM configuration as defined in TS 38.508-1 [4] Table 6.4.1-17.

Preamble:

- The UE is brought to state 1N-A, RRC\_IDLE Connectivity (NR), in accordance with the procedure described in TS 38.508-1 [4], Table 4.5.2.2-2.

11.3.7.3.2 Test procedure sequence

Table 11.3.7.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Make the UE attempt an emergency call dialling a number which is stored on the ME (e.g. 112 or 911). (NOTE 1) | - | - | - | - |
| 2 | Check: Does the UE transmit an *RRCSetupRequest* message with *establishmentCause* set to 'emergency’ within 30 s'? | --> | NR RRC: RRCSetupRequest | 1 | F |
| 3 | SS modifies NR Cell 1 SIB1 to remove Access barring for AC2 and sends short message. (NOTE 2, NOTE 3) | <-- | Short Message | - | - |
| 4 | Wait for 2.1\* modification period to allow the new system information to take effect | - | - | - | - |
| 5 | Start Timer = 84s (NOTE 2, NOTE 4) | - | - | - | - |
| - | EXCEPTION: Steps 5Aa1-5Ab3 describes optional behaviour that depends on the UE implementation. | - | - | - | - |
| 5Aa1 | UE transmits an *RRCSetupRequest* message with *establishmentCause* set to '*highPriorityAccess’* to establish an emergency call.(NOTE 7) | --> | NR RRC: RRCSetupRequest | - | - |
| 5Aa2 | Stop Timer = 84s | - | - | - | - |
| 5Ab1 | Timer = 84s expires | - | - | - | - |
| 5Ab2 | Make the UE attempt an emergency call dialling a number which is stored on the ME (e.g. 112 or 911). (NOTE 1) | - | - | - | - |
| 5Ab3 | UE transmits an *RRCSetupRequest* message with *establishmentCause* set to '*highPriorityAccess’* to establish an emergency call. | --> | NR RRC: RRCSetupRequest | - | - |
| 6 | Void | - | - | - | - |
| 7 | The SS transmits an *RRCSetup* message. | <-- | NR RRC: *RRCSetup* | - | - |
| - | EXCEPTION: Steps 8a1 to 8b2 describe behaviour that depends on the UE implementation; the "lower case letter" identifies a step sequence that take place if a particular implementation is under test. | - | - | - | - |
| 8a1 | The UE transmits an *RRCSetupComplete* message AND a SERVICE REQUEST message with 'Service type' set to 'high priority access'*.* | --> | NR RRC: RRCSetupComplete  5GMM: SERVICE REQUEST | - | - |
| 8a2 | Steps 4-8 are performed from the generic test procedure as specified in TS 38.508-1 [4] subclause 4.9.11. | - | - | - | - |
| 8b1 | The UE transmits an *RRCSetupComplete* message AND a REGISTRATION REQUEST message with ‘registration type’ set to ‘emergency’. (Note 6) | --> | NR RRC: RRCSetupComplete  5GMM: REGISTRATION REQUEST | - | - |
| 8b2 | Steps 5-15 are performed from the generic test procedure as specified in TS 38.508-1 [4] subclause 4.5.2.2-2fv  . | - | - | - | - |
| 9 | Void | - | - | - | - |
| - | EXCEPTION: Steps 10a1 to 10b1 describe behaviour that depends on the UE implementation; the "lower case letter" identifies a step sequence that take place if a particular implementation is under test. | - | - | - | - |
| 10a1 | IF pc\_SwitchOnOff THEN switch off UE, IF pc\_USIM\_Removal THEN remove the USIM. | - | - | - | - |
| 10a2 | SS starts timer1 = 5 sec to see if UE performs optional Step 10a3a1 (Note 5) | - | - | - | - |
| 10a3a1 | The UE transmits a DEREGISTRATION REQUEST message. | --> | NR RRC: ULInformationTransfer  5GMM: DEREGISTRATION REQUEST |  |  |
| 10a3a2 | The SS transmits an RRCRelease message IF step 10a3a1 was performed ELSE SS implicitly releases the RRC connection. | <-- | NR RRC: RRCRelease | - | - |
| 10b1 | ELSE power off UE | - | - | - | - |
| NOTE 1: This could be done by e.g. MMI or AT command.  NOTE 2: Since barring is alleviated, UE may re-attempt an emergency call, triggered at step 1, automatically after T390 stop/expiry without manual intervention.  NOTE 3: Steps 3 to 9 are there to ensure that UE under test supports emergency call and is not initiating it at Step 2 due to access barring for AC2.  NOTE 4: T390 timer value is derived from 38.331[12] T390 = (0.7 + 0.6\*rand)\*uac-BarringTime where the uac-BarringTime value of 64s is provided in 38.523-1 Table 11.3.7.3.3-1 and where the value of rand is chosen to be 1 as to arrive at the maximum value for T390 of 83.2s rounded up to 84s.  Note 5: The UE may implicitly de-register upon disabling N1 mode capability due to ‘IMS voice not available’  Note 6: UE may try to find service to place the emergency call (step 1) on other RATs since emergency access is barred on NR Cell 1. In this case UE will send a REGISTRATION REQUEST instead of a SERVICE REQUEST.  NOTE 7: UE may perform domain selection and stop T390. If UE move back to the NR Cell 1 during 84s timer running, UE may initiate emergency call before 84s timer expire. | | | | | |

11.3.7.3.3 Specific message contents

Table 11.3.7.3.3-1: *SIB1* for NR Cell 1 (preamble, Table 11.3.7.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-28 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| uac-BarringForCommon SEQUENCE { |  |  |  |
| UAC-BarringPerCatList ::= SEQUENCE (SIZE (1..maxAccessCat-1)) OF UAC-BarringPerCat { | 1 entry |  |  |
| UAC-BarringPerCat[1] SEQUENCE { |  | entry 1 |  |
| accessCategory | 2 | (= emergency) |  |
| uac-barringInfoSetIndex | 1 |  |  |
| } |  |  |  |
| } |  |  |  |
| uac-BarringPerPLMN-List | Not present |  |  |
| uac-BarringInfoSetList ::= SEQUENCE (SIZE(1..maxBarringInfoSet)) OF UAC-BarringInfoSet { | 1 entry |  |  |
| UAC-BarringInfoSet[1] SEQUENCE { |  | entry 1 |  |
| uac-BarringFactor | p00 |  |  |
| uac-BarringTime | s64 |  |  |
| uac-BarringForAccessIdentity | '0011111'B |  |  |
| } |  |  |  |
| uac-AccessCategory1-SelectionAssistanceInfo | Not Present |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.3.7.3.3-2: SERVICE REQUEST (preamble and Step 8, Table 11.3.7.3.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] Table 4.7.1-16 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Service type | ‘0101’B | High priority access | pc\_noOf\_PDUsNewConnections > 0 |

Table 11.3.7.3.3-3: RRCSetupRequest (step 5Aa1, 5Ab3, Table 11.3.7.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-23 | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCSetupRequest ::= SEQUENCE { |  |  |  |
| rrcSetupRequest SEQUENCE { |  |  |  |
| establishmentCause | highPriorityAccess |  |  |
| } |  |  |  |
| } |  |  |  |

### 11.3.8 UAC / Access Identity 0 / NR RRC\_IDLE / Cell re-selection while T390 is running

11.3.8.1 Test Purpose (TP)

(1)

**with** { UE not configured for special AIs (1,2,11-15) ,having access barred for MO signalling and T390 running in NR RRC\_IDLE state}

**ensure** **that** {

**when** { UE performs Cell Reselection to a new NR Cell }

**then** { UE stops T390 for MO signalling and informs upper layers about barring alleviation for this Access Category }

}

11.3.8.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in TS 24.501: clause 4.5.2, 4.5.2A 4.5.4.1 and 4.5.6 and TS 38.331: clause 5.3.14.1, 5.3.14.2, 5.3.14.4 and 5.3.14.5. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 4.5.2]

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

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

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

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

Table 4.5.2.1: Access identities

|  |  |
| --- | --- |
| Access Identity number | UE configuration |
| 0 | UE is not configured with any parameters from this table |
| 1 (NOTE 1) | UE is configured for multimedia priority service (MPS). |
| 2 (NOTE 2) | UE is configured for mission critical service (MCS). |
| 3-10 | Reserved for future use |
| 11 (NOTE 3) | Access Class 11 is configured in the UE. |
| 12 (NOTE 3) | Access Class 12 is configured in the UE. |
| 13 (NOTE 3) | Access Class 13 is configured in the UE. |
| 14 (NOTE 3) | Access Class 14 is configured in the UE. |
| 15 (NOTE 3) | Access Class 15 is configured in the UE. |
| NOTE 1: Access identity 1 is valid when: - the USIM file EFUAC\_AIC indicates the UE is configured for access identity 1 and the RPLMN is the HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present), or a visited PLMN of the home country (see the definition of home country in 3GPP TS 24.301 [15]); or - the UE receives the 5GS network feature support IE with the MPS indicator bit set to "Access identity 1 valid in RPLMN or equivalent PLMN" from the RPLMN as described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4.  NOTE 2: Access identity 2 is used by UEs configured for MCS and is valid when: - the USIM file EFUAC\_AIC indicates the UE is configured for access identity 2 and the RPLMN is the HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present), or a visited PLMN of the home country (see 3GPP TS 23.122 [5]); or - the UE receives the 5GS network feature support IE with the MCS indicator bit set to "Access identity 2 valid in RPLMN or equivalent PLMN" from the RPLMN as described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4.  NOTE 3: Access identities 11 and 15 are valid in HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present). Access Identities 12, 13 and 14 are valid in HPLMN and visited PLMNs of home country only (see the definition of home country in 3GPP TS 24.301 [15]). | |

The UE uses the MPS indicator bit of the 5GS network feature support IE to determine if access identity 1 is valid. Processing of the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message is described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4. The UE shall not consider access identity 1 to be valid when the UE is not in the country of its HPLMN prior to receiving the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message being set to "Access identity 1 valid in RPLMN or equivalent PLMN".

When the UE is in the country of its HPLMN, the contents of the USIM files EFUAC\_AIC and EFACC as specified in 3GPP TS 31.102 [22] and the rules specified in table 4.5.2.1 are used to determine the applicability of access identity 1 and access classes 11 - 15. When the UE is in the country of its HPLMN, and the USIM file EFUAC\_AIC does not indicate the UE is configured for access identity 1, the UE uses the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message to determine if access identity 1 is valid. When the UE is in the country of its HPLMN, and the USIM file EFUAC\_AIC indicates the UE is configured for access identity 1, the MPS indicator bit of the 5GS network feature support IE is not applicable. When the UE is not in the country of its HPLMN, the contents of the USIM files EFUAC\_AIC and EFACC are not applicable.

The UE uses the MCS indicator bit of the 5GS network feature support IE to determine if access identity 2 is valid. Processing of the MCS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message is described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4. The UE shall not consider access identity 2 to be valid when the UE is not in the country of its HPLMN prior to receiving the MCS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message being set to "Access identity 2 valid in RPLMN or equivalent PLMN".

When the UE is in the country of its HPLMN, the contents of the USIM files EFUAC\_AIC and EFACC as specified in 3GPP TS 31.102 [22] and the rules specified in table 4.5.2.1 are used to determine the applicability of access identity 2 and access classes 11 - 15. When the UE is in the country of its HPLMN, and the USIM file EFUAC\_AIC does not indicate the UE is configured for access identity 2, the UE uses the MCS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message to determine if access identity 2 is valid. When the UE is in the country of its HPLMN, and the USIM file EFUAC\_AIC indicates the UE is configured for access identity 2, the MCS indicator bit of the 5GS network feature support IE is not applicable. When the UE is not in the country of its HPLMN, the contents of the USIM files EFUAC\_AIC and EFACC are not applicable.

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

NOTE: The case when an access attempt matches more than one rule includes the case when multiple events trigger an access attempt at the same time.

Table 4.5.2.2: Mapping table for access categories

|  |  |  |  |
| --- | --- | --- | --- |
| Rule # | Type of access attempt | Requirements to be met | Access Category |
| 1 | Response to paging or NOTIFICATION over non-3GPP access;  5GMM connection management procedure initiated for the purpose of transporting an LPP message | Access attempt is for MT access | 0 (= MT\_acc) |
| 2 | Emergency | UE is attempting access for an emergency session (NOTE 1, NOTE 2) | 2 (= emergency) |
| 3 | Access attempt for operator-defined access category | UE stores operator-defined access category definitions valid in the current PLMN as specified in subclause 4.5.3, and access attempt is matching criteria of an operator-defined access category definition | 32-63  (= based on operator classification) |
| 4 | Access attempt for delay tolerant service | (a) UE is configured for NAS signalling low priority or UE supporting S1 mode is configured for EAB (see the "ExtendedAccessBarring" leaf of NAS configuration MO in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22]) where "EAB override" does not apply, and  (b). the UE received one of the categories a, b or c as part of the parameters for unified access control in the broadcast system information, and the UE is a member of the broadcasted category in the selected PLMN or RPLMN/equivalent PLMN  (NOTE 3, NOTE 5, NOTE 6, NOTE 7, NOTE 8) | 1 (= delay tolerant) |
| 5 | MO MMTel voice call | Access attempt is for MO MMTel voice call  or for NAS signalling connection recovery during ongoing MO MMTel voice call (NOTE 2) | 4 (= MO MMTel voice) |
| 6 | MO MMTel video call | Access attempt is for MO MMTel video call  or for NAS signalling connection recovery during ongoing MO MMTel video call (NOTE 2) | 5 (= MO MMTel video) |
| 7 | MO SMS over NAS or MO SMSoIP | Access attempt is for MO SMS over NAS (NOTE 4) or MO SMS over SMSoIP transfer  or for NAS signalling connection recovery during ongoing MO SMS or SMSoIP transfer (NOTE 2) | 6 (= MO SMS and SMSoIP) |
| 8 | UE NAS initiated 5GMM specific procedures | Access attempt is for MO signalling | 3 (= MO\_sig) |
| 9 | UE NAS initiated 5GMM connection management procedure or 5GMM NAS transport procedure | Access attempt is for MO data | 7 (= MO\_data) |
| 10 | An uplink user data packet is to be sent for a PDU session with suspended user-plane resources | No further requirement is to be met | 7 (= MO\_data) |
| NOTE 1: This includes 5GMM specific procedures while the service is ongoing and 5GMM connection management procedures required to establish a PDU session with request type = "initial emergency request" or "existing emergency PDU session", or to re-establish user-plane resources for such a PDU session. This further includes the service request procedure initiated with a SERVICE REQUEST message with the Service type IE set to "emergency services fallback".<  NOTE 2: Access for the purpose of NAS signalling connection recovery during an ongoing service, or for the purpose of NAS signalling connection establishment following fallback indication from lower layers during an ongoing service, is mapped to the access category of the ongoing service in order to derive an RRC establishment cause, but barring checks will be skipped for this access attempt.  NOTE 3: If the UE selects a new PLMN, then the selected PLMN is used to check the membership; otherwise the UE uses the RLPMN or a PLMN equivalent to the RPLMN.  NOTE 4: This includes the 5GMM connection management procedures triggered by the UE-initiated NAS transport procedure for transporting the MO SMS.  NOTE 5: The UE configured for NAS signalling low priority is not supported in this release of specification. If a UE supporting both S1 mode and N1 mode is configured for NAS signalling low priority in S1 mode as specified in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22], the UE shall ignore the configuration for NAS signalling low priority when in N1 mode.  NOTE 6: If the access category applicable for the access attempt is 1, then the UE shall additionally determine a second access category from the range 3 to 7. If more than one access category matches, the access category of the lowest rule number shall be chosen. The UE shall use the second access category only to derive an RRC establishment cause for the access attempt.  NOTE 7: "EAB override" does not apply, if the UE is not configured to allow overriding EAB (see the "Override\_ExtendedAccessBarring" leaf of NAS configuration MO in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22]), or if NAS has not received an indication from the upper layers to override EAB and the UE does not have a PDU session that was established with EAB override.  NOTE 8: For the definition of categories a, b and c associated with access category 1, see 3GPP TS 22.261 [3]. The categories associated with access category 1 are distinct from the categories a, b and c associated with EAB (see 3GPP TS 22.011 [1A]). | | | |

[TS 24.501, clause 4.5.2A]

[Rel-16]

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

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

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

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

Table 4.5.2A.1: Access identities

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

The contents of the unified access control configuration in the "list of subscriber data" stored in the ME (see 3GPP TS 23.122 [5]) and the rules specified in table 4.5.2A.1 are used to determine the applicability of access identity 1 in the SNPN. When the contents of the unified access control configuration in the "list of subscriber data" stored in the ME (see 3GPP TS 23.122 [5]) do not indicate the UE is configured for access identity 1 for the SNPN, the UE uses the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message to determine if access identity 1 is valid.

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

The contents of the unified access control configuration in the "list of subscriber data" stored in the ME (see 3GPP TS 23.122 [5]) and the rules specified in table 4.5.2A.1 are used to determine the applicability of access classes 11 to 15 in the SNPN.

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

NOTE: The case when an access attempt matches more than one rule includes the case when multiple events trigger an access attempt at the same time.

Table 4.5.2A.2: Mapping table for access categories

|  |  |  |  |
| --- | --- | --- | --- |
| Rule # | Type of access attempt | Requirements to be met | Access Category |
| 1 | Response to paging or NOTIFICATION over non-3GPP access (NOTE 11);  5GMM connection management procedure initiated for the purpose of transporting an LPP message without an ongoing 5GC-MO-LR procedure;  Access attempt to handover of MMTEL voice call, MMTEL video call or SMSoIP from non-3GPP access | Access attempt is for MT access, or handover of ongoing MMTEL voice call, MMTEL video call or SMSoIP from non-3GPP access | 0 (= MT\_acc) |
| 2 | Emergency | UE is attempting access for an emergency session (NOTE 1, NOTE 2) | 2 (= emergency) |
| 3 | Access attempt for operator-defined access category | UE stores operator-defined access category definitions valid in the SNPN as specified in subclause 4.5.3, and access attempt is matching criteria of an operator-defined access category definition | 32-63  (= based on operator classification) |
| 4 | Access attempt for delay tolerant service | (a) UE is configured for NAS signalling low priority, and  (b) the UE received one of the categories a, b or c as part of the parameters for unified access control in the broadcast system information, and the UE is a member of the broadcasted category in the selected SNPN or RSNPN  (NOTE 3, NOTE 5, NOTE 6, NOTE 7, NOTE 8) | 1 (= delay tolerant) |
| 4.1 | MO IMS registration related signalling | Access attempt is for MO IMS registration related signalling (e.g. IMS initial registration, re-registration, subscription refresh)  or for NAS signalling connection recovery during ongoing procedure for MO IMS registration related signalling (NOTE 2a) | 9 (= MO IMS registration related signalling) |
| 5 | MO MMTel voice call | Access attempt is for MO MMTel voice call  or for NAS signalling connection recovery during ongoing MO MMTel voice call (NOTE 2) | 4 (= MO MMTel voice) |
| 6 | MO MMTel video call | Access attempt is for MO MMTel video call  or for NAS signalling connection recovery during ongoing MO MMTel video call (NOTE 2) | 5 (= MO MMTel video) |
| 7 | MO SMS over NAS or MO SMSoIP | Access attempt is for MO SMS over NAS (NOTE 4) or MO SMS over SMSoIP transfer  or for NAS signalling connection recovery during ongoing MO SMS or SMSoIP transfer (NOTE 2) | 6 (= MO SMS and SMSoIP) |
| 8 | UE NAS initiated 5GMM specific procedures | Access attempt is for MO signalling | 3 (= MO\_sig) |
| 8.1 | Mobile originated location request | Access attempt is for mobile originated location request (NOTE 9) | 3 (= MO\_sig) |
| 8.2 | Mobile originated signalling transaction towards the PCF | Access attempt is for mobile originated signalling transaction towards the PCF (NOTE 10) | 3 (= MO\_sig) |
| 9 | UE NAS initiated 5GMM connection management procedure or 5GMM NAS transport procedure | Access attempt is for MO data | 7 (= MO\_data) |
| 10 | An uplink user data packet is to be sent for a PDU session with suspended user-plane resources | No further requirement is to be met | 7 (= MO\_data) |
| NOTE 1: In this release of the specification, there is no support for establishing an emergency session in an SNPN.  NOTE 2: Access for the purpose of NAS signalling connection recovery during an ongoing service as defined in subclause 4.5.5, or for the purpose of NAS signalling connection establishment following fallback indication from lower layers during an ongoing service as defined in subclause 4.5.5, is mapped to the access category of the ongoing service in order to derive an RRC establishment cause, but barring checks will be skipped for this access attempt.  NOTE 2a: Access for the purpose of NAS signalling connection recovery during an ongoing MO IMS registration related signalling as defined in subclause 4.5.5, or for the purpose of NAS signalling connection establishment following fallback indication from lower layers during an ongoing MO IMS registration related signalling as defined in subclause 4.5.5, is mapped to the access category of the MO IMS registration related signalling in order to derive an RRC establishment cause, but barring checks will be skipped for this access attempt.  NOTE 3: If the UE selects a new SNPN, then the selected SNPN is used to check the membership; otherwise the UE uses the RSNPN.  NOTE 4: This includes the 5GMM connection management procedures triggered by the UE-initiated NAS transport procedure for transporting the MO SMS.  NOTE 5: The UE configured for NAS signalling low priority is not supported in this release of specification.  NOTE 6: If the access category applicable for the access attempt is 1, then the UE shall additionally determine a second access category from the range 3 to 7. If more than one access category matches, the access category of the lowest rule number shall be chosen. The UE shall use the second access category only to derive an RRC establishment cause for the access attempt.  NOTE 7: Void.  NOTE 8: For the definition of categories a, b and c associated with access category 1, see 3GPP TS 22.261 [3]. The categories associated with access category 1 are distinct from the categories a, b and c associated with EAB (see 3GPP TS 22.011 [1A]).  NOTE 9: This includes: a) the UE-initiated NAS transport procedure for transporting a mobile originated location  request; b) the 5GMM connection management procedure triggered by a) above; and c) NAS signalling connection recovery during an ongoing 5GC-MO-LR procedure.  NOTE 10: This includes: a) the UE-initiated NAS transport procedure for transporting a mobile originated signalling  transaction towards the PCF; b) the 5GMM connection management procedure triggered by a) above; and c) NAS signalling connection recovery during an ongoing UE triggered V2X policy provisioning  procedure.  NOTE 11: The term "non-3GPP access" refers to the case when the UE is accessing SNPN services via a PLMN. | | | |

[TS 24.501, clause 4.5.4.1]

[Rel-15]

When the UE is in 5GMM-IDLE mode, upon receiving a request from the upper layers for an access attempt, the NAS shall categorize the access attempt into access identities and an access category following subclause 4.5.2, table 4.5.2.1 and table 4.5.2.2, and subclause 4.5.3, and provide the applicable access identities and the access category to the lower layers for the purpose of access control checking. In this request to the lower layer the NAS can also provide to the lower layer the RRC establishment cause determined as specified in subclause 4.5.6 of this specification.

NOTE 1: The access barring check is performed by the lower layers.

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

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

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

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

If the lower layers indicate that the access attempt is barred, the NAS shall not initiate the procedure to send the initial NAS message for the access attempt. Additionally:

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

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

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

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

b) if the event which triggered the access attempt was an MO-SMSoIP-attempt-started indication:

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

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

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

NOTE 4: Barring timers, on a per access category basis, are run by the lower layers. At expiry of barring timers, the indication of alleviation of access barring is indicated to the NAS on a per access category basis.

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

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

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

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

NOTE 1: The access barring check is performed by the lower layers.

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

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

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

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

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

[TS 24.501, clause 4.5.6]

When 5GMM requests the establishment of a NAS-signalling connection, the RRC establishment cause used by the UE shall be selected according to one or more access identities (see subclause 4.5.2) and the determined access category as specified in table 4.5.6.1 and table 4.5.6.2. If the determined access category is an operator-defined access category, then the RRC establishment cause used by the UE shall be selected according to table 4.5.6.1 and table 4.5.6.2 based on one or more access identities (see subclause 4.5.2) and the standardized access category determined for the operator-defined access category as described in subclause 4.5.3.

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

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

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

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

[TS 38.331, clause 5.3.14.1]

The purpose of this procedure is to perform access barring check for an access attempt associated with a given Access Category and one or more Access Identities upon request from upper layers according to TS 24.501 [23] or the RRC layer.

After a handover resulting in change of PCell in RRC\_CONNECTED the UE shall defer access barring checks until it has obtained valid UAC information (from *SIB1*) from the target cell.

[TS 38.331, clause 5.3.14.2]

Upon initiation of the procedure, the UE shall:

1> if timer T390 is running for the Access Category:

2> consider the access attempt as barred;

1> else if timer T302 is running and the Access Category is neither '2' nor '0':

2> consider the access attempt as barred;

1> else:

2> if the Access Category is '0':

3> consider the access attempt as allowed;

2> else:

3> if *SIB1* includes *uac-BarringPerPLMN-List* that contains a *UAC-BarringPerPLMN* for the selected PLMN or SNPN:

4> if the procedure in 5.2.2.4.2 for a selected PLMN resulted in use of information in *npn-IdentityInfoList* and *UAC-BarringPerPLMN* has an entry with the *plmn-IdentityIndex* corresponding to used information in this list:

5> select the *UAC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to used information in the *npn-IdentityInfoList*;

4> else:

5> select the *UAC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to the selected PLMN and the *PLMN-IdentityInfo, if any,* or the selected SNPN and the *npn-IdentityInfoList*;

3> if any *UAC-BarringPerPLMN* entry is selected:

4> in the remainder of this procedure, use the selected *UAC-BarringPerPLMN* entry (i.e. presence or absence of access barring parameters in this entry) irrespective of the *uac-BarringForCommon* included in *SIB1*;

3> else if SIB1 includes *uac-BarringForCommon*:

4> in the remainder of this procedure use the *uac-BarringForCommon* (i.e. presence or absence of these parameters) included in *SIB1*;

3> else:

4> consider the access attempt as allowed;

3> if *uac-BarringForCommon* is applicable or the *uac-ACBarringListType* indicates that *uac-ExplicitACBarringList* is used:

4> if the corresponding *UAC-BarringPerCatList* contains a *UAC-BarringPerCat* entry corresponding to the Access Category:

5> select the *UAC-BarringPerCat* entry;

5> if the *uac-BarringInfoSetList* contains a *UAC-BarringInfoSet* entry corresponding to the selected *uac-barringInfoSetIndex* in the *UAC-BarringPerCat*:

6> select the *UAC-BarringInfoSet* entry;

6> perform access barring check for the Access Category as specified in 5.3.14.5, using the selected *UAC-BarringInfoSet* as "UAC barring parameter";

5> else:

6> consider the access attempt as allowed;

4> else:

5> consider the access attempt as allowed;

3> else if the *uac-ACBarringListType* indicates that *uac-ImplicitACBarringList* is used:

4> select the *uac-BarringInfoSetIndex* corresponding to the Access Category in the *uac-ImplicitACBarringList*;

4> if the *uac-BarringInfoSetList* contains the *UAC-BarringInfoSet* entry corresponding to the selected *uac-BarringInfoSetIndex*:

5> select the *UAC-BarringInfoSet* entry;

5> perform access barring check for the Access Category as specified in 5.3.14.5, using the selected *UAC-BarringInfoSet* as "UAC barring parameter";

4> else:

5> consider the access attempt as allowed;

3> else:

4> consider the access attempt as allowed;

1> if the access barring check was requested by upper layers:

2> if the access attempt is considered as barred:

3> if timer T302 is running:

4> if timer T390 is running for Access Category '2':

5> inform the upper layer that access barring is applicable for all access categories except categories '0', upon which the procedure ends;

4> else

5> inform the upper layer that access barring is applicable for all access categories except categories '0' and '2', upon which the procedure ends;

3> else:

4> inform upper layers that the access attempt for the Access Category is barred, upon which the procedure ends;

2> else:

3> inform upper layers that the access attempt for the Access Category is allowed, upon which the procedure ends;

1> else:

2> the procedure ends.

[TS 38.331, clause 5.3.14.4]

The UE shall:

1> if timer T302 expires or is stopped, and if timer T390 corresponding to an Access Category is not running; or

1> if timer T390 corresponding to an Access Category other than '2' expires or is stopped, and if timer T302 is not running; or

1> if timer T390 corresponding to the Access Category '2' expires or is stopped:

2> consider the barring for this Access Category to be alleviated;

1> when barring for an Access Category is considered being alleviated:

2> if the Access Category was informed to upper layers as barred:

3> inform upper layers about barring alleviation for the Access Category.

2> if barring is alleviated for Access Category '8':

3> perform actions specified in 5.3.13.8;

[TS 38.331, clause 5.3.14.5]

The UE shall:

1> if one or more Access Identities are indicated according to TS 24.501 [23], and

1> if for at least one of these Access Identities the corresponding bit in the *uac-BarringForAccessIdentity* contained in "UAC barring parameter" is set to *zero*:

2> consider the access attempt as allowed;

1> else:

2> draw a random number '*rand*' uniformly distributed in the range: 0 ≤ *rand* < 1;

2> if '*rand*' is lower than the value indicated by *uac-BarringFactor* included in "UAC barring parameter":

3> consider the access attempt as allowed;

2> else:

3> consider the access attempt as barred;

1> if the access attempt is considered as barred:

2> draw a random number '*rand*' that is uniformly distributed in the range 0 ≤ *rand* < 1;

2> start timer T390 for the Access Category with the timer value calculated as follows, using the *uac-BarringTime* included in"AC barring parameter":

T390 = (0.7+ 0.6 \* *rand*) \* *uac-BarringTime.*

11.3.8.3 Test description

11.3.8.3.1 Pre-test conditions

System Simulator:

- NR Cell 1 and NR Cell 3 belong to the same tracking areas according to TS 38.508-1 [4] Table 4.4.2-3.

- System information combination NR-4 in TS 38.508-1 [4] sub-clause 4.4.3.1.2 is used in NR cells

UE:

None.

Preamble:

The UE is in state 0N-B on NR cell 1 according to TS 38.508-1 [4].

11.3.8.3.2 Test procedure sequence

Table 11.3.8.3.2-1/2 illustrate the downlink power levels and other changing parameters to be applied for the cell at various time instants of the test execution. The exact instants on which these values shall be applied are described in the texts in this clause. The configuration “T1” indicates the initial conditions for preamble. Configurations marked "T2" is applied at the points indicated in the Main behaviour description in Table 11.3.8.3.2-3.

Table 11.3.8.3.2-1: Time instances of cell power level and parameter changes for FR1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter | Unit | NR Cell 1 | NR Cell 3 | Remark |
| T1 | SS/PBCH  SSS EPRE | dBm/SCS | -88 | Off | The power level is such that SrxlevNRCell1 > 0 |
|  | Qrxlevmin | dBm | -110 | - |  |
| T2 | SS/PBCH  SSS EPRE | dBm/SCS | -99 | -88 | The power level values are assigned to satisfy RNRCell 1 < RNRCell 3 |
|  | Qrxlevmin | dBm | -110 | -110 |  |

Table 11.3.8.3.2-2: Time instances of cell power level and parameter changes for FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter | Unit | NR Cell 1 | NR Cell 3 | Remark |
| T1 | SS/PBCH  SSS EPRE | dBm/SCS | -82 | Off | The power level is such that SrxlevNRCell1 > 0 |
|  | Qrxlevmin | dBm | -110+Delta(NRf1) | - |  |
| T2 | SS/PBCH  SSS EPRE | dBm/SCS | -91 | -82 | The power level values are assigned to satisfy RNRCell 1 < RNRCell 3 |
|  | Qrxlevmin | dBm | -110+Delta(NRf1) | -110+Delta(NRf1) |  |

Table 11.3.8.3.2-3: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 1A-1L | Steps 2-13 of the generic procedure for UE registration specified in TS 38.508-1 [4] table 4.5.2.2-2 are performed. | - | - | - | - |
| 1M | SS transmits a REGISTRATION REJECT message with cause #22 (Congestion) and T3346 set to 1 minute | <-- | REGISTRATION REJECT | - | - |
| 1N | The SS releases the RRC connection | - | - | - | - |
| 1O | The SS changes the SIB1 of NR Cell 1 to set Cell 1 barred for ‘mo\_Signalling’. | - | - | - | - |
| 1P | The SS transmits a Short message on PDCCH using P-RNTI indicating a *systemInfoModification*. | <-- | PDCCH (DCI 1\_0): Short Message | - | - |
| 2 | Check: Does the UE send NR *RRCSetupRequest* with *EstablishmentCause* set to ‘*mo-Sigalling*’ within 70s (Note 1)? | --> | NR RRC: RRCSetupRequest | 1 | F |
| 2A | Void | - | - | - | - |
| 3 | Set the power levels according to “T2” as per Table 11.3.8.3.2-1/2 for UE to reselect to NR Cell 3. | - | - | - | - |
| 4 | Void | - | - | - | - |
| 5 | Check: Does the UE send NR *RRCSetupRequest* with *EstablishmentCause* set to ‘*mo-Sigalling*’ on NR Cell 3 within 130s? (Note 2) | --> | NR RRC: RRCSetupRequest | 1 | P |
| 5A-5C | Void | - | - | - | - |
| 6-23 | Steps 3-20a1 of the generic procedure for UE registration specified in TS 38.508-1 [4] table 4.5.2.2-2 are performed. | - | - | - | - |
| Note 1: Expire of T3346 (60s) + 10s tolerance = 70s make sure UE request to send REGISTRATION REQUEST message.  Note 2: T390 timer value is calculated by “T390 = (0.7+ 0.6 \* rand) \* uac-BarringTime”. With uac-BarringTime as s256 the worst-case timer value is 180 seconds which covers both FR1 and FR2 cell reselection scenario. The wait time for reselection to a newly detected inter frequency cell is selected to cover Tdetect,NR\_Inter (25\*1280ms=32s for FR1 and 25\*4\*1280ms=128s for FR2) + TSI-NR (11280ms= for FR2 1.28s for FR1 and FR2) = 33.28s rounded up to 34s for FR1 and 129.28s rounded up to 130s for FR2. | | | | | |

11.3.8.3.3 Specific message contents

**Table 11.3.8.3.3-1: *SIB1* for NR Cell 1 (Step1O, Table 11.3.8.3.2-3)**

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-28 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| uac-BarringForCommon SEQUENCE { |  |  |  |
| UAC-BarringPerCatList SEQUENCE (SIZE (1..maxAccessCat-1)) OF UAC-BarringPerCat { | 1 entry |  |  |
| UAC-BarringPerCat[1] SEQUENCE { |  | entry 1 |  |
| accessCategory | 3 | (= MO\_sig) |  |
| uac-barringInfoSetIndex | 1 |  |  |
| } |  |  |  |
| } |  |  |  |
| uac-BarringPerPLMN-List | Not present |  |  |
| uac-BarringInfoSetList ::= SEQUENCE (SIZE(1..maxBarringInfoSet)) OF UAC-BarringInfoSet { | 1 entry |  |  |
| UAC-BarringInfoSet[1] SEQUENCE { |  | entry 1 |  |
| uac-BarringFactor | p00 |  |  |
| uac-BarringTime | s256 |  |  |
| uac-BarringForAccessIdentity | '0000000'B |  |  |
| } |  |  |  |
| } |  |  |  |
| uac-AccessCategory1-SelectionAssistanceInfo | Not Present |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.3.8.3.3-2: REGISTRATION REJECT (Step 1M, Table 11.3.8.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-9 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GMM cause | '00010110'B | Cause #22 (Congestion) |  |
| T3346 Value | ‘00100001’B | 1 minute |  |

### 11.3.9 UAC / Access Identity 0 / ODAC / PLMN / RPLMN / not EPLMN

11.3.9.1 Test Purpose (TP)

(1)

**with** { UE not configured for special AIs (1,2,11-15) having received Operator Defined Access Category "x" in the range 32..63 with access category criteria type set to "DNN" valid in the selected PLMN or RPLMN as part of Registration Procedure }

**ensure** **that** {

**when** { SIB1 message indicates no barring for Access category 7 but 0% accessibility for Access Category "x" }

**then** { UE does not initiate PDU Session Establishment for the "DNN" }

}

(2)

**with** { UE not configured for special AIs (1,2,11-15) having received Operator Defined Access Category "x" in the range 32..63 with access category criteria type set to "DNN" valid in the selected PLMN or RPLMN as part of Registration Procedure , SIB1 message indicates no barring for Access category 7 but 0% accessibility for Access Category "x" }

**ensure** **that** {

**when** { UE moves to another cell belonging to a different PLMN not equivalent to the previous PLMN }

**then** { UE is able to initiate PDU Session Establishment for "DNN" in the new PLMN }

}

11.3.9.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in TS 24.501: clause 4.5.3 and TS 38.331: clause 5.3.14.1, 5.3.14.2, 5.3.14.4 and 5.3.14.5. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 4.5.3]

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

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

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

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

1) DNN;

2) OS Id + OS App Id of application triggering the access attempt; or

3) S-NSSAI; and

NOTE 1: An access category criteria type can be associated with more than one access category criteria values.

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

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

Each operator-defined access category definition has a different precedence value.

Several operator-defined access category definitions can have the same operator-defined access category number.

If:

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

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

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

the UE shall use instead:

- access category 3 (MO\_sig) if the access attempt is triggered by uplink signalling; or

- access category 7 (MO\_data) if the access attempt is triggered by uplink data

in combination with the access identities of the UE to determine the RRC establishment cause as specified in subclause 4.5.6.

The operator-defined access category definitions are valid in the PLMN which provided them and in a PLMN equivalent to the PLMN which provided them, as specified in annex C.

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

If the UE is stores operator-defined access category definitions valid in the selected PLMN or the RPLMN, then access control in 5GMM-CONNECTED mode and in 5GMM-CONNECTED mode with RRC inactive indication will only be performed for the events 1) to 6) defined in subclause 4.5.1.

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

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

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

NOTE 2: When the UE selects a new PLMN which is not equivalent to the previously selected PLMN, the UE can delete the operator-defined access category definitions stored for the previously selected PLMN e.g. if there is no storage space in the UE.

[TS 38.331, clause 5.3.14.1]

The purpose of this procedure is to perform access barring check for an access attempt associated with a given Access Category and one or more Access Identities upon request from upper layers according to TS 24.501 [23] or the RRC layer.

After a PCell change in RRC\_CONNECTED the UE shall defer access barring checks until it has obtained *SIB1* (as specified in 5.2.2.2) from the target cell.

[TS 38.331, clause 5.3.14.2]

Upon initiation of the procedure, the UE shall:

1> if timer T390 is running for the Access Category:

2> consider the access attempt as barred;

1> else if timer T302 is running and the Access Category is neither '2' nor '0':

2> consider the access attempt as barred;

1> else:

2> if the Access Category is '0':

3> consider the access attempt as allowed;

2> else:

3> if *SIB1* includes *uac-BarringPerPLMN-List* and the *uac-BarringPerPLMN-List* contains an *UAC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to the PLMN selected by upper layers (see TS 24.501 [23]):

4> select the *UAC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to the PLMN selected by upper layers;

4> in the remainder of this procedure, use the selected *UAC-BarringPerPLMN* entry (i.e. presence or absence of access barring parameters in this entry) irrespective of the *uac-BarringForCommon* included in *SIB1*;

3> else if SIB1 includes *uac-BarringForCommon*:

4> in the remainder of this procedure use the *uac-BarringForCommon* (i.e. presence or absence of these parameters) included in *SIB1*;

3> else:

4> consider the access attempt as allowed;

3> if uac-BarringForCommon is applicable or the uac-ACBarringListType indicates that uac-ExplicitACBarringList is used:

4> if the corresponding *UAC-BarringPerCatList* contains a *UAC-BarringPerCat* entry corresponding to the Access Category:

5> select the *UAC-BarringPerCat* entry;

5> if the uac-BarringInfoSetList contains a UAC-BarringInfoSet entry corresponding to the selected uac-barringInfoSetIndex in the UAC-BarringPerCat:

6> select the *UAC-BarringInfoSet* entry;

6> perform access barring check for the Access Category as specified in 5.3.14.5, using the selected *UAC-BarringInfoSet* as "UAC barring parameter";

5> else:

6> consider the access attempt as allowed;

4> else:

5> consider the access attempt as allowed;

3> else if the uac-ACBarringListType indicates that uac-ImplicitACBarringList is used:

4> select the *uac-BarringInfoSetIndex* corresponding to the Access Category in the *uac-ImplicitACBarringList*;

4> if the uac-BarringInfoSetList contains the UAC-BarringInfoSet entry corresponding to the selected uac-BarringInfoSetIndex:

5> select the *UAC-BarringInfoSet* entry;

5> perform access barring check for the Access Category as specified in 5.3.14.5, using the selected *UAC-BarringInfoSet* as "UAC barring parameter";

4> else:

5> consider the access attempt as allowed;

3> else:

4> consider the access attempt as allowed;

1> if the access barring check was requested by upper layers:

2> if the access attempt is considered as barred:

3> if timer T302 is running:

4> if timer T390 is running for Access Category '2':

5> inform the upper layer that access barring is applicable for all access categories except categories '0', upon which the procedure ends;

4> else

5> inform the upper layer that access barring is applicable for all access categories except categories '0' and '2', upon which the procedure ends;

3> else:

4> inform upper layers that the access attempt for the Access Category is barred, upon which the procedure ends;

2> else:

3> inform upper layers that the access attempt for the Access Category is allowed, upon which the procedure ends;

1> else:

2> the procedure ends.

[TS 38.331, clause 5.3.14.4]

The UE shall:

1> if timer T302 expires or is stopped:

2> for each Access Category for which T390 is not running:

3> consider the barring for this Access Category to be alleviated:

1> else if timer T390 corresponding to an Access Category other than '2' expires or is stopped, and if timer T302 is not running:

2> consider the barring for this Access Category to be alleviated;

1> else if timer T390 corresponding to the Access Category '2' expires or is stopped:

2> consider the barring for this Access Category to be alleviated;

1> when barring for an Access Category is considered being alleviated:

2> if the Access Category was informed to upper layers as barred:

3> inform upper layers about barring alleviation for the Access Category.

2> if barring is alleviated for Access Category '8':

3> perform actions specified in 5.3.13.8;

[TS 38.331, clause 5.3.14.5]

The UE shall:

1> if one or more Access Identities are indicated according to TS 24.501 [23], and

1> if for at least one of these Access Identities the corresponding bit in the *uac-BarringForAccessIdentity* contained in "UAC barring parameter" is set to *zero*:

2> consider the access attempt as allowed;

1> else:

2> draw a random number 'rand' uniformly distributed in the range: 0 ≤ rand < 1;

2> if 'rand' is lower than the value indicated by uac-BarringFactor included in "UAC barring parameter":

3> consider the access attempt as allowed;

2> else:

3> consider the access attempt as barred;

1> if the access attempt is considered as barred:

2> draw a random number 'rand' that is uniformly distributed in the range 0 ≤ rand < 1;

2> start timer T390 for the Access Category with the timer value calculated as follows, using the uac-BarringTime included in "AC barring parameter":

T390 = (0.7+ 0.6 \* *rand*) \* *uac-BarringTime.*

11.3.9.3 Test description

11.3.9.3.1 Pre-test conditions

System Simulator:

- 2 NR cells: NR Cell 1 and 12 as specified in TS 38.508-1 [4] table 4.4.2-3.

- System information combination NR-1 as defined in TS 38.508-1 [4] Table 4.4.3.1.2-1 is used in NR cells.

UE:

- None.

Preamble:

- The UE is registered on PLMN1 (NR Cell 1) and in state 3N-A on NR Cell 1(serving cell) by using the procedure described in TS 38.508-1 [4] clause 4.5.2.2 with “connected without release” except that the REGISTRATION ACCEPT message indicates Operator Defined Access Category ""33"" as described in Table 11.3.9.3.3-1.

11.3.9.3.2 Test procedure sequence

Table 11.3.9.3.2-1 for FR1 and Table 11.3.9.3.2-2 for FR2 illustrates the downlink power levels and other changing parameters to be applied for the cells at various time instants of the test execution. Row marked "T0" denotes the initial conditions in preamble, while the column marked "T1" is to be applied subsequently in the Main behaviour. The exact instants on which these values shall be applied are described in the texts in this clause.

Table 11.3.9.3.2-1: Time instances of cell power level and parameter changes for FR1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter | Unit | NR Cell 1 | NR Cell 12 | Remarks |
| T0 | SS/PBCH  SSS EPRE | dBm/SCS | -88 | Off | The power level values are assigned to ensure UE registered on NR Cell 1. |
| T1 | SS/PBCH  SSS EPRE | dBm/SCS | Off | -88 | The power level values are assigned to ensure UE registered on NR Cell 12. |
| Note 1: Power level “Off” is defined in TS 38.508-1 [4] Table 6.2.2.1-3. | | | | | |

Table 11.3.9.3.2-2: Time instances of cell power level and parameter changes for FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter | Unit | NR Cell 1 | NR Cell 12 | Remarks |
| T0 | SS/PBCH  SSS EPRE | dBm/SCS | -82 | Off | The power level values are assigned to ensure UE registered on NR Cell 1. |
| T1 | SS/PBCH  SSS EPRE | dBm/SCS | Off | -82 | The power level values are assigned to ensure UE registered on NR Cell 12. |
| Note 1: Power level “Off” is defined in TS 38.508-1 [4] Table 6.2.2.2-2. | | | | | |

Table 11.3.9.3.2-3: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1-2 | Void | - | - | - | - |
| 3 | Make the UE attempt to establish a PDU session for the DNN defined in Table 11.3.9.3.3-1. This can be done by an AT/MMI command. | - | - | - | - |
| 4 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST and the DNN in UL NAS TRANSPORT message is the same value in UL NAS TRANSPORT message in preamble within 11.2s? | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 1 | F |
| 5 | The SS adjusts the NR Cells power levels according to row "T1" in table 11.3.9.3.2-1/2. | - | - | - | - |
| 6 | The mobility registration updating procedure described in TS 38.508-1 [4] Table 4.9.5.2.2-1 is performed on NR Cell 12 and release RRC connection. (Note 1) | - | - | - | - |
| 6A | Start Timer=5 sec. | - | - | - | - |
|  | EXCEPTION: Steps 6Ba1-6Bb3 describes optional behaviour that depends on the UE implementation. |  |  |  |  |
| 6Ba1 | Check: Does the UE transmit an *RRCSetupRequest* message and *establishmentCause* is set to *mo-Data*? | --> | NR RRC: RRCSetupRequest | 2 | P |
| 6Ba2 | Stop Timer=5 sec. | - | - | - | - |
| 6Bb1 | Timer=5 sec expires | - | - | - | - |
| 6Bb2 | Make the UE attempt to establish a PDU session for the DNN defined in Table 11.3.9.3.3-1. This can be done by an AT/MMI command. | - | - | - | - |
| 6Bb3 | Check: Does the UE transmit an *RRCSetupRequest* message and *establishmentCause* is set to *mo-Data*? | --> | NR RRC: RRCSetupRequest | 2 | P |
| 9-14 | Steps 3-8 of the generic procedure for  NR RRC\_Connected specified in TS 38.508-1  Table 4.5.4.2-3 are performed. | - | - | - | - |
| 15 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST and the DNN value in UL NAS TRANSPORT message is the same as the DNN value of Operator-defined access category definitions defined in Table 11.3.9.3.3-1 | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 2 | P |
| 16 | The SS transmits *RRCReconfiguration* message containing PDU SESSION ESTABLISHMENT ACCEPT message. | <-- | NR RRC：*RRCReconfiguration*  5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |
| 17 | The UE transmits *RRCReconfigurationComplete* message to confirm the establishment of DRB. | --> | NR RRC：*RRCReconfigurationComplete* | - | - |
| 18 | Void | - | - | - | - |
| Note 1: SS ignore the PDU SESSION ESTABLISHMENT REQUEST sent before SS release RRC connection. | | | | | |

11.3.9.3.3 Specific message contents

Table 11.3.9.3.3-1: REGISTRATION ACCEPT (preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508 [4] Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| Operator-defined access category definitions |  |  |  |
| Precedence value | ‘0000 0000’B |  |  |
| PSAC | ‘1’B | Value 1 means that standardized access category is present. |  |
| Operator-defined access category number | ‘00001’B | 33(= based on operator classification) |  |
| Criteria |  |  |  |
| Criteria type | ‘0000 0000’B | DNN type |  |
| Criteria value |  |  |  |
| DNN length-value pair count | ‘0000 0001’B |  |  |
| DNN length-value pair |  |  |  |
| DNN value length | Set to the length in octets of the DNN value field. |  |  |
| DNN value | ‘ABCD‘ |  |  |
| Standardized access category | ‘00111’B | Access category number 7 |  |

Table 11.3.9.3.3-2: *SIB1* of NR Cell 1 and NR Cell 12 (preamble and all steps, Table 11.3.9.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-28 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| uac-BarringInfo SEQUENCE { |  |  | NR cell 1  NR cell 12 |
| uac-BarringForCommon SEQUENCE (SIZE (1..maxAccessCat-1)) OF UAC-BarringPerCat { | 1 entry |  |  |
| UAC-BarringPerCat[1] SEQUENCE { |  | entry 1 |  |
| accessCategory | 33 | (= based on operator classification) |  |
| uac-barringInfoSetIndex | 1 | Value 1 corresponds to the first entry in uac-BarringInfoSetList |  |
| } |  |  |  |
| } |  |  |  |
| uac-BarringPerPLMN-List | Not present |  |  |
| uac-BarringInfoSetList SEQUENCE (SIZE(1..maxBarringInfoSet)) OF UAC-BarringInfoSet { | 1 entry |  |  |
| UAC-BarringInfoSet[1] SEQUENCE { |  | entry 1 |  |
| uac-BarringFactor | p00 | 0% access probability |  |
| uac-BarringTime | s16 | 16 s |  |
| uac-BarringForAccessIdentity | ‘1111111’B | Value 1 means that access attempt is not allowed for the corresponding access identity.  The leftmost bit, bit 0 in the bit string corresponds to Access Identity 1. |  |
| } |  |  |  |
| } |  |  |  |
| uac-AccessCategory1-SelectionAssistanceInfo | Not Present |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.3.9.3.3-3: PDU SESSION ESTABLISHMENT ACCEPT (step 16, Table 11.3.9.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-2 | | | |
| Information Element | Value/remark | Comment | Condition |
| Authorized QoS rules | 5GC QoS rule of the Config#1 in Table 4.8.4-1 |  |  |
| Mapped EPS bearer contexts |  |  |  |
| Mapped EPS bearer context |  |  |  |
| Mapped EPS QoS parameters | EPC default bearer context of the Config#1 in Table 4.8.4-1 |  |  |
| DNN | The same DNN value as sent in the UL NAS TRANSPORT message at step 15 |  |  |

### 11.3.9a UAC / Access Identity 0 / ODAC / SNPN / RSNPN / new SNPN

11.3.9a.1 Test Purpose (TP)

(1)

**with** { UE not configured for special AIs (1,2,11-15) having received Operator Defined Access Category "x" in the range 32..63 with access category criteria type set to "DNN" valid in the selected SNPN or RSNPN as part of Registration Procedure }

**ensure** **that** {

**when** { SIB1 message indicates no barring for Access category 7 but 0% accessibility for Access Category "x" }

**then** { UE does not initiate PDU Session Establishment for the "DNN" }

}

(2)

**with** { UE not configured for special AIs (1,2,11-15) having received Operator Defined Access Category "x" in the range 32..63 with access category criteria type set to "DNN" valid in the selected SNPN or RSNPN as part of Registration Procedure , SIB1 message indicates no barring for Access category 7 but 0% accessibility for Access Category "x" }

**ensure** **that** {

**when** { UE moves to another cell belonging to a new SNPN }

**then** { UE is able to initiate PDU Session Establishment for "DNN" in the new SNPN }

}

11.3.9a.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in TS 24.501: clause 4.5.3 and TS 38.331: clause 5.3.14.1, 5.3.14.2, 5.3.14.4 and 5.3.14.5. Unless otherwise stated these are Rel-16 requirements.

[TS 24.501, clause 4.5.3]

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

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

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

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

1) DNN;

2) Void

3) OS Id + OS App Id of application triggering the access attempt; or

4) S-NSSAI; and

NOTE 1: An access category criteria type can be associated with more than one access category criteria values.

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

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

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

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

then:

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

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

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

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

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

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

- a service request procedure requesting user-plane resources for a PDU session; or

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

then:

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

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

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

Each operator-defined access category definition has a different precedence value.

Several operator-defined access category definitions can have the same operator-defined access category number.

If:

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

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

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

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

The operator-defined access category definitions are valid in the PLMN which provided them and in a PLMN equivalent to the PLMN which provided them, or in the SNPN which provided them, as specified in annex C.

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

If the UE stores operator-defined access category definitions valid in the selected PLMN or the RPLMN, or valid in the selected SNPN or RSNPN, then access control in 5GMM-CONNECTED mode and in 5GMM-CONNECTED mode with RRC inactive indication will only be performed for the events 1) to 6) defined in subclause 4.5.1.

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

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

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

NOTE 2: When the UE selects a new PLMN which is not equivalent to the previously selected PLMN, or selects a new SNPN, the UE can delete the operator-defined access category definitions stored for the previously selected PLMN or SNPN e.g. if there is no storage space in the UE.

[TS 38.331, clause 5.3.14.1]

The purpose of this procedure is to perform access barring check for an access attempt associated with a given Access Category and one or more Access Identities upon request from upper layers according to TS 24.501 [23] or the RRC layer. This procedure does not apply to IAB-MT. This procedure does not apply to L2 U2N Relay UE initiating RRC connection establishment or RRC connection resume upon reception of any message from a L2 U2N remote UE via SL-RLC0 or SL-RLC1 in accordance to 5.3.3.1a or 5.3.13.1a.

After a PCell change in RRC\_CONNECTED the UE shall defer access barring checks until it has obtained *SIB1* (as specified in 5.2.2.2) from the target cell.

[TS 38.331, clause 5.3.14.2]

Upon initiation of the procedure, the UE shall:

1> if timer T390 is running for the Access Category:

2> consider the access attempt as barred;

1> else if timer T302 is running and the Access Category is neither '2' nor '0':

2> consider the access attempt as barred;

1> else:

2> if the Access Category is '0':

3> consider the access attempt as allowed;

2> else:

3> if *SIB1* includes *uac-BarringPerPLMN-List* that contains a *UAC-BarringPerPLMN* for the selected PLMN or SNPN:

4> if the procedure in 5.2.2.4.2 for a selected PLMN resulted in use of information in *npn-IdentityInfoList* and *UAC-BarringPerPLMN* has an entry with the *plmn-IdentityIndex* corresponding to used information in this list:

5> select the *UAC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to used information in the *npn-IdentityInfoList*;

4> else:

5> select the *UAC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to the selected PLMN and the *PLMN-IdentityInfo, if any,* or the selected SNPN and the *npn-IdentityInfoList*;

3> if any *UAC-BarringPerPLMN* entry is selected:

4> in the remainder of this procedure, use the selected *UAC-BarringPerPLMN* entry (i.e. presence or absence of access barring parameters in this entry) irrespective of the *uac-BarringForCommon* included in *SIB1*;

3> else if SIB1 includes *uac-BarringForCommon*:

4> in the remainder of this procedure use the *uac-BarringForCommon* (i.e. presence or absence of these parameters) included in *SIB1*;

3> else:

4> consider the access attempt as allowed;

3> if *uac-BarringForCommon* is applicable or the *uac-ACBarringListType* indicates that *uac-ExplicitACBarringList* is used:

4> if the corresponding *UAC-BarringPerCatList* contains a *UAC-BarringPerCat* entry corresponding to the Access Category:

5> select the *UAC-BarringPerCat* entry;

5> if the *uac-BarringInfoSetList* contains a *UAC-BarringInfoSet* entry corresponding to the selected *uac-barringInfoSetIndex* in the *UAC-BarringPerCat*:

6> select the *UAC-BarringInfoSet* entry;

6> perform access barring check for the Access Category as specified in 5.3.14.5, using the selected *UAC-BarringInfoSet* as "UAC barring parameter";

5> else:

6> consider the access attempt as allowed;

4> else:

5> consider the access attempt as allowed;

3> else if the *uac-ACBarringListType* indicates that *uac-ImplicitACBarringList* is used:

4> select the *uac-BarringInfoSetIndex* corresponding to the Access Category in the *uac-ImplicitACBarringList*;

4> if the *uac-BarringInfoSetList* contains the *UAC-BarringInfoSet* entry corresponding to the selected *uac-BarringInfoSetIndex*:

5> select the *UAC-BarringInfoSet* entry;

5> perform access barring check for the Access Category as specified in 5.3.14.5, using the selected *UAC-BarringInfoSet* as "UAC barring parameter";

4> else:

5> consider the access attempt as allowed;

3> else:

4> consider the access attempt as allowed;

1> if the access barring check was requested by upper layers:

2> if the access attempt is considered as barred:

3> if timer T302 is running:

4> if timer T390 is running for Access Category '2':

5> inform the upper layer that access barring is applicable for all access categories except categories '0', upon which the procedure ends;

4> else

5> inform the upper layer that access barring is applicable for all access categories except categories '0' and '2', upon which the procedure ends;

3> else:

4> inform upper layers that the access attempt for the Access Category is barred, upon which the procedure ends;

2> else:

3> inform upper layers that the access attempt for the Access Category is allowed, upon which the procedure ends;

1> else:

2> the procedure ends.

[TS 38.331, clause 5.3.14.4]

The UE shall:

1> if timer T302 expires or is stopped:

2> for each Access Category for which T390 is not running:

3> consider the barring for this Access Category to be alleviated:

1> else if timer T390 corresponding to an Access Category other than '2' expires or is stopped, and if timer T302 is not running:

2> consider the barring for this Access Category to be alleviated;

1> else if timer T390 corresponding to the Access Category '2' expires or is stopped:

2> consider the barring for this Access Category to be alleviated;

1> when barring for an Access Category is considered being alleviated:

2> if the Access Category was informed to upper layers as barred:

3> inform upper layers about barring alleviation for the Access Category.

2> if barring is alleviated for Access Category '8'; or

2> if barring is alleviated for Access Category '2':

3> perform actions specified in 5.3.13.8;

[TS 38.331, clause 5.3.14.5]

The UE shall:

1> if one or more Access Identities equal to 1, 2, 11, 12, 13, 14, or 15 are indicated according to TS 24.501 [23], and

1> if for at least one of these Access Identities the corresponding bit in the *uac-BarringForAccessIdentity* contained in "UAC barring parameter" is set to *zero*:

2> consider the access attempt as allowed;

1> else:

2> if the establishment of the RRC connection is the result of release with redirect with *mpsPriorityIndication* (either in NR or E-UTRAN)*;* and

2> if the bit corresponding to Access Identity 1 in the *uac-BarringForAccessIdentity* contained in the "UAC barring parameter" is set to *zero:*

3> consider the access attempt as allowed;

2> else if Access Identity 3 is indicated:

3> draw a random number '*rand*' uniformly distributed in the range: 0 ≤ rand < 1;

3> if '*rand*' is lower than the value indicated by *uac-BarringFactorForAI3* included in "UAC barring parameter":

4> consider the access attempt as allowed;

3> else:

4> consider the access attempt as barred;

2> else:

3> draw a random number '*rand*' uniformly distributed in the range: 0 ≤ *rand* < 1;

3> if '*rand*' is lower than the value indicated by *uac-BarringFactor* included in "UAC barring parameter":

4> consider the access attempt as allowed;

3> else:

4> consider the access attempt as barred;

1> if the access attempt is considered as barred:

2> draw a random number '*rand*' that is uniformly distributed in the range 0 ≤ *rand* < 1;

2> start timer T390 for the Access Category with the timer value calculated as follows, using the *uac-BarringTime* included in"UAC barring parameter":

T390 = (0.7+ 0.6 \* *rand*) \* *uac-BarringTime.*

11.3.9a.3 Test description

11.3.9a.3.1 Pre-test conditions

System Simulator:

- 2 SNPN cells NR Cell 1, NR Cell 12 are configured broadcasting default SNPN IDs as indicated in TS 38.508-1 [4] Table 4.4.2-4.

- System information combination NR-12 as defined in TS 38.508-1 [4] clause 4.4.3.1.2 is used in NR cells.

UE:

- The UE is provisioned with a “list of subscriber data” to allow access to SNPN identified by NR Cell 1 and NR Cell 12.

Preamble:

- The UE is registered on SNPN associated with NR Cell 1 and in state 3N-A on NR Cell 1(serving cell) by using the procedure described in TS 38.508-1 [4] clause 4.5.2.2 with “connected without release” except that the REGISTRATION ACCEPT message indicates Operator Defined Access Category ""33" as described in Table 11.3.9a.3.3-1.

11.3.9a.3.2 Test procedure sequence

Table 11.3.9a.3.2-1 for FR1 and Table 11.3.9a.3.2-2 for FR2 illustrates the downlink power levels and other changing parameters to be applied for the cells at various time instants of the test execution. Row marked “T0” denotes the initial conditions in preamble, while the column marked "T1" is to be applied subsequently in the Main behaviour. The exact instants on which these values shall be applied are described in the texts in this clause.

Table 11.3.9a.3.2-1: Time instances of cell power level and parameter changes for FR1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter | Unit | NR Cell 1 | NR Cell 12 | Remarks |
| T0 | SS/PBCH  SSS EPRE | dBm/SCS | -88 | Off | The power level values are assigned to ensure UE registered on NR Cell 1. |
| T1 | SS/PBCH  SSS EPRE | dBm/SCS | Off | -88 | The power level values are assigned to ensure UE registered on NR Cell 12. |
| Note 1: Power level “Off” is defined in TS 38.508-1 [4] Table 6.2.2.1-3. | | | | | |

Table 11.3.9a.3.2-2: Time instances of cell power level and parameter changes for FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter | Unit | NR Cell 1 | NR Cell 12 | Remarks |
| T0 | SS/PBCH  SSS EPRE | dBm/SCS | -82 | Off | The power level values are assigned to ensure UE registered on NR Cell 1. |
| T1 | SS/PBCH  SSS EPRE | dBm/SCS | Off | -82 | The power level values are assigned to ensure UE registered on NR Cell 12. |
| Note 1: Power level “Off” is defined in TS 38.508-1 [4] Table 6.2.2.2-2. | | | | | |

Table 11.3.9a.3.2-3: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Make the UE attempt to establish a PDU session for the DNN defined in Table 11.3.9a.3.3-1. This can be done by an AT/MMI command. | - | - | - | - |
| 2 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST and the DNN in UL NAS TRANSPORT message is the same value in UL NAS TRANSPORT message in preamble within 11.2s? (Note 1) | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 1 | F |
| 3 | The SS adjusts the NR Cells power levels according to row "T1" in table 11.3.9a.3.2-1/2. | - | - | - | - |
| 4-22a1 | Steps 2-20a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 23 | Start Timer=5 sec. | - | - | - | - |
|  | EXCEPTION: Steps 24a1-24b3 describes optional behaviour that depends on the UE implementation. |  |  |  |  |
| 24a1 | Check: Does the UE transmit an *RRCSetupRequest* message and *establishmentCause* is set to *mo-Data*? | --> | NR RRC: RRCSetupRequest | 2 | P |
| 24a2 | Stop Timer=5 sec. | - | - | - | - |
| 24b1 | Timer=5 sec expires | - | - | - | - |
| 24b2 | Make the UE attempt to establish a PDU session for the DNN defined in Table 11.3.9a.3.3-1. This can be done by an AT/MMI command. | - | - | - | - |
| 24b3 | Check: Does the UE transmit an *RRCSetupRequest* message and *establishmentCause* is set to *mo-Data*? | --> | NR RRC: RRCSetupRequest | 2 | P |
| 25-30 | Steps 3-8 of the generic procedure for  NR RRC\_Connected specified in TS 38.508-1  Table 4.5.4.2-3 are performed. | - | - | - | - |
| 31 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST and the DNN value in UL NAS TRANSPORT message is the same as the DNN value of Operator-defined access category definitions defined in Table 11.3.9a.3.3-1 | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 2 | P |
| 32 | The SS transmits *RRCReconfiguration* message containing PDU SESSION ESTABLISHMENT ACCEPT message. | <-- | NR RRC：*RRCReconfiguration*  5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |
| 33 | The UE transmits *RRCReconfigurationComplete* message to confirm the establishment of DRB. | --> | NR RRC：*RRCReconfigurationComplete* | - | - |
| Note 1: The wait time 11.2s is selected to be less than T390 minimum = (0.7 + 0.6 \* *rand*) \* uac-BarringTime(16s) = 11.2s when ‘*rand’* takes the minimum value of 0. | | | | | |

11.3.9a.3.3 Specific message contentsTable 11.3.9a.3.3-1: REGISTRATION ACCEPT (preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508 [4] Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| Operator-defined access category definitions |  |  |  |
| Precedence value | ‘0000 0000’B |  |  |
| PSAC | ‘1’B | Value 1 means that standardized access category is present. |  |
| Operator-defined access category number | ‘00001’B | 33(= based on operator classification) |  |
| Criteria |  |  |  |
| Criteria type | ‘0000 0000’B | DNN type |  |
| Criteria value |  |  |  |
| DNN length-value pair count | ‘0000 0001’B |  |  |
| DNN length-value pair |  |  |  |
| DNN value length | Set to the length in octets of the DNN value field. |  |  |
| DNN value | ‘ABCD‘ |  |  |
| Standardized access category | ‘00111’B | Access category number 7(= MO\_data) |  |

Table 11.3.9a.3.3-2: *SIB1* of NR Cell 1 and NR Cell 12 (preamble and all steps, Table 11.3.9a.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-28 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| uac-BarringInfo SEQUENCE { |  |  | NR cell 1  NR cell 12 |
| uac-BarringForCommon SEQUENCE (SIZE (1..maxAccessCat-1)) OF UAC-BarringPerCat { | 1 entry |  |  |
| UAC-BarringPerCat[1] SEQUENCE { |  | entry 1 |  |
| accessCategory | 33 | (= based on operator classification) |  |
| uac-barringInfoSetIndex | 1 | Value 1 corresponds to the first entry in uac-BarringInfoSetList |  |
| } |  |  |  |
| } |  |  |  |
| uac-BarringPerPLMN-List | Not present |  |  |
| uac-BarringInfoSetList SEQUENCE (SIZE(1..maxBarringInfoSet)) OF UAC-BarringInfoSet { | 1 entry |  |  |
| UAC-BarringInfoSet[1] SEQUENCE { |  | entry 1 |  |
| uac-BarringFactor | p00 | 0% access probability |  |
| uac-BarringTime | s16 | 16 s |  |
| uac-BarringForAccessIdentity | ‘1111111’B | Value 1 means that access attempt is not allowed for the corresponding access identity.  The leftmost bit, bit 0 in the bit string corresponds to Access Identity 1. |  |
| } |  |  |  |
| } |  |  |  |
| uac-AccessCategory1-SelectionAssistanceInfo | Not Present |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.3.9a.3.3-2A: REGISTRATION REQUEST (step 6, Table 11.3.9a.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| ngKSI |  |  |  |
| NAS key set identifier | '111'B | no key is available |  |
| TSC | Any allowed value | TSC does not apply for NAS key set identifier value "111" |  |
| 5GS mobile identity | The valid SUCI | Only SUCI is available. |  |
| Last visited registered TAI | Not present |  |  |

Table 11.3.9a.3.3-3: PDU SESSION ESTABLISHMENT ACCEPT (step 32, Table 11.3.9a.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-2 | | | |
| Information Element | Value/remark | Comment | Condition |
| Authorized QoS rules | 5GC QoS rule of the Config#1 in Table 4.8.4-1 |  |  |
| Mapped EPS bearer contexts |  |  |  |
| Mapped EPS bearer context |  |  |  |
| Mapped EPS QoS parameters | EPC default bearer context of the Config#1 in Table 4.8.4-1 |  |  |
| DNN | The same DNN value as sent in the UL NAS TRANSPORT message at step 15 |  |  |

### 11.3.10 UAC / Access Identity 0 / AC9 / 0% access probability / SIP Re-registration

11.3.10.1 Test Purpose (TP)

(1)

**with** { the UE is NR RRC\_CONNECTED }

**ensure** **that** {

**when** { the UE receives SIB1 message not configured for special AIs (1,2,11-15) indicating UAC Info set to 0% accessibility for Access category 9 }

**then** { UE is not able to send SIP re-REGISTER message successfully }

}

(2)

**with** { the UE is NR RRC\_CONNECTED }

**ensure** **that** {

**when** { the UE receives SIB1 default message }

**then** { UE is able to perform reregistration successfully }

}

11.3.10.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in TS 24.501: clause 4.5.2, 4.5.4.2 and 4.5.6 and TS 38.331: clause 5.3.14.1, 5.3.14.2, 5.3.14.4 and 5.3.14.5. Unless otherwise stated these are Rel-16 requirements.

[TS 24.501, clause 4.5.2]

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

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

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

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

Table 4.5.2.1: Access identities

|  |  |
| --- | --- |
| **Access Identity number** | **UE configuration** |
| 0 | UE is not configured with any parameters from this table |
| 1 (NOTE 1) | UE is configured for multimedia priority service (MPS). |
| 2 (NOTE 2) | UE is configured for mission critical service (MCS). |
| 3-10 | Reserved for future use |
| 11 (NOTE 3) | Access Class 11 is configured in the UE. |
| 12 (NOTE 3) | Access Class 12 is configured in the UE. |
| 13 (NOTE 3) | Access Class 13 is configured in the UE. |
| 14 (NOTE 3) | Access Class 14 is configured in the UE. |
| 15 (NOTE 3) | Access Class 15 is configured in the UE. |
| NOTE 1: Access identity 1 is valid when: - the USIM file EFUAC\_AIC indicates the UE is configured for access identity 1 and the selected PLMN, if a new PLMN is selected, or RPLMN is the HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present), or a visited PLMN of the home country (see the definition of home country in 3GPP TS 24.301 [15]); or - the UE receives the 5GS network feature support IE with the MPS indicator bit set to "Access identity 1 valid" from the RPLMN as described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4.  NOTE 2: Access identity 2 is used by UEs configured for MCS and is valid when: - the USIM file EFUAC\_AIC indicates the UE is configured for access identity 2 and the selected PLMN, if a new PLMN is selected, or RPLMN is the HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present), or a visited PLMN of the home country (see 3GPP TS 23.122 [5]); or - the UE receives the 5GS network feature support IE with the MCS indicator bit set to "Access identity 2 valid" from the RPLMN as described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4.  NOTE 3: Access identities 11 and 15 are valid in HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present). Access Identities 12, 13 and 14 are valid in HPLMN and visited PLMNs of home country only (see the definition of home country in 3GPP TS 24.301 [15]). | |

The UE uses the MPS indicator bit of the 5GS network feature support IE to determine if access identity 1 is valid. Processing of the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message is described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4. The UE shall not consider access identity 1 to be valid when the UE is not in the country of its HPLMN or in an EHPLMN (if the EHPLMN list is present) prior to receiving the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message being set to "Access identity 1 valid".

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

The UE uses the MCS indicator bit of the 5GS network feature support IE to determine if access identity 2 is valid. Processing of the MCS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message is described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4. The UE shall not consider access identity 2 to be valid when the UE is not in the country of its HPLMN or in an EHPLMN (if the EHPLMN list is present) prior to receiving the MCS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message being set to "Access identity 2 valid".

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

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

When the UE is in the country of its HPLMN, the contents of the USIM file EFACC as specified in 3GPP TS 31.102 [22] and the rules specified in table 4.5.2.1 are used to determine the applicability of access classes 12 - 14. When the UE is not in the country of its HPLMN, access classes 12-14 are not applicable.

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

NOTE: The case when an access attempt matches more than one rule includes the case when multiple events trigger an access attempt at the same time.

Table 4.5.2.2: Mapping table for access categories

|  |  |  |  |
| --- | --- | --- | --- |
| **Rule #** | **Type of access attempt** | **Requirements to be met** | **Access Category** |
| 1 | Response to paging or NOTIFICATION over non-3GPP access;  5GMM connection management procedure initiated for the purpose of transporting an LPP message without an ongoing 5GC-MO-LR procedure;  Access attempt to handover of ongoing MMTEL voice call, MMTEL video call or SMSoIP from non-3GPP access | Access attempt is for MT access, or handover of ongoing MMTEL voice call, MMTEL video call or SMSoIP from non-3GPP access | 0 (= MT\_acc) |
| 2 | Emergency | UE is attempting access for an emergency session (NOTE 1, NOTE 2) | 2 (= emergency) |
| 3 | Access attempt for operator-defined access category | UE stores operator-defined access category definitions valid in the current PLMN as specified in subclause 4.5.3, and access attempt is matching criteria of an operator-defined access category definition | 32-63  (= based on operator classification) |
| 3.1 | Access attempt for MO exception data | UE is in NB-N1 mode and allowed to use exception data reporting (see the ExceptionDataReportingAllowed leaf of the NAS configuration MO in 3GPP TS 24.368 [17] or the USIM file EFNASCONFIG in 3GPP TS 31.102 [22]), and access attempt is for MO data or for MO signalling initiated upon receiving a request from upper layers to transmit user data related to an exceptional event. | 10 (= MO exception data) |
| 4 | Access attempt for delay tolerant service | (a) UE is configured for NAS signalling low priority or UE supporting S1 mode is configured for EAB (see the "ExtendedAccessBarring" leaf of NAS configuration MO in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22]) where "EAB override" does not apply, and  (b): the UE received one of the categories a, b or c as part of the parameters for unified access control in the broadcast system information, and the UE is a member of the broadcasted category in the selected PLMN or RPLMN/equivalent PLMN  (NOTE 3, NOTE 5, NOTE 6, NOTE 7, NOTE 8) | 1 (= delay tolerant) |
| 4.1 | MO IMS registration related signalling | Access attempt is for MO IMS registration related signalling (e.g. IMS initial registration, re-registration, subscription refresh)  or for NAS signalling connection recovery during ongoing procedure for MO IMS registration related signalling (NOTE 2a) | 9 (= MO IMS registration related signalling) |
| 5 | MO MMTel voice call | Access attempt is for MO MMTel voice call  or for NAS signalling connection recovery during ongoing MO MMTel voice call (NOTE 2) | 4 (= MO MMTel voice) |
| 6 | MO MMTel video call | Access attempt is for MO MMTel video call  or for NAS signalling connection recovery during ongoing MO MMTel video call (NOTE 2) | 5 (= MO MMTel video) |
| 7 | MO SMS over NAS or MO SMSoIP | Access attempt is for MO SMS over NAS (NOTE 4) or MO SMS over SMSoIP transfer  or for NAS signalling connection recovery during ongoing MO SMS or SMSoIP transfer (NOTE 2) | 6 (= MO SMS and SMSoIP) |
| 8 | UE NAS initiated 5GMM specific procedures | Access attempt is for MO signalling | 3 (= MO\_sig) |
| 8.1 | Mobile originated location request | Access attempt is for mobile originated location request (NOTE 9) | 3 (= MO\_sig) |
| 8.2 | Mobile originated signalling transaction towards the PCF | Access attempt is for mobile originated signalling transaction towards the PCF (NOTE 10) | 3 (= MO\_sig) |
| 9 | UE NAS initiated 5GMM connection management procedure or 5GMM NAS transport procedure | Access attempt is for MO data | 7 (= MO\_data) |
| 10 | An uplink user data packet is to be sent for a PDU session with suspended user-plane resources | No further requirement is to be met | 7 (= MO\_data) |
| NOTE 1: This includes 5GMM specific procedures while the service is ongoing and 5GMM connection management procedures required to establish a PDU session with request type = "initial emergency request" or "existing emergency PDU session", or to re-establish user-plane resources for such a PDU session. This further includes the service request procedure initiated with a SERVICE REQUEST message with the Service type IE set to "emergency services fallback".  NOTE 2: Access for the purpose of NAS signalling connection recovery during an ongoing service as defined in subclause 4.5.5, or for the purpose of NAS signalling connection establishment following fallback indication from lower layers during an ongoing service as defined in subclause 4.5.5, is mapped to the access category of the ongoing service in order to derive an RRC establishment cause, but barring checks will be skipped for this access attempt.  NOTE 2a: Access for the purpose of NAS signalling connection recovery during an ongoing procedure for MO IMS registration related signalling as defined in subclause 4.5.5, or for the purpose of NAS signalling connection establishment following fallback indication from lower layers during an ongoing procedure for MO IMS registration related signalling as defined in subclause 4.5.5, is mapped to the access category of the MO IMS registration related signalling in order to derive an RRC establishment cause, but barring checks will be skipped for this access attempt.  NOTE 3: If the UE selects a new PLMN, then the selected PLMN is used to check the membership; otherwise the UE uses the RLPMN or a PLMN equivalent to the RPLMN.  NOTE 4: This includes the 5GMM connection management procedures triggered by the UE-initiated NAS transport procedure for transporting the MO SMS.  NOTE 5: The UE configured for NAS signalling low priority is not supported in this release of specification. If a UE supporting both S1 mode and N1 mode is configured for NAS signalling low priority in S1 mode as specified in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22], the UE shall ignore the configuration for NAS signalling low priority when in N1 mode.  NOTE 6: If the access category applicable for the access attempt is 1, then the UE shall additionally determine a second access category from the range 3 to 7. If more than one access category matches, the access category of the lowest rule number shall be chosen. The UE shall use the second access category only to derive an RRC establishment cause for the access attempt.  NOTE 7: "EAB override" does not apply, if the UE is not configured to allow overriding EAB (see the "Override\_ExtendedAccessBarring" leaf of NAS configuration MO in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22]), or if NAS has not received an indication from the upper layers to override EAB and the UE does not have a PDU session that was established with EAB override.  NOTE 8: For the definition of categories a, b and c associated with access category 1, see 3GPP TS 22.261 [3]. The categories associated with access category 1 are distinct from the categories a, b and c associated with EAB (see 3GPP TS 22.011 [1A]).  NOTE 9: This includes: a) the UE-initiated NAS transport procedure for transporting a mobile originated location  request; b) the 5GMM connection management procedure triggered by a) above; and c) NAS signalling connection recovery during an ongoing 5GC-MO-LR procedure.  NOTE 10: This includes: a) the UE-initiated NAS transport procedure for transporting a mobile originated signalling  transaction towards the PCF; b) the 5GMM connection management procedure triggered by a) above; and c) NAS signalling connection recovery during an ongoing UE triggered V2X policy provisioning  procedure. | | | |

[TS 24.501, clause 4.5.4.2]

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

a) subclause 4.5.2, table 4.5.2.1 and table 4.5.2.2, and subclause 4.5.2.3, if the UE is not operating in SNPN access mode; or

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

[TS 24.501, clause 4.5.6]

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

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

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

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

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

[TS 38.331, clause 5.3.14.1]

The purpose of this procedure is to perform access barring check for an access attempt associated with a given Access Category and one or more Access Identities upon request from upper layers according to TS 24.501 [23] or the RRC layer. This procedure does not apply to IAB-MT.

After a PCell change in RRC\_CONNECTED the UE shall defer access barring checks until it has obtained *SIB1* (as specified in 5.2.2.2) from the target cell.

[TS 38.331, clause 5.3.14.2]

Upon initiation of the procedure, the UE shall:

1> if timer T390 is running for the Access Category:

2> consider the access attempt as barred;

1> else if timer T302 is running and the Access Category is neither '2' nor '0':

2> consider the access attempt as barred;

1> else:

2> if the Access Category is '0':

3> consider the access attempt as allowed;

2> else:

3> if *SIB1* includes *uac-BarringPerPLMN-List* that contains a *UAC-BarringPerPLMN* for the selected PLMN or SNPN:

4> if the procedure in 5.2.2.4.2 for a selected PLMN resulted in use of information in *npn-IdentityInfoList* and *UAC-BarringPerPLMN* has an entry with the *plmn-IdentityIndex* corresponding to used information in this list:

5> select the *UAC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to used information in the *npn-IdentityInfoList*;

4> else:

5> select the *UAC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to the selected PLMN and the *PLMN-IdentityInfo, if any,* or the selected SNPN and the *npn-IdentityInfoList*;

3> if any *UAC-BarringPerPLMN* entry is selected:

4> in the remainder of this procedure, use the selected *UAC-BarringPerPLMN* entry (i.e. presence or absence of access barring parameters in this entry) irrespective of the *uac-BarringForCommon* included in *SIB1*;

3> else if SIB1 includes *uac-BarringForCommon*:

4> in the remainder of this procedure use the *uac-BarringForCommon* (i.e. presence or absence of these parameters) included in *SIB1*;

3> else:

4> consider the access attempt as allowed;

3> if *uac-BarringForCommon* is applicable or the *uac-ACBarringListType* indicates that *uac-ExplicitACBarringList* is used:

4> if the corresponding *UAC-BarringPerCatList* contains a *UAC-BarringPerCat* entry corresponding to the Access Category:

5> select the *UAC-BarringPerCat* entry;

5> if the *uac-BarringInfoSetList* contains a *UAC-BarringInfoSet* entry corresponding to the selected *uac-barringInfoSetIndex* in the *UAC-BarringPerCat*:

6> select the *UAC-BarringInfoSet* entry;

6> perform access barring check for the Access Category as specified in 5.3.14.5, using the selected *UAC-BarringInfoSet* as "UAC barring parameter";

5> else:

6> consider the access attempt as allowed;

4> else:

5> consider the access attempt as allowed;

3> else if the *uac-ACBarringListType* indicates that *uac-ImplicitACBarringList* is used:

4> select the *uac-BarringInfoSetIndex* corresponding to the Access Category in the *uac-ImplicitACBarringList*;

4> if the *uac-BarringInfoSetList* contains the *UAC-BarringInfoSet* entry corresponding to the selected *uac-BarringInfoSetIndex*:

5> select the *UAC-BarringInfoSet* entry;

5> perform access barring check for the Access Category as specified in 5.3.14.5, using the selected *UAC-BarringInfoSet* as "UAC barring parameter";

4> else:

5> consider the access attempt as allowed;

3> else:

4> consider the access attempt as allowed;

1> if the access barring check was requested by upper layers:

2> if the access attempt is considered as barred:

3> if timer T302 is running:

4> if timer T390 is running for Access Category '2':

5> inform the upper layer that access barring is applicable for all access categories except categories '0', upon which the procedure ends;

4> else

5> inform the upper layer that access barring is applicable for all access categories except categories '0' and '2', upon which the procedure ends;

3> else:

4> inform upper layers that the access attempt for the Access Category is barred, upon which the procedure ends;

2> else:

3> inform upper layers that the access attempt for the Access Category is allowed, upon which the procedure ends;

1> else:

2> the procedure ends.

[TS 38.331, clause 5.3.14.4]

The UE shall:

1> if timer T302 expires or is stopped:

2> for each Access Category for which T390 is not running:

3> consider the barring for this Access Category to be alleviated:

1> else if timer T390 corresponding to an Access Category other than '2' expires or is stopped, and if timer T302 is not running:

2> consider the barring for this Access Category to be alleviated;

1> else if timer T390 corresponding to the Access Category '2' expires or is stopped:

2> consider the barring for this Access Category to be alleviated;

1> when barring for an Access Category is considered being alleviated:

2> if the Access Category was informed to upper layers as barred:

3> inform upper layers about barring alleviation for the Access Category.

2> if barring is alleviated for Access Category '8'; or

2> if barring is alleviated for Access Category '2':

3> perform actions specified in 5.3.13.8;

[TS 38.331, clause 5.3.14.5]

The UE shall:

1> if one or more Access Identities are indicated according to TS 24.501 [23], and

1> if for at least one of these Access Identities the corresponding bit in the *uac-BarringForAccessIdentity* contained in "UAC barring parameter" is set to *zero*:

2> consider the access attempt as allowed;

1> else:

2> if the establishment of the RRC connection is the result of release with redirect with *mpsPriorityIndication* (either in NR or E-UTRAN)*;* and

2> if the bit corresponding to Access Identity 1 in the *uac-BarringForAccessIdentity* contained in the "UAC barring parameter" is set to *zero:*

3> consider the access attempt as allowed;

2> else:

3> draw a random number '*rand*' uniformly distributed in the range: 0 ≤ *rand* < 1;

3> if '*rand*' is lower than the value indicated by *uac-BarringFactor* included in "UAC barring parameter":

4> consider the access attempt as allowed;

3> else:

4> consider the access attempt as barred;

1> if the access attempt is considered as barred:

2> draw a random number '*rand*' that is uniformly distributed in the range 0 ≤ *rand* < 1;

2> start timer T390 for the Access Category with the timer value calculated as follows, using the *uac-BarringTime* included in"UAC barring parameter":

T390 = (0.7+ 0.6 \* *rand*) \* *uac-BarringTime.*

11.3.10.3 Test description

11.3.10.3.1 Pre-test conditions

System Simulator:

- NR Cell 1.

- Cell power level is selected according to TS 38.508-1 [4] Table 6.2.2.1-3.

- System information combination NR-1 as defined in TS 38.508-1 [4] Table 4.4.3.1.2-1 is used in NR cell 1.

UE:

- None.

Preamble:

- The UE is switched on and brought to state 3N-A in accordance with the procedure described in TS 38.508-1 [4] and IMS PDU session establishment is completed on NR Cell 1.

11.3.10.3.2 Test procedure sequence

Table 11.3.10.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **St** | **Procedure** | **Message Sequence** | | **TP** | **Verdict** |
|  |  | **U - S** | **Message** |  |  |
| 1-8 | Void | - | - | - | - |
| 9 | The SS changes the SIB1 according to Table 11.3.10.3.3-2 and sends Short Message on PDCCH using P-RNTI. | <-- | PDCCH (DCI 1\_0): Short Message | - | - |
| 9A | Wait for 2.1\* modification period to allow the new system information to take effect. | - | - | - | - |
| 10 | Check: Does the UE perform SIP *re-registration* within 80s (Note 2)?  (Note: It is checked that the UE does not try to transmit Re-Registration while access barring is enabled.) | --> | REGISTER: Re-Registration | 1 | F |
| 11 | The SS changes the SIB1 according to 38.508-1 [4] Table 4.6.1-28 and transmits a Short message on PDCCH using P-RNTI indicating a systemInfoModification. | <-- | PDCCH (DCI 1\_0): Short Message | - | - |
| 11A | Void |  |  |  |  |
| 12 | Check: Does the UE perform SIP re-registration? | --> | REGISTER: Re-Registration | 2 | P |
| 13 | SS responds with 200 OK. | <-- | 200 OK | - | - |
| Note 1: Void  Note 2: Value of 80s = 60s (Half of expiration time) + 20s (time when access barring is enabled after half of expiration time) | | | | | |

11.3.10.3.3 Specific message contents

Table 11.3.10.3.3-1: 200 OK for REGISTER (Preamble)

| Derivation path: TS 34.229-1 [35], Table in subclause A.1.3 | | | | |
| --- | --- | --- | --- | --- |
| **Header/param** | **Cond** | **Value/remark** | **Rel** | **Reference** |
| **Contact** |  |  |  |  |
| expires |  | 120 |  |  |

Table 11.3.10.3.3-2: *SIB1* of NR Cell 1 (step 9, Table 11.3.10.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-28 | | | |
| **Information Element** | **Value/remark** | **Comment** | **Condition** |
| SIB1 ::= SEQUENCE { |  |  |  |
| uac-BarringInfo SEQUENCE { |  |  |  |
| uac-BarringForCommon SEQUENCE (SIZE (1..maxAccessCat-1)) OF UAC-BarringPerCat { | 1 entry |  |  |
| UAC-BarringPerCat[1] SEQUENCE { |  | entry 1 |  |
| accessCategory | 9 | (= MO IMS registration related signalling) |  |
| uac-barringInfoSetIndex | 1 |  |  |
| } |  |  |  |
| } |  |  |  |
| uac-BarringPerPLMN-List | Not present |  |  |
| uac-BarringInfoSetList SEQUENCE (SIZE(1..maxBarringInfoSet)) OF UAC-BarringInfoSet { | 1 entry |  |  |
| UAC-BarringInfoSet[1] SEQUENCE { |  | entry 1 |  |
| uac-BarringFactor | p00 | 0 % access probability |  |
| uac-BarringTime | s4 | 4 s |  |
| uac-BarringForAccessIdentity | '0000000'B |  |  |
| } |  |  |  |
| } |  |  |  |
| uac-AccessCategory1-SelectionAssistanceInfo | Not Present |  |  |
| } |  |  |  |
| } |  |  |  |

### 11.3.11 UAC / Access Identity 1 / 0% access probability / release with redirect with *mpsPriorityIndication /* RRC\_INACTIVE

11.3.11.1 Test Purpose (TP)

(1)

**with** { UE in NR RRC\_INACTIVE state }

**ensure that** {

**when** { UE receives an RRCRelease message including mpsPriorityIndication-r16 and the IE redirectedCarrierInfo with nr and Access Identity 1 in the *uac-BarringForAccessIdentity* contained in the "UAC barring parameter" is set to *zero* in SIB1 of target cell }

**then** { UE considers access attempt as allowed and resumes RRC connection with establishmentCause set to mps-PriorityAccess }

}

11.3.11.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 38.331, clauses 5.3.13.2, 5.3.14.5. Unless otherwise stated these are Rel-16 requirements.

[TS 38.331, clause 5.3.13.2]

The UE initiates the procedure when upper layers or AS (when responding to RAN paging, upon triggering RNA updates while the UE is in RRC\_INACTIVE, or for NR sidelink communication/V2X sidelink communication as specified in clause 5.3.13.1a) requests the resume of a suspended RRC connection.

…

Upon initiation of the procedure, the UE shall:

…

1> else if the resumption of the RRC connection is triggered by upper layers:

2> if the upper layers provide an Access Category and one or more Access Identities:

3> perform the unified access control procedure as specified in 5.3.14 using the Access Category and Access Identities provided by upper layers;

4> if the access attempt is barred, the procedure ends;

2> if the resumption occurs after release with redirect with *mpsPriorityIndication*:

3> set the resumeCause to mps-PriorityAccess;

[TS 38.331, clause 5.3.14.5]

The UE shall:

1> if one or more Access Identities are indicated according to TS 24.501 [23], and

1> if for at least one of these Access Identities the corresponding bit in the *uac-BarringForAccessIdentity* contained in "UAC barring parameter" is set to *zero*:

2> consider the access attempt as allowed;

1> else:

2> if the establishment of the RRC connection is the result of release with redirect with *mpsPriorityIndication* (either in NR or E-UTRAN)*;* and

2> if the bit corresponding to Access Identity 1 in the *uac-BarringForAccessIdentity* contained in the "UAC barring parameter" is set to *zero:*

3> consider the access attempt as allowed;

The UE shall set the contents of *RRCSetupRequest* message as follows:

1> set the *ue-Identity* as follows:

2> if upper layers provide a 5G-S-TMSI:

3> set the *ue-Identity* to *ng-5G-S-TMSI-Part1*;

2> else:

3> draw a 39-bit random value in the range 0..239-1 and set the *ue-Identity* to this value;

NOTE 1: Upper layers provide the *5G-S-TMSI* if the UE is registered in the TA of the current cell.

1> if the establishment of the RRC connection is the result of release with redirect with *mpsPriorityIndication* (either in NR or E-UTRAN):

2> set the *establishmentCause* to *mps-PriorityAccess*;

1> else:

2> set the *establishmentCause* in accordance with the information received from upper layers;

…

11.3.11.3 Test description

11.3.11.3.1 Pre-test conditions

System Simulator:

- NR Cell 1 and NR Cell 3.

- Cell power levels are selected according to TS 38.508-1 [4] Table 6.2.2.1-3 for FR1 or Table 6.2.2.2-2 for FR2. NR Cell 3 is switched on after UE has registered on NR Cell 1.

- System information combination NR-4 as defined in TS 38.508-1 [4] clause 4.4.3.1.2 is used in NR cells.

UE:

- None.

Preamble:

- The UE is in state 3N-A on NR Cell 1(serving cell) according to TS 38.508-1 [4] Table 4.4A.2-1 and using the message condition UE TEST LOOP MODE B active with IP PDU delay = 2 seconds according to TS 38.508-1 [4].

11.3.11.3.2 Test procedure sequence

Table 11.3.11.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS transmits one IP PDU. | - | - | - | - |
| 2 | Wait for 1 second after the IP packet has been transmitted in step 1. (Note 1) | - | - | - | - |
| 3 | The SS transmits an *RRCRelease* message (IE *redirectedCarrierInfo* including NR Cell 3 and IE *mpsPriorityIndication* and *suspendConfig*). | <-- | NR RRC: *RRCRelease* | - | - |
| 4 | Check: Does the UE transmit *RRCResumeRequest* message including the establishmentCause as *mps-PriorityAccess* on NR cell 3? | --> | NR RRC: *RRCResumeRequest* | 1 | P |
| 5 | The SS transmits an RRCResume message. | <-- | NR RRC: *RRCResume* | - | - |
| - | EXCEPTION: Steps 6 and 7 can happen in any order | - | - | - | - |
| 6 | The UE transmits an RRCResumeComplete message. | --> | NR RRC: *RRCResumeComplete* |  |  |
| 7 | The UE loops back the IP PDU. | - | - | - | - |
| 8 | The SS transmits DEACTIVATE TEST MODE message. | <-- | DEACTIVATE TEST MODE | - | - |
| 9 | The UE transmits DEACTIVATE TEST MODE COMPLETE message. | --> | DEACTIVATE TEST MODE COMPLETE | - | - |
| 10 | Switch off UE in RRC CONNECTED as described in TS 38.508-1 [4] subclause 4.9.6.3 | - | - | - | - |
| Note 1: The 1 second delay is used to secure that the UE has received and forwarded the IP Packet transmitted by the SS in step 1 to the UE test loop function before the *RRCRelease* message is sent by the SS in step 3. | | | | | |

11.3.11.3.3 Specific message contents

Table 11.3.11.3.3-1:SIB4 for NR cells 1 and 3 (preamble and all steps, Table 11.3.11.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.6.2-3 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB4 ::= SEQUENCE { |  |  |  |
| interFreqCarrierFreqList SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo { | 1 entry |  |  |
| InterFreqCarrierFreqInfo[1] SEQUENCE { |  | entry 1 |  |
| dl-CarrierFreq | Same downlink NR ARFCN as used for NR Cell 3 |  | NR Cell 1 |
|  | Same downlink NR ARFCN as used for NR Cell 1 |  | NR Cell 3 |
| cellReselectionPriority | Not present |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.3.11.3.3-2:SIB1 for NR cell 3 (preamble and all steps, Table 11.3.11.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-28 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| uac-BarringInfo SEQUENCE { |  |  | step 25 |
| uac-BarringForCommon SEQUENCE (SIZE (1..maxAccessCat-1)) OF UAC-BarringPerCat { | 1 entry |  |  |
| UAC-BarringPerCat[1] SEQUENCE { |  | entry 1 |  |
| accessCategory | 7 | (= MO\_data) |  |
| uac-barringInfoSetIndex | 1 | Value 1 corresponds to the first entry in uac-BarringInfoSetList |  |
| } |  |  |  |
| } |  |  |  |
| uac-BarringPerPLMN-List | Not present |  |  |
| uac-BarringInfoSetList SEQUENCE (SIZE(1..maxBarringInfoSet)) OF UAC-BarringInfoSet { | 1 entry |  |  |
| UAC-BarringInfoSet[1] SEQUENCE { |  | entry 1 |  |
| uac-BarringFactor | p00 | 0% access probability |  |
| uac-BarringTime | s16 | 16 s |  |
| uac-BarringForAccessIdentity | ‘0111111’B | Value 0 means that access attempt is allowed for the corresponding access identity.  The leftmost bit, bit 0 in the bit string corresponds to Access Identity 1. |  |
| } |  |  |  |
| } |  |  |  |
| uac-AccessCategory1-SelectionAssistanceInfo | Not Present |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.3.11.3.3-3: CLOSE UE TEST LOOP (Preamble, Table 11.3.11.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7A-3, condition UE TEST LOOP MODE B | | | |
| Information Element | Value/remark | Comment | Condition |
| UE test loop mode B LB setup |  |  |  |
| IP PDU delay | '0000 0010'B | 2 seconds |  |

Table 11.3.11.3.3-4: *RRCRelease* message (step 3, Table 11.3.11.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.6.1-16 with condition NR\_RRC\_INACTIVE | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCRelease ::= SEQUENCE { |  |  |  |
| rrc-TransactionIdentifier | RRC-TransactionIdentifier |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcRelease SEQUENCE { |  |  |  |
| redirectedCarrierInfo CHOICE { |  |  |  |
| nr SEQUENCE { |  |  |  |
| carrierFreq | ARFCN-ValueNR for NR Cell 3 frequency |  |  |
| ssbSubcarrierSpacing | Subcarrier spacing of SSB for NR Cell 3 |  |  |
| smtc | SSB-MTC | 38.508-1 [4] Table 4.6.3-185 |  |
| } |  |  |  |
| } |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| mpsPriorityIndication-r16 | true |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.3.11.3.3-5: *RRCResumeRequest* (step 4, Table 11.3.11.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-19 | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCResumeRequest ::= SEQUENCE { |  |  |  |
| rrcResumeRequest SEQUENCE { |  |  |  |
| establishmentCause | mps-PriorityAccess |  |  |
| } |  |  |  |
| } |  |  |  |

### 11.3.12 UAC / Access Identity 0 / AC7 / 0% access probability / Uplink user data transfer

11.3.12.1 Test Purpose (TP)

(1)

**with** { UE not configured for special AIs (1,2,11-15) having received a SIB1 message indicating UAC Info set to 0% accessibility for Access category 7 and in NR RRC\_IDLE }

**ensure** **that** {

**when** { UE initiates uplink user data packet to be sent for a PDU session }

**then** { UE does not send the data packet }

}

(2)

**with** { UE not configured for special AIs (1,2,11-15) , previously barred for MO\_data in NR RRC\_IDLE & current SIB1 indicates no access barred as part of UAC Info }

**ensure** **that** {

**when** { UE tries to send another uplink user data packet after T390 expires }

**then** { UE is able to successfully send the user data packet }

}

11.3.12.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in TS 24.501: clause 4.5.2, 4.5.4.2, 4.5.2A and 4.5.6 and TS 38.331: clause 5.3.14.1, 5.3.14.2, 5.3.14.4 and 5.3.14.5. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, clause 4.5.2]

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

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

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

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

Table 4.5.2.1: Access identities

|  |  |
| --- | --- |
| Access Identity number | UE configuration |
| 0 | UE is not configured with any parameters from this table |
| 1 (NOTE 1) | UE is configured for multimedia priority service (MPS). |
| 2 (NOTE 2) | UE is configured for mission critical service (MCS). |
| 3-10 | Reserved for future use |
| 11 (NOTE 3) | Access Class 11 is configured in the UE. |
| 12 (NOTE 3) | Access Class 12 is configured in the UE. |
| 13 (NOTE 3) | Access Class 13 is configured in the UE. |
| 14 (NOTE 3) | Access Class 14 is configured in the UE. |
| 15 (NOTE 3) | Access Class 15 is configured in the UE. |
| NOTE 1: Access identity 1 is valid when: - the USIM file EFUAC\_AIC indicates the UE is configured for access identity 1 and the RPLMN is the HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present), or a visited PLMN of the home country (see the definition of home country in 3GPP TS 24.301 [15]); or - the UE receives the 5GS network feature support IE with the MPS indicator bit set to "Access identity 1 valid in RPLMN or equivalent PLMN" from the RPLMN as described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4.  NOTE 2: Access identity 2 is used by UEs configured for MCS and is valid when: - the USIM file EFUAC\_AIC indicates the UE is configured for access identity 2 and the RPLMN is the HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present), or a visited PLMN of the home country (see 3GPP TS 23.122 [5]); or - the UE receives the 5GS network feature support IE with the MCS indicator bit set to "Access identity 2 valid in RPLMN or equivalent PLMN" from the RPLMN as described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4.  NOTE 3: Access identities 11 and 15 are valid in HPLMN (if the EHPLMN list is not present or is empty) or EHPLMN (if the EHPLMN list is present). Access Identities 12, 13 and 14 are valid in HPLMN and visited PLMNs of home country only (see the definition of home country in 3GPP TS 24.301 [15]). | |

The UE uses the MPS indicator bit of the 5GS network feature support IE to determine if access identity 1 is valid. Processing of the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message is described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4. The UE shall not consider access identity 1 to be valid when the UE is not in the country of its HPLMN prior to receiving the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message being set to "Access identity 1 valid in RPLMN or equivalent PLMN".

When the UE is in the country of its HPLMN, the contents of the USIM files EFUAC\_AIC and EFACC as specified in 3GPP TS 31.102 [22] and the rules specified in table 4.5.2.1 are used to determine the applicability of access identity 1 and access classes 11 - 15. When the UE is in the country of its HPLMN, and the USIM file EFUAC\_AIC does not indicate the UE is configured for access identity 1, the UE uses the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message to determine if access identity 1 is valid. When the UE is in the country of its HPLMN, and the USIM file EFUAC\_AIC indicates the UE is configured for access identity 1, the MPS indicator bit of the 5GS network feature support IE is not applicable. When the UE is not in the country of its HPLMN, the contents of the USIM files EFUAC\_AIC and EFACC are not applicable.

The UE uses the MCS indicator bit of the 5GS network feature support IE to determine if access identity 2 is valid. Processing of the MCS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message is described in subclause 5.5.1.2.4 and subclause 5.5.1.3.4. The UE shall not consider access identity 2 to be valid when the UE is not in the country of its HPLMN prior to receiving the MCS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message being set to "Access identity 2 valid in RPLMN or equivalent PLMN".

When the UE is in the country of its HPLMN, the contents of the USIM files EFUAC\_AIC and EFACC as specified in 3GPP TS 31.102 [22] and the rules specified in table 4.5.2.1 are used to determine the applicability of access identity 2 and access classes 11 - 15. When the UE is in the country of its HPLMN, and the USIM file EFUAC\_AIC does not indicate the UE is configured for access identity 2, the UE uses the MCS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message to determine if access identity 2 is valid. When the UE is in the country of its HPLMN, and the USIM file EFUAC\_AIC indicates the UE is configured for access identity 2, the MCS indicator bit of the 5GS network feature support IE is not applicable. When the UE is not in the country of its HPLMN, the contents of the USIM files EFUAC\_AIC and EFACC are not applicable.

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

NOTE: The case when an access attempt matches more than one rule includes the case when multiple events trigger an access attempt at the same time.

Table 4.5.2.2: Mapping table for access categories

|  |  |  |  |
| --- | --- | --- | --- |
| **Rule #** | **Type of access attempt** | **Requirements to be met** | **Access Category** |
| 1 | Response to paging or NOTIFICATION over non-3GPP access;  5GMM connection management procedure initiated for the purpose of transporting an LPP message | Access attempt is for MT access | 0 (= MT\_acc) |
| 2 | Emergency | UE is attempting access for an emergency session (NOTE 1, NOTE 2) | 2 (= emergency) |
| 3 | Access attempt for operator-defined access category | UE stores operator-defined access category definitions valid in the current PLMN as specified in subclause 4.5.3, and access attempt is matching criteria of an operator-defined access category definition | 32-63  (= based on operator classification) |
| 4 | Access attempt for delay tolerant service | (a) UE is configured for NAS signalling low priority or UE supporting S1 mode is configured for EAB (see the "ExtendedAccessBarring" leaf of NAS configuration MO in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22]) where "EAB override" does not apply, and  (b). the UE received one of the categories a, b or c as part of the parameters for unified access control in the broadcast system information, and the UE is a member of the broadcasted category in the selected PLMN or RPLMN/equivalent PLMN  (NOTE 3, NOTE 5, NOTE 6, NOTE 7, NOTE 8) | 1 (= delay tolerant) |
| 5 | MO MMTel voice call | Access attempt is for MO MMTel voice call  or for NAS signalling connection recovery during ongoing MO MMTel voice call (NOTE 2) | 4 (= MO MMTel voice) |
| 6 | MO MMTel video call | Access attempt is for MO MMTel video call  or for NAS signalling connection recovery during ongoing MO MMTel video call (NOTE 2) | 5 (= MO MMTel video) |
| 7 | MO SMS over NAS or MO SMSoIP | Access attempt is for MO SMS over NAS (NOTE 4) or MO SMS over SMSoIP transfer  or for NAS signalling connection recovery during ongoing MO SMS or SMSoIP transfer (NOTE 2) | 6 (= MO SMS and SMSoIP) |
| 8 | UE NAS initiated 5GMM specific procedures | Access attempt is for MO signalling | 3 (= MO\_sig) |
| 9 | UE NAS initiated 5GMM connection management procedure or 5GMM NAS transport procedure | Access attempt is for MO data | 7 (= MO\_data) |
| 10 | An uplink user data packet is to be sent for a PDU session with suspended user-plane resources | No further requirement is to be met | 7 (= MO\_data) |
| NOTE 1: This includes 5GMM specific procedures while the service is ongoing and 5GMM connection management procedures required to establish a PDU session with request type = "initial emergency request" or "existing emergency PDU session", or to re-establish user-plane resources for such a PDU session. This further includes the service request procedure initiated with a SERVICE REQUEST message with the Service type IE set to "emergency services fallback".<  NOTE 2: Access for the purpose of NAS signalling connection recovery during an ongoing service, or for the purpose of NAS signalling connection establishment following fallback indication from lower layers during an ongoing service, is mapped to the access category of the ongoing service in order to derive an RRC establishment cause, but barring checks will be skipped for this access attempt.  NOTE 3: If the UE selects a new PLMN, then the selected PLMN is used to check the membership; otherwise the UE uses the RLPMN or a PLMN equivalent to the RPLMN.  NOTE 4: This includes the 5GMM connection management procedures triggered by the UE-initiated NAS transport procedure for transporting the MO SMS.  NOTE 5: The UE configured for NAS signalling low priority is not supported in this release of specification. If a UE supporting both S1 mode and N1 mode is configured for NAS signalling low priority in S1 mode as specified in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22], the UE shall ignore the configuration for NAS signalling low priority when in N1 mode.  NOTE 6: If the access category applicable for the access attempt is 1, then the UE shall additionally determine a second access category from the range 3 to 7. If more than one access category matches, the access category of the lowest rule number shall be chosen. The UE shall use the second access category only to derive an RRC establishment cause for the access attempt.  NOTE 7: "EAB override" does not apply, if the UE is not configured to allow overriding EAB (see the "Override\_ExtendedAccessBarring" leaf of NAS configuration MO in 3GPP TS 24.368 [17] or 3GPP TS 31.102 [22]), or if NAS has not received an indication from the upper layers to override EAB and the UE does not have a PDU session that was established with EAB override.  NOTE 8: For the definition of categories a, b and c associated with access category 1, see 3GPP TS 22.261 [3]. The categories associated with access category 1 are distinct from the categories a, b and c associated with EAB (see 3GPP TS 22.011 [1A]). | | | |

[TS 24.501, clause 4.5.2A]

[Rel-16]

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

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

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

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

Table 4.5.2A.1: Access identities

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

The contents of the unified access control configuration in the "list of subscriber data" stored in the ME (see 3GPP TS 23.122 [5]) and the rules specified in table 4.5.2A.1 are used to determine the applicability of access identity 1 in the SNPN. When the contents of the unified access control configuration in the "list of subscriber data" stored in the ME (see 3GPP TS 23.122 [5]) do not indicate the UE is configured for access identity 1 for the SNPN, the UE uses the MPS indicator bit of the 5GS network feature support IE in the REGISTRATION ACCEPT message to determine if access identity 1 is valid.

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

The contents of the unified access control configuration in the "list of subscriber data" stored in the ME (see 3GPP TS 23.122 [5]) and the rules specified in table 4.5.2A.1 are used to determine the applicability of access classes 11 to 15 in the SNPN.

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

NOTE: The case when an access attempt matches more than one rule includes the case when multiple events trigger an access attempt at the same time.

Table 4.5.2A.2: Mapping table for access categories

|  |  |  |  |
| --- | --- | --- | --- |
| Rule # | Type of access attempt | Requirements to be met | Access Category |
| 1 | Response to paging or NOTIFICATION over non-3GPP access (NOTE 11);  5GMM connection management procedure initiated for the purpose of transporting an LPP message without an ongoing 5GC-MO-LR procedure;  Access attempt to handover of MMTEL voice call, MMTEL video call or SMSoIP from non-3GPP access | Access attempt is for MT access, or handover of ongoing MMTEL voice call, MMTEL video call or SMSoIP from non-3GPP access | 0 (= MT\_acc) |
| 2 | Emergency | UE is attempting access for an emergency session (NOTE 1, NOTE 2) | 2 (= emergency) |
| 3 | Access attempt for operator-defined access category | UE stores operator-defined access category definitions valid in the SNPN as specified in subclause 4.5.3, and access attempt is matching criteria of an operator-defined access category definition | 32-63  (= based on operator classification) |
| 4 | Access attempt for delay tolerant service | (a) UE is configured for NAS signalling low priority, and  (b) the UE received one of the categories a, b or c as part of the parameters for unified access control in the broadcast system information, and the UE is a member of the broadcasted category in the selected SNPN or RSNPN  (NOTE 3, NOTE 5, NOTE 6, NOTE 7, NOTE 8) | 1 (= delay tolerant) |
| 4.1 | MO IMS registration related signalling | Access attempt is for MO IMS registration related signalling (e.g. IMS initial registration, re-registration, subscription refresh)  or for NAS signalling connection recovery during ongoing procedure for MO IMS registration related signalling (NOTE 2a) | 9 (= MO IMS registration related signalling) |
| 5 | MO MMTel voice call | Access attempt is for MO MMTel voice call  or for NAS signalling connection recovery during ongoing MO MMTel voice call (NOTE 2) | 4 (= MO MMTel voice) |
| 6 | MO MMTel video call | Access attempt is for MO MMTel video call  or for NAS signalling connection recovery during ongoing MO MMTel video call (NOTE 2) | 5 (= MO MMTel video) |
| 7 | MO SMS over NAS or MO SMSoIP | Access attempt is for MO SMS over NAS (NOTE 4) or MO SMS over SMSoIP transfer  or for NAS signalling connection recovery during ongoing MO SMS or SMSoIP transfer (NOTE 2) | 6 (= MO SMS and SMSoIP) |
| 8 | UE NAS initiated 5GMM specific procedures | Access attempt is for MO signalling | 3 (= MO\_sig) |
| 8.1 | Mobile originated location request | Access attempt is for mobile originated location request (NOTE 9) | 3 (= MO\_sig) |
| 8.2 | Mobile originated signalling transaction towards the PCF | Access attempt is for mobile originated signalling transaction towards the PCF (NOTE 10) | 3 (= MO\_sig) |
| 9 | UE NAS initiated 5GMM connection management procedure or 5GMM NAS transport procedure | Access attempt is for MO data | 7 (= MO\_data) |
| 10 | An uplink user data packet is to be sent for a PDU session with suspended user-plane resources | No further requirement is to be met | 7 (= MO\_data) |
| NOTE 1: In this release of the specification, there is no support for establishing an emergency session in an SNPN.  NOTE 2: Access for the purpose of NAS signalling connection recovery during an ongoing service as defined in subclause 4.5.5, or for the purpose of NAS signalling connection establishment following fallback indication from lower layers during an ongoing service as defined in subclause 4.5.5, is mapped to the access category of the ongoing service in order to derive an RRC establishment cause, but barring checks will be skipped for this access attempt.  NOTE 2a: Access for the purpose of NAS signalling connection recovery during an ongoing MO IMS registration related signalling as defined in subclause 4.5.5, or for the purpose of NAS signalling connection establishment following fallback indication from lower layers during an ongoing MO IMS registration related signalling as defined in subclause 4.5.5, is mapped to the access category of the MO IMS registration related signalling in order to derive an RRC establishment cause, but barring checks will be skipped for this access attempt.  NOTE 3: If the UE selects a new SNPN, then the selected SNPN is used to check the membership; otherwise the UE uses the RSNPN.  NOTE 4: This includes the 5GMM connection management procedures triggered by the UE-initiated NAS transport procedure for transporting the MO SMS.  NOTE 5: The UE configured for NAS signalling low priority is not supported in this release of specification.  NOTE 6: If the access category applicable for the access attempt is 1, then the UE shall additionally determine a second access category from the range 3 to 7. If more than one access category matches, the access category of the lowest rule number shall be chosen. The UE shall use the second access category only to derive an RRC establishment cause for the access attempt.  NOTE 7: Void.  NOTE 8: For the definition of categories a, b and c associated with access category 1, see 3GPP TS 22.261 [3]. The categories associated with access category 1 are distinct from the categories a, b and c associated with EAB (see 3GPP TS 22.011 [1A]).  NOTE 9: This includes: a) the UE-initiated NAS transport procedure for transporting a mobile originated location  request; b) the 5GMM connection management procedure triggered by a) above; and c) NAS signalling connection recovery during an ongoing 5GC-MO-LR procedure.  NOTE 10: This includes: a) the UE-initiated NAS transport procedure for transporting a mobile originated signalling  transaction towards the PCF; b) the 5GMM connection management procedure triggered by a) above; and c) NAS signalling connection recovery during an ongoing UE triggered V2X policy provisioning  procedure.  NOTE 11: The term "non-3GPP access" refers to the case when the UE is accessing SNPN services via a PLMN. | | | |

[TS 24.501, clause 4.5.4.2]

[Rel-15]

When the UE is in 5GMM-CONNECTED mode or 5GMM-CONNECTED mode with RRC inactive indication, upon detecting one of events 1) through 6) listed in subclause 4.5.1, the NAS shall categorize the corresponding access attempt into access identities and an access category following subclause 4.5.2, table 4.5.2.1 and table 4.5.2.2, and subclause 4.5.2.3, and provide the access identities and the access category to the lower layers for the purpose of access control checking. In this request to the lower layer the NAS can also provide to the lower layer the RRC establishment cause determined as specified in subclause 4.5.6 of this specification.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

NOTE 3: In this case prohibiting the initiation of the MMTEL voice session, MMTEL video session or prohibiting sending of the SMS over IP is performed by the upper layers.

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

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

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

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

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

[Rel-16]

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

a) subclause 4.5.2, table 4.5.2.1 and table 4.5.2.2, and subclause 4.5.2.3, if the UE is not operating in SNPN access mode; or

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

[TS 24.501, clause 4.5.6]

When 5GMM requests the establishment of a NAS-signalling connection, the RRC establishment cause used by the UE shall be selected according to one or more access identities (see subclause 4.5.2) and the determined access category as specified in table 4.5.6.1 and table 4.5.6.2. If the determined access category is an operator-defined access category, then the RRC establishment cause used by the UE shall be selected according to table 4.5.6.1 and table 4.5.6.2 based on one or more access identities (see subclause 4.5.2) and the standardized access category determined for the operator-defined access category as described in subclause 4.5.3.

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

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

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

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

[TS 38.331, clause 5.3.14.1]

The purpose of this procedure is to perform access barring check for an access attempt associated with a given Access Category and one or more Access Identities upon request from upper layers according to TS 24.501 [23] or the RRC layer.

After a PCell change in RRC\_CONNECTED the UE shall defer access barring checks until it has obtained *SIB1* (as specified in 5.2.2.2) from the target cell.

[TS 38.331, clause 5.3.14.2]

Upon initiation of the procedure, the UE shall:

1> if timer T390 is running for the Access Category:

2> consider the access attempt as barred;

1> else if timer T302 is running and the Access Category is neither '2' nor '0':

2> consider the access attempt as barred;

1> else:

2> if the Access Category is '0':

3> consider the access attempt as allowed;

2> else:

3> if *SIB1* includes *uac-BarringPerPLMN-List* that contains a *UAC-BarringPerPLMN* for the selected PLMN or SNPN:

4> if the procedure in 5.2.2.4.2 for a selected PLMN resulted in use of information in *npn-IdentityInfoList* and *UAC-BarringPerPLMN* has an entry with the *plmn-IdentityIndex* corresponding to used information in this list:

5> select the *UAC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to used information in the *npn-IdentityInfoList*;4> else:

5> select the *UAC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to the selected PLMN and the *PLMN-IdentityInfo, if any,* or the selected SNPN and the *npn-IdentityInfoList*;

3> if any *UAC-BarringPerPLMN* entry is selected:

4> in the remainder of this procedure, use the selected *UAC-BarringPerPLMN* entry (i.e. presence or absence of access barring parameters in this entry) irrespective of the *uac-BarringForCommon* included in *SIB1*;

3> else if SIB1 includes *uac-BarringForCommon*:

4> in the remainder of this procedure use the *uac-BarringForCommon* (i.e. presence or absence of these parameters) included in *SIB1*;

3> else:

4> consider the access attempt as allowed;

3> if uac-BarringForCommon is applicable or the uac-ACBarringListType indicates that uac-ExplicitACBarringList is used:

4> if the corresponding *UAC-BarringPerCatList* contains a *UAC-BarringPerCat* entry corresponding to the Access Category:

5> select the *UAC-BarringPerCat* entry;

5> if the uac-BarringInfoSetList contains a UAC-BarringInfoSet entry corresponding to the selected uac-barringInfoSetIndex in the UAC-BarringPerCat:

6> select the UAC-BarringInfoSet entry;

6> perform access barring check for the Access Category as specified in 5.3.14.5, using the selected UAC-BarringInfoSet as "UAC barring parameter";

5> else:

6> consider the access attempt as allowed;

4> else:

5> consider the access attempt as allowed;

3> else if the uac-ACBarringListType indicates that uac-ImplicitACBarringList is used:

4> select the *uac-BarringInfoSetIndex* corresponding to the Access Category in the *uac-ImplicitACBarringList*;

4> if the uac-BarringInfoSetList contains the UAC-BarringInfoSet entry corresponding to the selected uac-BarringInfoSetIndex:

5> select the *UAC-BarringInfoSet* entry;

5> perform access barring check for the Access Category as specified in 5.3.14.5, using the selected *UAC-BarringInfoSet* as "UAC barring parameter";

4> else:

5> consider the access attempt as allowed;

3> else:

4> consider the access attempt as allowed;

1> if the access barring check was requested by upper layers:

2> if the access attempt is considered as barred:

3> if timer T302 is running:

4> if timer T390 is running for Access Category '2':

5> inform the upper layer that access barring is applicable for all access categories except categories '0', upon which the procedure ends;

4> else

5> inform the upper layer that access barring is applicable for all access categories except categories '0' and '2', upon which the procedure ends;

3> else:

4> inform upper layers that the access attempt for the Access Category is barred, upon which the procedure ends;

2> else:

3> inform upper layers that the access attempt for the Access Category is allowed, upon which the procedure ends;

1> else:

2> the procedure ends.

[TS 38.331, clause 5.3.14.4]

The UE shall:

1> if timer T302 expires or is stopped, and if timer T390 corresponding to an Access Category is not running; or

1> if timer T390 corresponding to an Access Category other than '2' expires or is stopped, and if timer T302 is not running; or

1> if timer T390 corresponding to the Access Category '2' expires or is stopped:

2> consider the barring for this Access Category to be alleviated;

1> when barring for an Access Category is considered being alleviated:

2> if the Access Category was informed to upper layers as barred:

3> inform upper layers about barring alleviation for the Access Category.

2> if barring is alleviated for Access Category '8':

3> perform actions specified in 5.3.13.8;

[TS 38.331, clause 5.3.14.5]

The UE shall:

1> if one or more Access Identities are indicated according to TS 24.501 [23], and

1> if for at least one of these Access Identities the corresponding bit in the *uac-BarringForAccessIdentity* contained in "UAC barring parameter" is set to *zero*:

2> consider the access attempt as allowed;

1> else:

2> draw a random number '*rand*' uniformly distributed in the range: 0 ≤ *rand* < 1;

2> if '*rand*' is lower than the value indicated by *uac-BarringFactor* included in "UAC barring parameter":

3> consider the access attempt as allowed;

2> else:

3> consider the access attempt as barred;

1> if the access attempt is considered as barred:

2> draw a random number '*rand*' that is uniformly distributed in the range 0 ≤ *rand* < 1;

2> start timer T390 for the Access Category with the timer value calculated as follows, using the *uac-BarringTime* included in"AC barring parameter":

T390 = (0.7+ 0.6 \* *rand*) \* *uac-BarringTime.*

11.3.12.3 Test description

11.3.12.3.1 Pre-test conditions

System Simulator:

- NR Cell 1.

- Cell power level is selected according to 38.508-1 [4] Table 6.2.2.1-3.

- System information combination NR-1 as defined in TS 38.508-1 [4] Table 4.4.3.1.2-1 is used in NR Cell 1.

UE:

- None.

Preamble:

- The UE is in state 3N-A on NR Cell 1(serving cell) with at least one PDU session active according to TS 38.508-1 [4] Table 4.4A.2-1 and using the message condition UE TEST LOOP MODE B active with IP PDU delay = 20 seconds according to TS 38.508-1 [4]. DRB 1 is defined as default DRB for the PDU session.

11.3.12.3.2 Test procedure sequence

Table 11.3.12.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS transmits 1 IP PDU. | - | - | - | - |
| 2 | The SS waits 1 second after the IP packet has been transmitted and transmits an *RRCRelease* message. | <-- | NR RRC: RRCRelease | - | - |
| 3 | The SS changes SIB1 according to Table 11.3.12.3.3-2 and sends Short Message on PDCCH using P-RNTI. | <-- | PDCCH (DCI 1\_0): Short Message | - | - |
| 4 | The SS waits for 2.1\* modification period to allow the new system information to take effect. | - | - | - | - |
| 5 | Check: Does the UE transmit *RRCSetupRequest* message including *mo-Data* as establishmentCause within 30 seconds? (Note 1) | --> | NR RRC: RRCSetupRequest | 1 | F |
| 6 | The SS changes *SIB1* according to 38.508-1 [4] Table 4.6.1-28 and sends Short Message on PDCCH using P-RNTI. | <-- | PDCCH (DCI 1\_0): Short Message | - | - |
| 7 | Start Timer = 60s (Note 2) | - | - | - | - |
|  | EXCEPTION: Steps 8a1 to 8b23 describe behaviour that depends on the UE implementation; the "lower case letter" identifies a step sequence that take place if the UE is implemented in a certain way. |  |  |  |  |
| 8a1 | Check: Does the UE transmit *RRCSetupRequest* message including *mo-Data*? | --> | NR RRC: RRCSetupRequest | 2 | P |
| 8a2 | Stop Timer = 60s. |  |  |  |  |
| 8a3-8a7 | Steps 3-7 of expected sequence from Table 4.5.4.2-3 as defined in TS 38.508-1 [4] are performed. | - | - | - | - |
| 8a8 | Void | - | - | - | - |
| 8b1 | Timer = 60s expires | - | - | - | - |
| 8b2-8b9 | Steps 1-8 of procedure specified in 38.508-1 [4] Table 4.9.4.2.2-1 are performed | - | - | - | - |
| 8b10 | The SS transmits an OPEN UE TEST LOOP message. | <-- | NR RRC: *DLInformationTransfer*  TC: OPEN UE TEST LOOP | - | - |
| 8b11 | The UE transmits an OPEN UE TEST LOOP COMPLETE message. | --> | NR RRC: *ULInformationTransfer*  TC: OPEN UE TEST LOOP COMPLETE | - | - |
| 8b12 | The SS transmits a CLOSE UE TEST LOOP message. using the message condition UE TEST LOOP MODE B with IP PDU delay = 2 second | <-- | NR RRC: *DLInformationTransfer*  TC: CLOSE UE TEST LOOP | - | - |
| 8b13 | The UE transmits a CLOSE UE TEST LOOP COMPLETE message. | --> | NR RRC: *ULInformationTransfer*  TC: CLOSE UE TEST LOOP COMPLETE | - | - |
| 8b14 | The SS transmits 1 IP PDU. | - | - | - | - |
| 8b15 | SS waits for 1s and then transmits a RRCRelease message | <-- | - | - | - |
| 8b16-8b22 | Steps 1-7 of procedure specified in 38.508-1 [4] Table 4.9.4.2.2-1 are performed | - | - | - | - |
| 8b23 | Void | - | - | - | - |
| - | EXCEPTION: Steps 9 and 9A can occur in any order. | - | - | - | - |
| 9 | The UE loops back IP PDU | - | - | 2 | P |
| 9A | The UE transmits an RRCReconfigurationComplete message. | --> | NR RRC: RRCReconfigurationComplete | - | - |
| 10 | The SS transmits DEACTIVATE TEST MODE message. | <-- | DEACTIVATE TEST MODE | - | - |
| 11 | The UE transmits DEACTIVATE TEST MODE COMPLETE message. | --> | DEACTIVATE TEST MODE COMPLETE | - | - |
| 12 | The SS transmits an *RRCRelease* message to release RRC connection and move the UE to RRC\_IDLE. | <-- | NR RRC: RRCRelease | - | - |
| Note 1: T390 is a random value between (0.7 + 0.6 \* 0) \* uac-BarringTime(64s) = 44.8s and (0.7 + 0.6 \* 0.99) \* uac-BarringTime(64s) = 82.816s.  Note 2: The wait time 60s is selected to cover the case when the upper limit of T390 (82.816s) expires. | | | | | |

11.3.12.3.3 Specific message contents

Table 11.3.12.3.3-1: CLOSE UE TEST LOOP (preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol discriminator | 1 1 1 1 |  |  |
| Skip indicator | 0 0 0 0 |  |  |
| Message type | 1 0 0 0 0 0 0 0 |  |  |
| UE test loop mode | 0 0 0 0 0 0 0 1 | UE test loop mode B | UE TEST LOOP MODE B |
| UE test loop mode B LB setup |  |  |
| IP PDU delay | 0 0 0 1 0 1 0 0 | 20 seconds |

Table 11.3.12.3.3-2: *SIB1* of NR Cell 1 (step3, Table 11.3.12.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-28 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| uac-BarringInfo SEQUENCE { |  |  |  |
| uac-BarringForCommon SEQUENCE (SIZE (1..maxAccessCat-1)) OF UAC-BarringPerCat { | 1 entry |  |  |
| UAC-BarringPerCat[1] SEQUENCE { |  | entry 1 |  |
| accessCategory | 7 | (= MO\_data) |  |
| uac-barringInfoSetIndex | 1 | Value 1 corresponds to the first entry in uac-BarringInfoSetList |  |
| } |  |  |  |
| } |  |  |  |
| uac-BarringPerPLMN-List | Not present |  |  |
| uac-BarringInfoSetList SEQUENCE (SIZE(1..maxBarringInfoSet)) OF UAC-BarringInfoSet { | 1 entry |  |  |
| UAC-BarringInfoSet[1] SEQUENCE { |  | entry 1 |  |
| uac-BarringFactor | p00 | 0% access probability |  |
| uac-BarringTime | s64 | 64 seconds |  |
| uac-BarringForAccessIdentity | '0000000'B |  |  |
| } |  |  |  |
| } |  |  |  |
| uac-AccessCategory1-SelectionAssistanceInfo | Not Present |  |  |
| } |  |  |  |
| } |  |  |  |

**Table 11.3.12.3.3-3: *RRCSetupRequest* (All steps, Table 11.3.12.3.2-1)**

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-23 | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCSetupRequest ::= SEQUENCE { |  |  |  |
| rrcSetupRequest SEQUENCE { |  |  |  |
| establishmentCause | mo-Data |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.3.12.3.3-4: CLOSE UE TEST LOOP (Step 8b12, Table 11.3.12.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol discriminator | 1 1 1 1 |  |  |
| Skip indicator | 0 0 0 0 |  |  |
| Message type | 1 0 0 0 0 0 0 0 |  |  |
| UE test loop mode | 0 0 0 0 0 0 0 1 | UE test loop mode B | UE TEST LOOP MODE B |
| UE test loop mode B LB setup |  |  |
| IP PDU delay | 0 0 0 0 0 0 1 0 | 2 seconds |

## 11.4 Emergency Services

### 11.4.1 5GMM-REGISTERED.NORMAL-SERVICE / 5GMM-IDLE / Emergency call / Utilising emergency number stored on the USIM / New emergency PDU session / Network failing the authentication check (5G AKA)

11.4.1.1 Test Purpose (TP)

(1)

**with** { UE in 5GMM-REGISTERED.NORMAL-SERVICE state and 5GMM-IDLE mode }

**ensure that** {

**when** { UE is requested to make an outgoing call using an emergency number stored on the USIM }

**then** { UE establishes an RRC connection with the RRC *establishmentCause* set to "emergency", **and**, sends a SERVICE REQUEST message with Service type IE set to "emergency services", **and**, establishes a New emergency PDU session by sending an UL NAS TRANSPORT message with Request type set to "initial emergency request" and a PDU SESSION ESTABLISHMENT REQUEST }

}

(2)

**with** { UE in 5GMM-REGISTERED.NORMAL-SERVICE state and 5GMM-CONNECTED mode having established an Emergency call }

**ensure that** {

**when** { UE establishes that the network has failed the authentication check during a 5G AKA based primary authentication and key agreement procedure }

**then** { UE continues using the current security context, **and**, releases all non-emergency PDU sessions by initiating UE-requested PDU session release procedure and does not treat the active cell as barred for non-emergency services }

}

11.4.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 38.331 [12], subclause 5.3.3.3, TS 24.501 [22], subclauses 5.6.1.2, 6.4.1.2, 5.4.1.3.7, TS 22.101 [42], subclause 10.1.1. Unless otherwise stated these are Rel-15 requirements.

[TS 38.331, subclause 5.3.3.3]

The UE shall set the contents of *RRCSetupRequest* message as follows:

...

1> set the *establishmentCause* in accordance with the information received from upper layers;

The UE shall submit the *RRCSetupRequest* message to lower layers for transmission.

[TS 24.501, subclause 5.6.1.2]

The UE initiates the service request procedure by sending a SERVICE REQUEST message to the AMF and starts timer T3517.

If the UE is sending the SERVICE REQUEST message from 5GMM-IDLE mode and the UE needs to send non-cleartext IEs, the UE shall send the SERVICE REQUEST message including the NAS message container IE as described in subclause 4.4.6.

...

For case c) in subclause 5.6.1.1, the Uplink data status IE shall not be included in the SERVICE REQUEST message except if the UE has one or more active always-on PDU sessions associated with the access type over which the SERVICE REQUEST message is sent. If the UE is not a UE configured for high priority access in selected PLMN and:

a) if the SERVICE REQUEST message is triggered by a request for emergency services from the upper layer, the UE shall set the service type IE in the SERVICE REQUEST message to "emergency services"; or

[TS 24.501, subclause 6.4.1.2]

In order to initiate the UE-requested PDU session establishment procedure, the UE shall create a PDU SESSION ESTABLISHMENT REQUEST message.

NOTE 0: When IMS voice is available over either 3GPP access or non-3GPP access, the "voice centric" UE in 5GMM-REGISTERED state will receive a request from upper layers to establish the PDU session for IMS signalling, if the conditions for performing an initial registration with IMS indicated in 3GPP TS 24.229 [14] subclause U.3.1.2 are satisfied.

If the UE requests to establish a new PDU session, the UE shall allocate a PDU session ID which is not currently being used by another PDU session over either 3GPP access or non-3GPP access.

The UE shall allocate a PTI value currently not used and shall set the PTI IE of the PDU SESSION ESTABLISHMENT REQUEST message to the allocated PTI value.

...

If the UE requests to establish a new emergency PDU session, the UE shall set the SSC mode IE of the PDU SESSION ESTABLISHMENT REQUEST message to "SSC mode 1".

...

The UE shall transport:

a) the PDU SESSION ESTABLISHMENT REQUEST message;

b) the PDU session ID of the PDU session being established, or being handed over or being transferred;

..

e) the request type which is set to:

...

3) "initial emergency request", if the UE requests to establish a new emergency PDU session; and

...

If the request type is set to "initial emergency request" or "existing emergency PDU session", neither DNN nor S-NSSAI is transported by the UE using the NAS transport procedure as specified in subclause 5.4.5.

[TS 22.101, subclause 10.1.1]

The ME shall identify an emergency number dialled by the end user as a valid emergency number and initiate emergency call establishment if it occurs under one or more of the following conditions. If it occurs outside of the following conditions, the ME should not initiate emergency call establishment but normal call establishment. Emergency number identification takes place before and takes precedence over any other (e.g. supplementary service related) number analysis.

...

b) Any emergency call number stored on a SIM/USIM when the SIM/USIM is present.

[TS 24.501, subclause 5.4.1.3.7]

g) Network failing the authentication check.

If the UE deems that the network has failed the authentication check, then it shall request RRC to locally release the RRC connection and treat the active cell as barred (see 3GPP TS 38.304 [28]). The UE shall start any retransmission timers (e.g. T3510, T3517 or T3521), if they were running and stopped when the UE received the first AUTHENTICATION REQUEST message containing an incorrect authentication challenge data causing authentication failure.

...

For items c, d, e, and f whether or not the UE is registered for emergency services:

...

The UE shall deem that the network has failed the authentication check or assume that the authentication is not genuine and proceed as described in item g above if any of the following occurs:

- the timer T3520 expires;

...

For items c, d, e, and f:

...

If a UE has an emergency PDU session established or is establishing an emergency PDU session when timer T3520 expires, the UE shall not deem that the network has failed the authentication check and not behave as described in item g. Instead the UE shall continue using the current security context, if any, release all non-emergency PDU sessions, if any, by initiating UE-requested PDU session release procedure. If there is an ongoing PDU session establishment procedure, the UE shall release all non-emergency PDU sessions upon completion of the PDU session establishment procedure. The UE shall start any retransmission timers (e.g. T3510, T3517 or T3521) if:

- they were running and stopped when the UE received the AUTHENTICATION REQUEST message and detected an authentication failure;

- the procedures associated with these timers have not yet been completed.

The UE shall behave as if the UE is registered for emergency services.

11.4.1.3 Test description

11.4.1.3.1 Pre-test conditions

System Simulator:

- 1 NR Cell

- NR Cell 1 as defined in TS 38.508-1 [4] Table 4.4.2-3. System information combination NR-1 as defined in TS 38.508-1 [4], subclause 4.4.3.1.2. SIB1 indicates *ims-EmergencySupport*.

UE:

- The UE is equipped with a test USIM with USIM Configuration 20 as defined in TS 38.508-1 [4] Table 6.4.1-20 (USIM contains two Emergency Numbers: 144, 117).

Preamble:

- Cells power level configuration in accordance with TS 38.508-1 [4], Table 6.2.2.1-3:

- NR Cell 1 "Serving cell"

- The UE is in test state 1N-A as defined in TS 38.508-1 [4], subclause 4.4A.2 on NR Cell 1.

NOTE: pc\_noOf\_PDUsSameConnection + pc\_noOf\_PDUsNewConnection > 0.

11.4.1.3.2 Test procedure sequence

Table 11.4.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| - | The following messages are to be observed on NR Cell 1 unless explicitly stated otherwise. | - | - | - | - |
| 1 | Make the UE attempt an IMS emergency call dialling the number 144 which is stored on the USIM. (NOTE 1) | - | - | - | - |
| 2 | Check: Does the UE performs Generic Test Procedure for IMS Emergency call establishment with IMS emergency registration as specified in TS 38.508-1 [4], subclause 4.9.11? | - | - | 1 | - |
| 2A | The SS initiates the 5G AKA based primary authentication and key agreement procedure by sending an AUTHENTICATION REQUEST message; the included ngKSI value is the same as the one used in the initial message SERVICE REQUEST sent in step 2. | <-- | AUTHENTICATION REQUEST | - | - |
| 2B | The UE sends an AUTHENTICATION FAILURE message with 5GMM cause #71 "ngKSI already in use" | --> | AUTHENTICATION FAILURE | - | - |
| 2BA | Wait for T3520 expires. | - | - | - | - |
| - | EXCEPTION: Depending on the number of non-IMS Emergency relevant PDUs active at this moment of time step 2C is repeated 1 or more times. | - | - | - | - |
| 2C | FOR i=1 TO i= pc\_noOf\_PDUsSameConnection + pc\_noOf\_PDUsNewConnection  Repeat the PDU session release procedure specified in Table 11.4.1.3.2-2: Parallel behaviour.  Depending on UE implementation the PDU session release procedures can run in parallel or in sequence. | - | - | - | - |
| 2CA | The SS is configured to Stop RA response | - | - | - | - |
| 3 | Make the UE release the emergency call. (NOTE 1) | - | - | - | - |
| 3A | Generic test procedure for MO Release of Voice Call / 5GS, as defined in Annex A.7 of TS 34.229-5 [41], is performed. |  |  |  |  |
| 3B | SS starts timer T1 = 5 seconds. | - | - | - | - |
| - | EXCEPTION: Steps 3Ba1 to 3Bb1 describe a transaction that depends on the UE behaviour; the "lower case letter" identifies a step sequence that takes place if a specific behaviour happens. | - | - | - | - |
| 3Ca1 | The UE transmits a PDU SESSION RELEASE REQUEST message. | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION RELEASE REQUEST | - | - |
| 3Ca2 | Stop timer T1. | - | - | - | - |
| 3Cb1 | Timer T1 expires. | - | - | - | - |
| 3D | The SS transmits a PDU SESSION RELEASE COMMAND message. | <-- | NR RRC: DLInformationTransfer 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION RELEASE COMMAND | - | - |
| 3E | Check: Does the UE transmit a PDU SESSION RELEASE COMPLETE message? | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION RELEASE COMPLETE | - | - |
| 3EA | The SS transmits an RRCRelease message | <-- | NR RRC: RRCRelease | - | - |
| 3EB | SS configures the RA Response. | - | - | - | - |
| 3F – 9A2 | Void | - | - | - | - |
| 9A3 – 9A21a1 | Steps 2-20a1 of Table 4.5.2.2- 2: Registration procedure for initial registration as specified in TS 38.508-1 [4] are performed on NR Cell 1. | - | - | 2 | P |
| 9A22-23 | Void | - | - | - | - |
| NOTE 1: This could be done by e.g. MMI or AT command.  NOTE 2: The UE may optionally transmit a De-registration REQ during 3E – 3EA. | | | | | |

Table 11.4.1.3.2-2: Parallel behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Check: Does the UE transmit a PDU SESSION RELEASE REQUEST message with PDU session ID equal to one of the IDs of an existing PDU session BUT different to the PDU session ID assigned to the Emergency PDU session in step 2, Table 11.4.1.3.2-1? | - | PDU SESSION RELEASE REQUEST | 2 | P |
| 2 | Check: Does the UE perform PDU session release procedure defined in clause 4.9.21 of TS 38.508-1 [4]? | - |  | 2 | P |

11.4.1.3.3 Specific message contents

Table 11.4.1.3.3-1: Message AUTHENTICATION REQUEST (step 2A, Table 11.4.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-1 | | | |
| Information Element | Value/Remark | Comment | Condition |
| ngKSI | The same ng-KSI assigned in the Preamble and indicated in the initial message SERVICE REQUEST sent in step 2 |  |  |

Table 11.4.1.3.3-2: Message AUTHENTICATION FAILURE (step 2B, Table 11.4.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-4 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GMM cause | ‘0100 0111’B | ngKSI already in use |  |

### 11.4.1a 5GMM-REGISTERED.NORMAL-SERVICE / 5GMM-IDLE / Emergency call / Utilising emergency number stored on the USIM / New emergency PDU session / PEIPS assistance information

11.4.1a.1 Test Purpose (TP)

(1)

**with** { UE with PEIPS assistance information provided with the Paging subgroup ID in 5GMM-IDLE state with an emergency PDU Session established on a cell that support PEIPS and subgroupsNumForUEID is absent in subgroupConfig }

**ensure that** {

**when** { UE receives a Paging message with matching identity and a PEI with the bit corresponding for the subgroup the UE belongs to indicated as 0 }

**then** { UE responds to paging }

}

11.4.1a.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501 [22], subclauses 5.3.25. Unless otherwise stated these are Rel-17 requirements.

[TS 24.501, subclause 5.6.1.2]

When an emergency PDU session is successfully established over 3GPP access after the UE received the Negotiated PEIPS assistance information IE during the last registration procedure, the UE and the AMF shall not use PEIPS assistance information until:

- the successful completion of the PDU session release procedure of the emergency PDU;

- the UE receives PEIPS assistance information during a registration procedure with PDU session status IE or upon successful completion of a service request procedure, if the UE or the network locally releases the emergency PDU session;

- the successful completion of handover of emergency PDU session to non-3GPP access; or

- the successful transfer of the emergency PDU session in 5GS to the EPS or ePDG connected to EPC.

11.4.1a.3 Test description

11.4.1a.3.1 Pre-test conditions

System Simulator:

- 1 NR Cell

- NR Cell 1 as defined in TS 38.508-1 [4] Table 4.4.2-3. System information combination NR-1 as defined in TS 38.508-1 [4], subclause 4.4.3.1.2. SIB1 indicates *ims-EmergencySupport*.

UE:

- The UE is equipped with a test USIM with USIM Configuration 20 as defined in TS 38.508-1 [4] Table 6.4.1-20 (USIM contains two Emergency Numbers: 144, 117).

Preamble:

- Cells power level configuration in accordance with TS 38.508-1 [4], Table 6.2.2.1-3:

- NR Cell 1 "Serving cell"

- The UE is in 5GS state 0-A according to TS 38.508-1 [4], clause 4.4A.2 Table 4.4A.2-0.

11.4.1a.3.2 Test procedure sequence

Table 11.4.1a.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2-21a1 | The UE performs steps 1-20a1 of the RRC\_IDLE procedure specified in TS 38.508-1 [4], table 4.5.2.2-2. | - | - | - | - |
| 22 | Make the UE attempt an IMS emergency call dialling the number 144 which is stored on the USIM. (NOTE 1) | - | - | - | - |
| 23 | The UE performs Test Procedure for IMS Emergency call establishment with IMS emergency registration as specified in TS 38.508-1 [4], subclause 4.9.11. | - | - | - | - |
| 24 | The Test procedure for IMS MT Emergency call release as specified in TS 38.508-1 [4], subclause 4.9.12B takes place with “keep emergency PDU session”. | - | - | - | - |
| 25 | The SS releases the RRC connection. | - | - | - | - |
| 26 | The SS transmits a PEI with the bit corresponding for the subgroup the UE belongs to indicated as 0 and the Paging message including a matched identity. | <-- | NR RRC: *Paging* | - | - |
| 27 | Check: Does the UE transmit an *RRCSetupRequest* message? | --> | NR RRC: *RRCSetupRequest* | 1 | P |
| 28 | The SS transmits an *RRCSetup* message. | <-- | NR RRC: *RRCSetup* | - | - |
| 29 | The UE transmits an *RRCSetupComplete* message including SERVICE REQUEST to confirm the successful completion of the connection establishment. | --> | NR RRC: *RRCSetupComplete*  5GMM: SERVICE REQUEST | - | - |
| 30 | Steps 5 to 8 of the NR RRC\_CONNECTED procedure in TS 38.508-1 [4], Table 4.5.4.2-3 are executed to successfully complete the service request procedure. | - | - | - | - |
| NOTE 1: This could be done by e.g., MMI or AT command. | | | | | |

11.4.1a.3.3 Specific message contents

Table 11.4.1a.3.3-1: SIB1 for NR Cell 1(preamble and all steps, Table 11.4.1a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], table 4.6.1-28 with condition PEI | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| servingCellConfigCommon | ServingCellConfigCommonSIB in Table 11.4.1a.3.3-2 |  |  |
| } |  |  |  |

Table 11.4.1a.3.3-2: ServingCellConfigCommonSIB(Table 11.4.1a.3.3-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], table 4.6.3-169 with condition PEI | | | |
| Information Element | Value/remark | Comment | Condition |
| ServingCellConfigCommonSIB ::= SEQUENCE { |  |  |  |
| downlinkConfigCommon | DownlinkConfigCommonSIB in Table 11.4.1a.3.3-3 |  |  |
| } |  |  |  |

Table 11.4.1a.3.3-3: DownlinkConfigCommonSIB(Table 11.4.1a.3.3-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], table 4.6.3-53 with condition PEI | | | |
| Information Element | Value/remark | Comment | Condition |
| DownlinkConfigCommonSIB ::= SEQUENCE { |  |  |  |
| pei-Config-r17 ::= SEQUENCE { |  |  |  |
| subgroupConfig-r17 ::= SEQUENCE { |  |  |  |
| subgroupsNumForUEID-r17 | Not Present |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.4.1a.3.3-3A: REGISTRATION REQUEST (step 5, Table 11.4.1a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | | Value/remark | Comment | Condition |
| 5GMM capability | |  |  |  |
| NR-PSSI (octet 6, bit 4) | | '1'B | NR paging subgrouping supported |  |

Table 11.4.1a.3.3-4: REGISTRATION ACCEPT (step 15, Table 11.4.1a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| Negotiated PEIPS assistance information |  |  |  |
| PEIPS assistance information IEI | ‘33’H |  |  |
| Length of PEIPS assistance information contents | ‘01’H |  |  |
| PEIPS assistance information type 1 |  |  |  |
| Type of information | ‘000’B | Paging subgroup ID value |  |
| Paging subgroup ID value | ‘00001’B |  |  |

Table 11.4.1a.3.3-5: *RRCSetupRequest* (step 27, Table 11.4.1a.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-23 | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCSetupRequest ::= SEQUENCE { |  |  |  |
| rrcSetupRequest SEQUENCE { |  |  |  |
| establishmentCause | mt-Access |  |  |
| } |  |  |  |
| } |  |  |  |

### 11.4.2 5GMM-DEREGISTERED.LIMITED-SERVICE / Emergency call / Utilisation of emergency numbers stored on the ME / Initial registration for emergency services / Handling of forbidden PLMNs

11.4.2.1 Test Purpose (TP)

(1)

**with** { UE in 5GMM-DEREGISTERED.LIMITED-SERVICE state }

**ensure that** {

**when** { UE is requested to make an outgoing call using an emergency number stored on the ME }

**then** { UE establishes an RRC connection with the RRC *establishmentCause* set to "emergency", **and**, attempts an Initial registration for emergency services by sending a REGISTRATION REQUEST message with IE Service type set to "emergency services", **and**, accepts and applies security with NULL security and integrity algorithms, **and**, after successful completion of the registration for emergency services establishes an emergency PDU session by sending an UL NAS TRANSPORT message with Request type set to "initial emergency request" and a PDU SESSION ESTABLISHMENT REQUEST }

}

(2)

**with** { UE in 5GMM-DEREGISTERED.LIMITED-SERVICE state }

**ensure that** {

**when** { UE has performed an IMS Emergency call on a forbidden PLMN }

**then** { UE does not remove the PLMN code of the accessed PLMN from the list of forbidden PLMNs }

}

11.4.2.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 38.331 [12], subclause 5.3.3.3, TS 23.501 [37], subclause 5.16.4.1, TS 23.122 [38], subclauses 2, 3.1, 3.5, TS 24.501 [22], subclauses 4.4.4.1, 5.1.3.2.1.3.3, 5.3.2, 5.4.2.3, 5.5.1.2.2, 5.5.1.2.4, 6.4.1.2, TS 22.101 [42], subclause 10.1.1. Unless otherwise stated these are Rel-15 requirements.

[TS 36.331, subclause 5.3.3.3]

The UE shall set the contents of *RRCSetupRequest* message as follows:

...

1> set the *establishmentCause* in accordance with the information received from upper layers;

The UE shall submit the *RRCSetupRequest* message to lower layers for transmission.

[TS 23.501, subclause 5.16.4.1]

UEs that are in limited service state, as specified in TS 23.122 [17], or that camp normally on a cell but failed to register successfully to the network under conditions specified in TS 24.501 [47], initiate the Registration procedure by indicating that the registration is to receive Emergency Services, referred to as Emergency Registration, and a Follow-on request is included in the Registration Request to initiate PDU Session Establishment procedure with a Request Type indicating "Emergency Request". UEs that had registered for normal services and do not have emergency PDU Sessions established and that are subject to Mobility Restriction in the present area or RAT (e.g. because of restricted tracking area) shall initiate the UE Requested PDU Session Establishment procedure to receive Emergency Services, i.e. with a Request Type indicating "Emergency Request". Based on local regulation, the network supporting Emergency Services for UEs in limited service state provides Emergency Services to these UE, regardless whether the UE can be authenticated, has roaming or Mobility Restrictions or a valid subscription.

[TS 23.122, clause 2]

If the MS is unable to find a suitable cell to camp on, or the SIM is not inserted, or if it receives certain responses to an LR request (e.g., "illegal MS"), it attempts to camp on a cell irrespective of the PLMN identity, and enters a "limited service" state in which it can only attempt to make emergency calls. An MS operating in NB-S1 mode, never attempts to make emergency calls.

[TS 23.122, subclause 3.1]

An MS that is attaching for emergency bearer services or is attached for emergency bearer services may access PLMNs in the list of "forbidden PLMNs" or the list of "forbidden PLMNs for GPRS service". The MS shall not remove any entry from the list of "forbidden PLMNs" or the list of "forbidden PLMNs for GPRS service" as a result of such accesses.

[TS 23.122, subclause 3.5]

There are a number of situations in which the MS is unable to obtain normal service from a PLMN. These include:

a) Failure to find a suitable cell of the selected PLMN;

...

(In automatic PLMN selection mode, items a, c and f would normally cause a new PLMN selection, but even in this case, the situation may arise when no PLMNs are available and allowable for use).

For the items a to f, the MS attempts to camp on an acceptable cell, irrespective of its PLMN identity, so that emergency calls can be made if necessary, with the exception that an MS operating in NB-S1 mode, shall never attempt to make emergency calls. When in the limited service state with a valid SIM, the MS shall search for available and allowable PLMNs in the manner described in subclause 4.4.3.1 and when indicated in the SIM also as described in subclause 4.4.3.4. For an MS that is not in eCall only mode, with the exception of performing GPRS attach or EPS attach for emergency bearer services, or performing registration for emergency services, no LR requests are made until a valid SIM is present and either a suitable cell is found or a manual network reselection is performed. For an MS in eCall only mode, no LR requests are made except for performing EPS attach for emergency bearer services or registration for emergency services. When performing GPRS attach or EPS attach for emergency bearer services, or registration for emergency services, the PLMN of the current serving cell is considered as the selected PLMN for the duration the MS is attached for emergency bearer services or registered for emergency services. In the limited service state the presence of the MS need not be known to the PLMN on whose cell it has camped.

There are also other conditions under which only emergency calls may be made. These are shown in table 2 in clause 5. ProSe direct communication and ProSe direct discovery for public safety use can be initiated if necessary (see 3GPP TS 24.334 [51]) when in the limited service state due to items a) or c) or f). V2X communication over PC5 can be initiated if necessary (see 3GPP TS 24.386 [59]) when in the limited service state due to items a) or c) or f).

[TS 24.501, subclause 4.4.4.1]

The use of "null integrity protection algorithm" 5G-IA0 (see subclause 9.11.3.32) in the current 5G NAS security context is only allowed for an unauthenticated UE for which establishment of emergency services is allowed. For setting the security header type in outbound NAS messages, the UE and the AMF shall apply the same rules irrespective of whether the "null integrity protection algorithm" or any other integrity protection algorithm is indicated in the 5G NAS security context.

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

[TS 24.501, subclause 5.1.3.2.1.3.3]

The substate 5GMM-DEREGISTERED.LIMITED-SERVICE is chosen in the UE, when it is known that a selected cell for 3GPP access or TA for non-3GPP access is unable to provide normal service (e.g. the selected cell over 3GPP access is in a forbidden PLMN or is in a forbidden tracking area or TA for non-3GPP access is forbidden).

[TS 24.501, subclause 5.3.2]

The UE provides the SUPI to the network in concealed form. The SUCI is a privacy preserving identifier containing the concealed SUPI. When the SUPI contains a network specific identifier, the SUCI shall take the form of an NAI as specified in 3GPP TS 23.003 [4].

A UE supporting N1 mode includes a SUCI:

a) in the REGISTRATION REQUEST message when the UE is attempting initial registration procedure and a valid 5G-GUTI is not available; or

...

The UE shall use the "null-scheme" as specified in 3GPP TS 33.501 [24] to generate the SUCI, if the following applies:

a) the UE performs a registration procedure for emergency services or initiates a de-registration procedure before the registration procedure for emergency services was completed successfully; and

[TS 24.501, subclause 5.4.2.3]

If the UE is registered for emergency services, performing initial registration for emergency services or establishing an emergency PDU session and the SECURITY MODE COMMAND message is received with ngKSI value "000" and 5G-IA0 and 5G-EA0 as selected 5G NAS security algorithms, the UE shall locally derive and take in use 5G NAS security context. The UE shall delete existing current 5G NAS security context.

The UE shall accept a SECURITY MODE COMMAND message indicating the "null integrity protection algorithm" 5G-EA0 as the selected 5G NAS integrity algorithm only if the message is received when the UE is registered for emergency services, performing initial registration for emergency services or establishing an emergency PDU session.

[TS 24.501, subclause 5.5.1.2.2]

The UE in state 5GMM-DEREGISTERED shall initiate the registration procedure for initial registration by sending a REGISTRATION REQUEST message to the AMF,

...

b) when the UE performs initial registration for emergency services;

...

If the UE initiates an initial registration for emergency services or needs to prolong the established NAS signalling connection after the completion of the initial registration procedure (e.g. due to uplink signalling pending), the UE shall set the Follow-on request indicator to 1.

[TS 24.501, subclause 5.5.1.2.4]

If the initial registration procedure is not for emergency services, and if the PLMN identity of the registered PLMN is a member of the list of "forbidden PLMNs", any such PLMN identity shall be deleted from the corresponding list(s).

[TS 24.501, subclause 6.4.1.2]

In order to initiate the UE-requested PDU session establishment procedure, the UE shall create a PDU SESSION ESTABLISHMENT REQUEST message.

NOTE 0: When IMS voice is available over either 3GPP access or non-3GPP access, the "voice centric" UE in 5GMM-REGISTERED state will receive a request from upper layers to establish the PDU session for IMS signalling, if the conditions for performing an initial registration with IMS indicated in 3GPP TS 24.229 [14] subclause U.3.1.2 are satisfied.

If the UE requests to establish a new PDU session, the UE shall allocate a PDU session ID which is not currently being used by another PDU session over either 3GPP access or non-3GPP access.

The UE shall allocate a PTI value currently not used and shall set the PTI IE of the PDU SESSION ESTABLISHMENT REQUEST message to the allocated PTI value.

...

If the UE requests to establish a new emergency PDU session, the UE shall set the SSC mode IE of the PDU SESSION ESTABLISHMENT REQUEST message to "SSC mode 1".

...

The UE shall transport:

a) the PDU SESSION ESTABLISHMENT REQUEST message;

b) the PDU session ID of the PDU session being established, or being handed over or being transferred;

..

e) the request type which is set to:

...

3) "initial emergency request", if the UE requests to establish a new emergency PDU session; and

...

If the request type is set to "initial emergency request" or "existing emergency PDU session", neither DNN nor S-NSSAI is transported by the UE using the NAS transport procedure as specified in subclause 5.4.5.

[TS 22.101, subclause 10.1.1]

The ME shall identify an emergency number dialled by the end user as a valid emergency number and initiate emergency call establishment if it occurs under one or more of the following conditions. If it occurs outside of the following conditions, the ME should not initiate emergency call establishment but normal call establishment. Emergency number identification takes place before and takes precedence over any other (e.g. supplementary service related) number analysis.

a) 112 and 911 shall always be available. These numbers shall be stored on the ME.

11.4.2.3 Test description

11.4.2.3.1 Pre-test conditions

System Simulator:

- 1 NR Cell

- NR Cell 1, as defined in TS 38.508-1 [4], Table 4.4.2-3, with the exception that cells' PLMN is defined in Table 11.4.2.3.1-1 below.

Table 11.4.2.3.1-1: PLMN identifiers

|  |  |
| --- | --- |
| NR Cell | PLMN name |
| 1 | PLMN2 |

- System information combination NR-1 as defined in TS 38.508-1 [4], subclause 4.4.3.1.2. SIB1 indicates *ims-EmergencySupport*.

UE:

- The UE is equipped with a test USIM with USIM Configuration 15 as defined in TS 38.508-1 [4], Table 6.4.1-15 (PLMN2 is set in it as 'forbidden PLMN', PLMN1 is the HPLMN).

Preamble:

- The UE is in test state 0N-B (Switched Off) as defined in TS 38.508-1 [4], subclause 4.4A.2. Prior to being switched off the UE is registered on PLMN1.

11.4.2.3.2 Test procedure sequence

Table 11.4.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Void | - | - | - | - |
| - | The SS configures:  - NR Cell 1 as "Serving cell" | - | - | - | - |
| 2 | Switch the UE on. | - | - | - | - |
| 3 | Make the UE attempt an IMS emergency call dialling a number which is stored on the ME (e.g. 112 or 911). (NOTE 1) | - | - | - | - |
| 4 | Check: Does the UE performs Generic Test Procedure for IMS Emergency call establishment without IMS emergency registration as specified in TS 38.508-1 [4], subclause 4.9.12? | - | - | 1 | - |
| 5 | Make the UE release the emergency call. (NOTE 1) | - | - | - | - |
| 6 | Void | - | - | - | - |
| 6A-6C | Steps 1-3 of the Generic test procedure for IMS MO Emergency call release as specified in TS 38.508-1 [4], subclause 4.9.12A  take place. | - | - | - | - |
| 7 | Start Timer T1=6 seconds.  NOTE: This is an arbitrary value to wait for UE initiated detach. | - | - | - | - |
| - | EXCEPTION: In parallel to step 8 below, the steps specified in Tables 11.4.2.3.2-2 and 11.4.2.3.2-3 may take place | - | - | - | - |
| 8 | Timer T1=6 seconds expires | - | - | - | - |
| 8a1-8b3 | Void | - | - | - | - |
| 9 | SS releases the RRC connection | <-- | NR RRC: RRCRelease | - | - |
| 9A | Make the UE attempt an IMS none-emergency call. (NOTE 2). | - | - | - | - |
| 10 | Check: Does the UE transmit an *RRCSetupRequest* message in the next 10seconds?  NOTE: This is an arbitrary value to wait for catching not allowed UE behaviour. | --> | NR RRC: RRCSetupRequest | 2 | F |
| NOTE 1: This could be done by e.g. MMI or AT command.  NOTE 2: This could be done by e.g. MMI or AT command. | | | | | |

Table 11.4.2.3.2-2: Parallel Behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE transmits a DEREGISTRATION REQUEST message with De-registration type IE set to "Normal de-registration". | --> | NR RRC: ULInformationTransfer  5GMM: DEREGISTRATION REQUEST | - | - |
| 2 | The SS transmits a DEREGISTRATION ACCEPT message. | <-- | NR RRC: DLInformationTransfer  5GMM: DEREGISTRATION ACCEPT | - | - |

Table 11.4.2.3.2-3: Parallel Behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE transmits a PDU SESSION RELEASE REQUEST message. | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION RELEASE REQUEST | - | - |
| 2 | The SS transmits a PDU SESSION RELEASE COMMAND message. | <-- | NR RRC: *DLInformationTransfer 5GMM: DL NAS TRANSPORT*  *5GSM*: PDU SESSION RELEASE COMMAND | - | - |
| 3 | Check: Does the UE transmit a PDU SESSION RELEASE COMPLETE message? | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION RELEASE COMPLETE | - | - |

11.4.2.3.3 Specific message contents

Table 11.4.2.3.3-1:REGISTRATION REQUEST (step 4, Table 11.4.2.3.2-1; step 3, TS 38.508-1 [4], Table 4.9.12.2.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-6, condition EMERGENCY. | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS mobile identity | Not checked |  |  |

Table 11.4.2.3.3-2:DEREGISTRATION REQUEST (Step 8a1, Table 11.4.2.3.2-1)

|  |
| --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-12, Condition NORMAL. |

Table 11.4.2.3.3-3:Void

### 11.4.3 5GMM-DEREGISTERED.NO-SUPI / Emergency call / Utilisation of emergency numbers stored on the ME / Initial registration for emergency services

11.4.3.1 Test Purpose (TP)

(1)

**with** { UE in 5GMM-DEREGISTERED.NO-SUPI state (no USIM) }

**ensure that** {

**when** { UE is requested to make an outgoing call using an emergency number stored on the ME }

**then** { UE establishes an RRC connection with the RRC *establishmentCause* set to "emergency", **and**, attempts an Initial registration for emergency services by sending a REGISTRATION REQUEST message with IE Service type set to "emergency services", **and**, accepts and applies security with NULL security and integrity algorithms, **and**, after successful completion of the registration for emergency services establishes an emergency PDU session by sending an UL NAS TRANSPORT message with Request type set to "initial emergency request" and a PDU SESSION ESTABLISHMENT REQUEST }

}

(2)

**with** { UE not containing credentials }

**ensure that** {

**when** { UE being switched on and being made to start an emergency call }

**then** { UE sends a correctly composed INVITE request for an anonymous emergency call and completes call setup }

}

11.4.3.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 38.331 [12], subclause 5.3.3.3, TS 23.501 [37], subclause 5.16.4.1, TS 23.122 [38], subclauses 2, 3.5, TS 24.501 [22], subclauses 4.4.4.1, 5.1.3.2.1.3.6, 5.3.2, 5.4.2.3, 5.5.1.2.2, 6.4.1.2, TS 22.101 [42], subclause 10.1.1, TS 24.229 [44], subclauses 5.1.6.1, 5.1.6.8.2. Unless otherwise stated these are Rel-15 requirements.

[TS 36.331, subclause 5.3.3.3]

The UE shall set the contents of *RRCSetupRequest* message as follows:

...

1> set the *establishmentCause* in accordance with the information received from upper layers;

The UE shall submit the *RRCSetupRequest* message to lower layers for transmission.

[TS 23.501, subclause 5.16.4.1]

UEs that are in limited service state, as specified in TS 23.122 [17], or that camp normally on a cell but failed to register successfully to the network under conditions specified in TS 24.501 [47], initiate the Registration procedure by indicating that the registration is to receive Emergency Services, referred to as Emergency Registration, and a Follow-on request is included in the Registration Request to initiate PDU Session Establishment procedure with a Request Type indicating "Emergency Request". UEs that had registered for normal services and do not have emergency PDU Sessions established and that are subject to Mobility Restriction in the present area or RAT (e.g. because of restricted tracking area) shall initiate the UE Requested PDU Session Establishment procedure to receive Emergency Services, i.e. with a Request Type indicating "Emergency Request". Based on local regulation, the network supporting Emergency Services for UEs in limited service state provides Emergency Services to these UE, regardless whether the UE can be authenticated, has roaming or Mobility Restrictions or a valid subscription.

[TS 23.122, clause 2]

If the MS is unable to find a suitable cell to camp on, or the SIM is not inserted, or if it receives certain responses to an LR request (e.g., "illegal MS"), it attempts to camp on a cell irrespective of the PLMN identity, and enters a "limited service" state in which it can only attempt to make emergency calls. An MS operating in NB-S1 mode, never attempts to make emergency calls.

[TS 23.122, subclause 3.5]

There are a number of situations in which the MS is unable to obtain normal service from a PLMN. These include:

...

b) No SIM in the MS;

...

For the items a to f, the MS attempts to camp on an acceptable cell, irrespective of its PLMN identity, so that emergency calls can be made if necessary, with the exception that an MS operating in NB-S1 mode, shall never attempt to make emergency calls. When in the limited service state with a valid SIM, the MS shall search for available and allowable PLMNs in the manner described in subclause 4.4.3.1 and when indicated in the SIM also as described in subclause 4.4.3.4. For an MS that is not in eCall only mode, with the exception of performing GPRS attach or EPS attach for emergency bearer services, or performing registration for emergency services, no LR requests are made until a valid SIM is present and either a suitable cell is found or a manual network reselection is performed. For an MS in eCall only mode, no LR requests are made except for performing EPS attach for emergency bearer services or registration for emergency services. When performing GPRS attach or EPS attach for emergency bearer services, or registration for emergency services, the PLMN of the current serving cell is considered as the selected PLMN for the duration the MS is attached for emergency bearer services or registered for emergency services. In the limited service state the presence of the MS need not be known to the PLMN on whose cell it has camped.

There are also other conditions under which only emergency calls may be made. These are shown in table 2 in clause 5. ProSe direct communication and ProSe direct discovery for public safety use can be initiated if necessary (see 3GPP TS 24.334 [51]) when in the limited service state due to items a) or c) or f). V2X communication over PC5 can be initiated if necessary (see 3GPP TS 24.386 [59]) when in the limited service state due to items a) or c) or f).

[TS 24.501, subclause 4.4.4.1]

The use of "null integrity protection algorithm" 5G-IA0 (see subclause 9.11.3.32) in the current 5G NAS security context is only allowed for an unauthenticated UE for which establishment of emergency services is allowed. For setting the security header type in outbound NAS messages, the UE and the AMF shall apply the same rules irrespective of whether the "null integrity protection algorithm" or any other integrity protection algorithm is indicated in the 5G NAS security context.

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

[TS 24.501, subclause 5.1.3.2.1.3.6]

The substate 5GMM-DEREGISTERED.NO-SUPI is chosen in the UE, if the N1 mode is enabled and the UE has no valid subscriber data available (SIM/USIM not available, the SIM/USIM is considered invalid by the UE).

[TS 24.501, subclause 5.3.2]

A UE supporting NG-RAN includes a PEI:

a) when neither SUPI nor valid 5G-GUTI is available to use for emergency services in the REGISTRATION REQUEST message with 5GS registration type IE set to "emergency registration"; and

[TS 24.501, subclause 5.4.2.3]

If the UE is registered for emergency services, performing initial registration for emergency services or establishing an emergency PDU session and the SECURITY MODE COMMAND message is received with ngKSI value "000" and 5G-IA0 and 5G-EA0 as selected 5G NAS security algorithms, the UE shall locally derive and take in use 5G NAS security context. The UE shall delete existing current 5G NAS security context.

The UE shall accept a SECURITY MODE COMMAND message indicating the "null integrity protection algorithm" 5G-EA0 as the selected 5G NAS integrity algorithm only if the message is received when the UE is registered for emergency services, performing initial registration for emergency services or establishing an emergency PDU session.

[TS 24.501, subclause 5.5.1.2.2]

The UE in state 5GMM-DEREGISTERED shall initiate the registration procedure for initial registration by sending a REGISTRATION REQUEST message to the AMF,

...

b) when the UE performs initial registration for emergency services;

...

If the UE initiates an initial registration for emergency services or needs to prolong the established NAS signalling connection after the completion of the initial registration procedure (e.g. due to uplink signalling pending), the UE shall set the Follow-on request indicator to 1.

[TS 24.501, subclause 6.4.1.2]

In order to initiate the UE-requested PDU session establishment procedure, the UE shall create a PDU SESSION ESTABLISHMENT REQUEST message.

NOTE 0: When IMS voice is available over either 3GPP access or non-3GPP access, the "voice centric" UE in 5GMM-REGISTERED state will receive a request from upper layers to establish the PDU session for IMS signalling, if the conditions for performing an initial registration with IMS indicated in 3GPP TS 24.229 [14] subclause U.3.1.2 are satisfied.

If the UE requests to establish a new PDU session, the UE shall allocate a PDU session ID which is not currently being used by another PDU session over either 3GPP access or non-3GPP access.

The UE shall allocate a PTI value currently not used and shall set the PTI IE of the PDU SESSION ESTABLISHMENT REQUEST message to the allocated PTI value.

...

If the UE requests to establish a new emergency PDU session, the UE shall set the SSC mode IE of the PDU SESSION ESTABLISHMENT REQUEST message to "SSC mode 1".

...

The UE shall transport:

a) the PDU SESSION ESTABLISHMENT REQUEST message;

b) the PDU session ID of the PDU session being established, or being handed over or being transferred;

..

e) the request type which is set to:

...

3) "initial emergency request", if the UE requests to establish a new emergency PDU session; and

...

If the request type is set to "initial emergency request" or "existing emergency PDU session", neither DNN nor S-NSSAI is transported by the UE using the NAS transport procedure as specified in subclause 5.4.5.

[TS 22.101, subclause 10.1.1]

The ME shall identify an emergency number dialled by the end user as a valid emergency number and initiate emergency call establishment if it occurs under one or more of the following conditions. If it occurs outside of the following conditions, the ME should not initiate emergency call establishment but normal call establishment. Emergency number identification takes place before and takes precedence over any other (e.g. supplementary service related) number analysis.

a) 112 and 911 shall always be available. These numbers shall be stored on the ME.

[TS 24.229, clause 5.1.6.1]:

If the IM CN subsystem is selected and the UE has no credentials the UE can make an emergency call without being registered. The UE shall attempt an emergency call as described in subclause 5.1.6.8.2.

[TS 24.229, clause 5.1.6.8.2]:

When establishing an emergency session for an unregistered user, the UE is allowed to receive responses to emergency requests and requests inside an established emergency session on the unprotected ports. The UE shall reject or silently discard all other messages not arriving on a protected port. Additionally, the UE shall transmit signalling packets pertaining to the emergency session from the same IP address and unprotected port on which it expects to receive signalling packets containing the responses to emergency requests and the requests inside the established emergency session.

Prior to establishing an emergency session for an unregistered user, the UE shall acquire a local IP address, discover a P-CSCF, and establish an IP-CAN bearer that can be used for SIP signalling. The UE shall send only the initial INVITE requests to the port advertised to the UE during the P-CSCF discovery procedure. If the UE does not receive any specific port information during the P-CSCF discovery procedure, the UE shall send the initial INVITE request to the SIP default port values as specified in RFC 3261 [26].

The UE shall apply the procedures as specified in subclause 5.1.2A.1 and subclause 5.1.3 with the following additions:

1) the UE shall set the From header field of the INVITE request to "Anonymous" as specified in RFC 3261 [26];

2) the UE shall include a service URN in the Request-URI of the initial INVITE request in accordance with subclause 5.1.6.8.1;

NOTE 1: Other specifications make provision for emergency service identifiers, which are not specifically the emergency service URN, to be recognised in the UE. Emergency service identifiers which the UE does not detect will be treated as a normal call by the UE.

3) the UE shall insert in the INVITE request, a To header field with the same emergency service URN as in the Request-URI;

4) if available to the UE (as defined in the access technology specific annexes for each access technology), the UE shall include in the P-Access-Network-Info header field in any request for a dialog, any subsequent request (except CANCEL requests) or response (except CANCEL responses) within a dialog or any request. Insertion of the P-Access-Network-Info header field into the ACK request is optional. The UE shall populate the P-Access-Network-Info header field with the current point of attachment to the IP-CAN as specified for the access network technology (see subclause 7.2A.4). The P-Access-Network-Info header field contains the location identifier such as the cell id, the line id or the identity of the WLAN access node, which is relevant for routeing the emergency call;

5) if defined by the access technology specific annex, the UE shall populate the P-Preferred-Identity header field in the INVITE request with an equipment identifier as a SIP URI. The special details of the equipment identifier to use depend on the IP-CAN;

6) a Contact header field set to include SIP URI that contains in the hostport parameter the IP address of the UE and an unprotected port where the UE will receive incoming requests belonging to this dialog. The UE shall also include a "sip.instance" media feature tag containing Instance ID as described in RFC 5626 [92]. The UE shall not include either the public or temporary GRUU in the Contact header field;

7) a Via header field set to include the IP address of the UE in the sent-by field and for the UDP the unprotected server port value where the UE will receive response to the emergency request, while for the TCP, the response is received on the TCP connection on which the emergency request was sent. For the UDP, the UE shall also include "rport" header field parameter with no value in the top Via header field. Unless the UE has been configured to not send keep-alives, and unless the UE is directly connected to an IP-CAN for which usage of NAT is not defined, it shall include a "keep" header field parameter with no value in the Via header field, in order to indicate support of sending keep-alives associated with, and during the lifetime of, the emergency session, as described in RFC 6223 [143];

NOTE 2: The UE inserts the same IP address and port number into the Contact header field and the Via header field, and sends all IP packets to the P-CSCF from this IP address and port number.

8) if the UE has its location information available, or a URI that points to the location information, the UE shall include a Geolocation header field in the INVITE request in the following way:

- if the UE is aware of the URI that points to where the UE's location is stored, include the URI as the Geolocation header field value, as described in RFC 6442 [89]; or

- if the UE is aware of its location information, include the location information in a PIDF location object, in accordance with RFC 4119 [90], include the location object in a message body with the content type application/pidf+xml, and include a Content ID URL, referring to the message body, as the Geolocation header field value, as described RFC 6442 [89], and include a Content-Disposition header field with a disposition type "render" value and a "handling" header field parameter with an "optional" value, as described in RFC 3261 [26];

9) if the UE includes a Geolocation header field, the UE shall also include a Geolocation-Routing header field with a "yes" header field value, which indicates that the location of the UE can be used by other entities to make routing decisions, as described in RFC 6442 [89];

10) if the UE has neither geographical location information available, nor a URI that points to the location information, the UE shall not insert a Geolocation header field in the INVITE request; and

NOTE 3: It is suggested that UE's only use the option of providing a URI when the domain part belongs to the current P-CSCF or S-CSCF provider. This is an issue on which the network operator needs to provide guidance to the end user. A URI that is only resolvable to the UE which is making the emergency call is inapplicable in this area.

11) if support of the current location discovery during an emergency call is allowed in the IP-CAN specific annex and the UE supports the current location discovery during an emergency call, the UE shall include a Recv-Info header field as described in RFC 6086 [25], indicating the g.3gpp.current-location-discovery info package name and shall include an Accept header field indicating the "application/vnd.3gpp.current-location-discovery+xml" MIME type.

NOTE 4: During the dialog, the points of attachment to the IP-CAN of the UE can change (e.g. UE connects to different cells). The UE will populate the P-Access-Network-Info header field in any request or response within a dialog with the current point of attachment to the IP-CAN (e.g. the current cell information).

The UE shall build a proper preloaded Route header field value for all new dialogs. The UE shall build a Route header field value containing only the P-CSCF URI (containing the unprotected port number and the IP address acquired at the time of the P-CSCF discovery procedures which was used in registration of the contact address (or registration flow).

NOTE 5: If the UE is provisioned with or receives a FQDN at the time of the P-CSCF discovery procedures, the FQDN is resolved to an IP address at the time of the P-CSCF discovery procedures.

When a SIP transaction times out, i.e. timer B, timer F or timer H expires at the UE, the UE may behave as if timer F expired, as described in subclause 5.1.1.4.

NOTE 6: It is an implementation option whether these actions are also triggered by other means.

NOTE 7: A number of header fields can reveal information about the identity of the user. Where privacy is required, implementers should also give consideration to other header fields that can reveal identity information. RFC 3323 [33] subclause 4.1 gives considerations relating to a number of header fields.

NOTE 8: RFC 3261 [26] provides for the use of the Priority header field with a suggested value of "emergency". It is not precluded that emergency sessions contain this value, but such usage will have no impact on the processing within the IM CN subsystem.

If the response for the initial INVITE request indicates that the UE is behind NAT, and the INVITE request was sent over TCP connection, the UE shall keep the TCP connection during the entire duration of the emergency session. In this case the UE will receive all responses to the emergency requests and the requests inside the established emergency session over this TCP connection.

If the Via header field of any provisional response, or of the final 200 (OK) response, for the initial INVITE request contains a "keep" header field parameter with a value, unless the UE detects that it is not behind a NAT, the UE shall start to send keep-alives associated with the session towards the P-CSCF, as described in RFC 6223 [143].

11.4.3.3 Test description

11.4.3.3.1 Pre-test conditions

System Simulator:

- 1 NR Cells

- NR Cell 1, as defined in TS 38.508-1 [4] Table 4.4.2-3. System information combination NR-1 as defined in TS 38.508-1 [4], subclause 4.4.3.1.2. SIB1 indicates ims-EmergencySupport.

UE:

- The UE is NOT equipped with USIM.

Preamble:

- The UE is in test state 0-A (Switched Off) as defined in TS 38.508-1 [4], subclause 4.4A.2.

11.4.3.3.2 Test procedure sequence

Table 11.4.3.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Switch the UE on. | - | - | - | - |
| 2 | Make the UE attempt an IMS emergency call dialling a number which is stored on the ME (e.g. 112 or 911). (NOTE 1) | - | - | - | - |
| 3 | Check: Does the UE performs Generic Test Procedure for IMS Emergency call establishment without IMS emergency registration as specified in TS 38.508-1 [4], subclause 4.9.12? | - | - | 1,2 | P |
| 4 | Make the UE release the emergency call. (NOTE 1) | - | - | - | - |
| 5 | Void | - | - | - | - |
| 6A-6C | Steps 1-3 of the Generic test procedure for IMS MO Emergency call release as specified in TS 38.508-1 [4], subclause 4.9.12A take place. | - | - | - | - |
| 6 | Start Timer=5 sec.  NOTE: This is an arbitrary value to wait for UE initiated detach. | - | - | - | - |
| - | EXCEPTION: In parallel to step 7 below, the steps specified in Tables 11.4.3.3.2-2, and 11.4.3.3.2-3 may take place | - | - | - | - |
| 7 | Timer T1=5 seconds expires | - | - | - | - |
| 8 | The Generic test procedure Switch/Power off procedure after EMERGENCY CALL RELEASED in RRC\_CONNECTED of Table 10.3.7-1 in TS 38.523-3 [3] takes place. | - | - | - | - |
| NOTE 1: This could be done by e.g. MMI or AT command. | | | | | |

Table 11.4.3.3.2-2: Parallel Behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE transmits a DEREGISTRATION REQUEST message with De-registration type IE set to "Normal de-registration". | --> | NR RRC: ULInformationTransfer  5GMM: DEREGISTRATION REQUEST | - | - |
| 2 | The SS transmits a DEREGISTRATION ACCEPT message. | <-- | NR RRC: DLInformationTransfer  5GMM: DEREGISTRATION ACCEPT | - | - |

Table 11.4.3.3.2-3: Parallel Behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE transmits a PDU SESSION RELEASE REQUEST message. | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION RELEASE REQUEST | - | - |
| 2 | The SS transmits a PDU SESSION RELEASE COMMAND message. | <-- | NR RRC: *DLInformationTransfer*  *5GMM: DL NAS TRANSPORT*  *5GSM*: PDU SESSION RELEASE COMMAND | - | - |
| 3 | Check: Does the UE transmit a PDU SESSION RELEASE COMPLETE message? | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION RELEASE COMPLETE | - | - |

11.4.3.3.3 Specific message contents

Table 11.4.3.3.3-1:REGISTRATION REQUEST (step 3, Table 11.4.3.3.2-1; step 3, TS 38.508-1 [4], Table 4.9.12.2.2-1)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-6, condition EMERGENCY. | | | | |
| Information Element | Value/remark | Comment | Condition | |
| 5GS mobile identity | PEI |  |  | |

Table 11.4.3.3.3-2:DEREGISTRATION REQUEST (Step 7a1, Table 11.4.3.3.2-1)

|  |
| --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-12, Condition NORMAL. |

Table 11.4.3.3.3-3: INVITE (step 3, table 11.4.3.3.2-1)

|  |
| --- |
| Derivation Path: TS 34.229-5[41] A.6, Step 1, with Conditions A6 of TS 34.229-1 [35] cl A.2.1 |

Table 11.4.3.3.3-4: 180 Ringing (step 3, table 11.4.3.3.2-1)

|  |
| --- |
| Derivation Path: TS 34.229-5[41] A.6, step 3, conditions A7 of TS 34.229-1 [35] cl A.2.6 |

Table 11.4.3.3.3-5: 200 OK (step 3, table 11.4.3.3.2-1)

|  |
| --- |
| Derivation Path: TS 34.229-5[41] A.6, step 4, conditions A7 of TS 34.229-1 [35] cl A.3.1 |

### 11.4.4 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE T3346 running / Emergency call establishment / 5GMM-REGISTERED.NORMAL-SERVICE / Emergency call establishment before T3396 expiry

11.4.4.1 Test Purpose (TP)

(1)

**with** { UE in 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE state, timer T3346 is running and 5GMM-IDLE mode }

**ensure that** {

**when** { UE is requested to make an Emergency call }

**then** { UE initiates the registration procedure for mobility and periodic registration update, and, establishes the Emergency call }

}

(2)

**with** { UE in 5GMM-REGISTERED.NORMAL-SERVICE state, timer T3396 is running and 5GMM-IDLE mode }

**ensure that** {

**when** { UE is requested to make an Emergency call }

**then** { UE establishes the Emergency call }

}

11.4.4.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501 [22], subclause 5.5.1.3.5, 5.3.9, 5.5.1.3.2, 6.3.3.3, TS 22.101 [42], subclause 10.1.1. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, subclause 5.5.1.3.5]

If the mobility and periodic registration update request cannot be accepted by the network, the AMF shall send a REGISTRATION REJECT message to the UE including an appropriate 5GMM cause value.

...

The UE shall take the following actions depending on the 5GMM cause value received in the REGISTRATION REJECT message.

...

#22 (Congestion).

If the T3346 value IE is present in the REGISTRATION REJECT message and the value indicates that this timer is neither zero nor deactivated, the UE shall proceed as described below, otherwise it shall be considered as an abnormal case and the behaviour of the UE for this case is specified in subclause 5.5.1.3.7.

The UE shall abort the registration procedure for mobility and periodic registration update. If the rejected request was not for initiating an emergency PDU session, the UE shall set the 5GS update status to 5U2 NOT UPDATED and change to state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE.

The UE shall stop timer T3346 if it is running.

If the REGISTRATION REJECT message is integrity protected, the UE shall start timer T3346 with the value provided in the T3346 value IE.

...

The UE stays in the current serving cell and applies the normal cell reselection process. The registration procedure for mobility and periodic registration update is started, if still necessary, when timer T3346 expires or is stopped.

[TS 24.501, subclause 5.3.9]

If timer T3346 is running or is deactivated, and the UE is a UE configured for high priority access in selected PLMN, or the UE needs to initiate signalling for emergency services or emergency services fallback, then the UE is allowed to initiate 5GMM procedures.

[TS 24.501, subclause 5.5.1.3.2]

The UE in state 5GMM-REGISTERED shall initiate the registration procedure for mobility and periodic registration update by sending a REGISTRATION REQUEST message to the AMF,

...

k) when the UE in state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE receives a request from the upper layers to establish an emergency PDU session or perform emergency services fallback;

[TS 24.501, subclause 6.3.3.3]

Upon receipt of a PDU SESSION RELEASE COMMAND message and a PDU session ID, using the NAS transport procedure as specified in subclause 5.4.5, the UE considers the PDU session as released and the UE shall create a PDU SESSION RELEASE COMPLETE message.

...

If the PDU SESSION RELEASE COMMAND message includes 5GSM cause #26 "insufficient resources" and the Back-off timer value IE, the UE shall ignore the 5GSM congestion re-attempt indicator IE provided by the network, if any, and the UE shall take different actions depending on the timer value received for timer T3396 in the Back-off timer value:

...

When the timer T3396 is running or the timer is deactivated, the UE is allowed to initiate a PDU session establishment procedure for emergency services.

...

The UE shall set the Follow-on request indicator to 1, if the UE:

a) initiates the mobility and periodic registration updating procedure upon request of the upper layers to establish an emergency PDU session;

[TS 22.101, subclause 10.1.1]

The ME shall identify an emergency number dialled by the end user as a valid emergency number and initiate emergency call establishment if it occurs under one or more of the following conditions. If it occurs outside of the following conditions, the ME should not initiate emergency call establishment but normal call establishment. Emergency number identification takes place before and takes precedence over any other (e.g. supplementary service related) number analysis.

a) 112 and 911 shall always be available. These numbers shall be stored on the ME.

b) Any emergency call number stored on a SIM/USIM when the SIM/USIM is present.

c) 000, 08, 110, 999, 118 and 119 when a SIM/USIM is not present. These numbers shall be stored on the ME.

d) Additional emergency call numbers that may have been downloaded by the serving network when the SIM/USIM is present.

11.4.4.3 Test description

11.4.4.3.1 Pre-test conditions

System Simulator:

- 2 NR Cells

- NR Cell 1 and NR Cell 11 as defined in TS 38.508-1 [4] Table 4.4.2-3.

- On all cells when active: System information combination NR-1 as defined in TS 38.508-1 [4], subclause 4.4.3.1.2. SIB1 indicates ims-EmergencySupport.

UE:

None.

Preamble:

- Cells power level configuration in accordance with TS 38.508-1 [4], Table 6.2.2.1-3:

- NR Cell 1 "Serving cell"

- NR Cell 11 "Non-Suitable "Off" cell"

- The UE is in test state 1N-A as defined in TS 38.508-1 [4], subclause 4.4A.2 on NR Cell 1

- During the initial registration:

- The list of tracking areas provided by the AMF (IE 'TAI list') contains only the TAI of NR Cell 1.

NOTE: pc\_noOf\_PDUsSameConnection + pc\_noOf\_PDUsNewConnection > 0.

11.4.4.3.2 Test procedure sequence

Table 11.4.4.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS configures:  - NR Cell 11 as "Serving cell"  - NR Cell 1 as "Non-Suitable "Off" cell". | - | - | - | - |
| - | The following messages are to be observed on NR Cell 11 unless explicitly stated otherwise. | - | - | - | - |
| 2 | The UE transmits an *RRCSetupRequest* message. | --> | NR RRC: RRCSetupRequest | - | - |
| 3 | SS transmit an *RRCSetup* message. | <-- | NR RRC: *RRCSetup* | - | - |
| 4 | The UE transmits an *RRCSetupComplete* message to confirm the successful completion of the connection establishment and a REGISTRATION REQUEST message indicating "mobility registration updating" is sent to update the registration of the actual tracking area. | --> | NR RRC: RRCSetupComplete  5GMM: REGISTRATION REQUEST | - | - |
| 5 | SS sends a REGISTRATION REJECTmessage containing 5GMM cause value = #22 (Congestion). | <-- | NR RRC: DLInformationTransfer  5GMM: REGISTRATION REJECT | - | - |
| 6 | The SS transmits an *RRCRelease* message. | <-- | NR RRC: RRCRelease | - | - |
| 7 | Make the UE attempt an IMS emergency call dialling an emergency number e.g. 112 or 911). (NOTE 1) | - | - | - | - |
| 8 | Check: Does the UE perform steps 1-3 from the Registration procedure for mobility registration update as specified in TS 38.508-1 [4] subclause 4.9.5? | - | - | 1 | P |
| 8AA | The SS transmits a *SecurityModeCommand* message. | <-- | NR RRC: SecurityModeCommand | - | - |
| 8AB | The UE transmits a *SecurityModeComplete* message. | --> | NR RRC: SecurityModeComplete | - | - |
| 8AC | The UE performs steps 4-5 from the Registration procedure for mobility registration update as specified in TS 38.508-1 [4] subclause 4.9.5. | - | - | - | - |
| 8A | Check: Does the UE transmit an UL NAS TRANSPORT message with 'Request type' set to 'initial emergency request', and, a PDU SESSION ESTABLISHMENT REQUEST for establishing an emergency PDU? | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 1 | P |
| 9-9D | Steps 9-13 from Generic Test Procedure for IMS Emergency call establishment with IMS Emergency registration as specified in TS 38.508-1 [4], subclause 4.9.11, including the parallel behaviour specified in table 4.9.11.2.2-2 are performed. | - | - | - | - |
| 10 | Make the UE release the emergency call. (NOTE 1) | - | - | - | - |
| 11 | The Generic test procedure for IMS MO Emergency call release as specified in TS 38.508-1 [4], subclause 4.9.12A takes place. | - | - | - | - |
| - | EXCEPTION: Steps 12-13 below are repeated pc\_noOf\_PDUsSameConnection + pc\_noOf\_PDUsNewConnection times. The SS releases all active PDUs due to insufficient resources. | - | - | - | - |
| 12 | The SS sends a PDU SESSION RELEASE COMMAND including 5GSM cause #26 “insufficient resources", and, Back-off timer value IE, which provides the value of the T3396, set to a value which is neither zero nor a value which indicates that the timer is deactivated. | <-- | NR RRC: DLInformationTransfer  5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION RELEASE COMMAND | - | - |
| 13 | The UE transmits a PDU SESSION RELEASE COMPLETE. | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION RELEASE COMPLETE | - | - |
| 14 | The SS releases the RRC connection. | - | NR RRC: RRCRelease | - | - |
| 15 | Make the UE attempt an IMS emergency call dialling an emergency number e.g. 112 or 911). (NOTE 1) | - | - | - | - |
| 16A-16E | Check: Does the UE perform steps 1-5 of Generic Test Procedure for IMS Emergency call establishment with IMS Emergency registration as specified in TS 38.508-1 [4], subclause 4.9.11? | - | - | 2 | P |
| 16F | The SS transmits a SERVICE ACCEPT message. | <-- | NR RRC: DLInformationTransfer  5GMM: SERVICE ACCEPT | - | - |
| 16G-16L | Check: Does the UE perform steps 8-13 of Generic Test Procedure for IMS Emergency call establishment with IMS Emergency registration as specified in TS 38.508-1 [4], subclause 4.9.11? | - | - | 2 | P |
| 17 | Make the UE release the emergency call. (NOTE 1) | - | - | - | - |
| 18 | The Generic test procedure for IMS MO Emergency call release as specified in TS 38.508-1 [4], subclause 4.9.12A takes place. | - | - | - | - |
| NOTE 1: This could be done by e.g. MMI or AT command. | | | | | |

11.4.4.3.3 Specific message contents

Table 11.4.4.3.3-0: REGISTRATION REQUEST (step 4, Table 11.4.4.3.2-1)

|  |
| --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-6, Condition MOBILITY. |

Table 11.4.4.3.3-1: REGISTRATION REJECT (step 5, Table 11.4.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | ‘00010110’B | #22 (Congestion) |  |
| T3346 value | ‘00100011’B | 3 minutes |  |

Table 11.4.4.3.3-2: REGISTRATION REQUEST (step 8, Table 11.4.4.3.2-1; step 3, TS 38.508-1 [4] Table 4.9.5.2.2-1)

|  |
| --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-6, Condition MOBILITY. |

Table 11.4.4.3.3-3:UL NAS TRANSPORT (step 8A, Table 11.4.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-10, condition INITIAL\_PDU\_REQUEST. | | | |
| Information Element | Value/remark | Comment | Condition |
| Request type | ‘011’B | initial emergency request |  |
| S-NSSAI | Not Present |  |  |
| DNN | Not Present |  |  |

Table 11.4.4.3.3-4:PDU SESSION ESTABLISHMENT REQUEST (step 8A, Table 11.4.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.2-1. | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | A value that is not currently being used by another PDU session |  |  |
| PTI | A value currently not used |  |  |
| SSC mode | ‘001’B | SSC mode 1 |  |

Table 11.4.4.3.3-5: PDU SESSION RELEASE COMMAND (step 12, Table 11.4.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.2-14 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | An ID of an existing PDU session |  |  |
| 5GSM cause | '0001 1010'B | insufficient resources |  |
| Back-off timer value | ‘1010 0101’B | 5 minutes |  |

Table 11.4.4.3.3-6: RRCReconfiguration (step 16H, Table 11.4.4.3.2-1; step 9, TS 38.508-1 [4] Table 4.9.11.2.2-1)

|  |
| --- |
| Derivation Path: TS 38.508-1 [4] Table 4.8.1-1B: RRCReconfiguration-SRB2-DRB(1,0) |

### 11.4.5 5GMM-REGISTERED.LIMITED-SERVICE / 5GMM-IDLE / Emergency call establishment and release / Handling of 5GS forbidden tracking areas for roaming

11.4.5.1 Test Purpose (TP)

(1)

**with** { UE in 5GMM-REGISTERED.LIMITED-SERVICE state and 5GMM-IDLE mode }

**ensure that** {

**when** { UE is requested to make an Emergency call }

**then** { UE sends INVITE and establishes the Emergency call }

}

(2)

**with** { UE in 5GMM-REGISTERED.LIMITED-SERVICE state and 5GMM-IDLE mode having established an Emergency call }

**ensure that** {

**when** { UE is requested to release the Emergency call }

**then** { UE releases the Emergency call, **and**, the UE considers the current cell as belonging to 5GS forbidden tracking areas for roaming }

}

11.4.5.2 Conformance requirement

References: The conformance requirements covered in the present TC are specified in: TS 24.501 [22], subclause 5.5.1.3.5, TS 23.122 [38], subclause 3.4.2, TS 24.229 [44] subclauses U.2.2.6.1, 5.1.6.8.2. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, subclause 5.5.1.3.5]

#15 (No suitable cells in tracking area).

The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2). The UE shall reset the registration attempt counter and shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE. The UE shall search for a suitable cell in another tracking area according to 3GPP TS 38.304 [28].

The UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" and shall remove the current TAI from the stored TAI list, if present.

If the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status and tracking area updating attempt counter as specified in 3GPP TS 24.301 [15] for the case when the normal tracking area updating procedure is rejected with the EMM cause with the same value.

[TS 23.122, subclause 3.4.2]

The MS is not allowed to request 5GS services except emergency services when camped on a cell of a TA of which belongs to the list of "5GS forbidden tracking areas for regional provision of service".

[TS 24.229, clause U.2.2.6.1]:

Some jurisdictions allow emergency calls to be made when the UE does not contain an UICC, or where the credentials are not accepted. Additionally, where the UE is in state 5GMM-REGISTERED.LIMITED-SERVICE or 5GMM-REGISTERED.PLMN-SEARCH, a normal registration in 5GS has been attempted but it can also be assumed that a registration in the IM CN subsystem will also fail. In such cases, subject to the lower layers indicating that the network does support emergency bearer services in limited service state (see 3GPP TS 36.331 [19F] or 3GPP TS 38.331 [19G]), the procedures for emergency calls without registration can be applied, as defined in subclause 5.1.6.8.2. If the 5GS primary authentication procedure has already succeeded during the latest normal or emergency registration procedure in 5GS, the UE shall perform an initial emergency registration, as described in subclause 5.1.6.2 before attempting an emergency call as described in subclause 5.1.6.8.3.

NOTE 1: The UE can determine that 5GS primary authentication procedure has succeeded during the emergency registration procedure in 5GS when a non-null integrity protection algorithm (i.e. other than 5G-IA0 algorithm) is received in the NAS signalling SECURITY MODE COMMAND message.

To perform emergency registration, the UE shall request to establish an emergency PDU session as described in 3GPP TS 24.501 [258]. The procedures for PDU session establishment and P-CSCF discovery, as described in subclause U.2.2.1 of this specification apply accordingly.

[TS 24.229, clause 5.1.6.8.2]:

When establishing an emergency session for an unregistered user, the UE is allowed to receive responses to emergency requests and requests inside an established emergency session on the unprotected ports. The UE shall reject or silently discard all other messages not arriving on a protected port. Additionally, the UE shall transmit signalling packets pertaining to the emergency session from the same IP address and unprotected port on which it expects to receive signalling packets containing the responses to emergency requests and the requests inside the established emergency session.

Prior to establishing an emergency session for an unregistered user, the UE shall acquire a local IP address, discover a P-CSCF, and establish an IP-CAN bearer that can be used for SIP signalling. The UE shall send only the initial INVITE requests to the port advertised to the UE during the P-CSCF discovery procedure. If the UE does not receive any specific port information during the P-CSCF discovery procedure, the UE shall send the initial INVITE request to the SIP default port values as specified in RFC 3261 [26].

The UE shall apply the procedures as specified in subclause 5.1.2A.1 and subclause 5.1.3 with the following additions:

1) the UE shall set the From header field of the INVITE request to "Anonymous" as specified in RFC 3261 [26];

2) the UE shall include a service URN in the Request-URI of the initial INVITE request in accordance with subclause 5.1.6.8.1;

NOTE 1: Other specifications make provision for emergency service identifiers, which are not specifically the emergency service URN, to be recognised in the UE. Emergency service identifiers which the UE does not detect will be treated as a normal call by the UE.

3) the UE shall insert in the INVITE request, a To header field with the same emergency service URN as in the Request-URI;

4) if available to the UE (as defined in the access technology specific annexes for each access technology), the UE shall include in the P-Access-Network-Info header field in any request for a dialog, any subsequent request (except CANCEL requests) or response (except CANCEL responses) within a dialog or any request. Insertion of the P-Access-Network-Info header field into the ACK request is optional. The UE shall populate the P-Access-Network-Info header field with the current point of attachment to the IP-CAN as specified for the access network technology (see subclause 7.2A.4). The P-Access-Network-Info header field contains the location identifier such as the cell id, the line id or the identity of the WLAN access node, which is relevant for routeing the emergency call;

5) if defined by the access technology specific annex, the UE shall populate the P-Preferred-Identity header field in the INVITE request with an equipment identifier as a SIP URI. The special details of the equipment identifier to use depend on the IP-CAN;

6) a Contact header field set to include SIP URI that contains in the hostport parameter the IP address of the UE and an unprotected port where the UE will receive incoming requests belonging to this dialog. The UE shall also include a "sip.instance" media feature tag containing Instance ID as described in RFC 5626 [92]. The UE shall not include either the public or temporary GRUU in the Contact header field;

7) a Via header field set to include the IP address of the UE in the sent-by field and for the UDP the unprotected server port value where the UE will receive response to the emergency request, while for the TCP, the response is received on the TCP connection on which the emergency request was sent. For the UDP, the UE shall also include "rport" header field parameter with no value in the top Via header field. Unless the UE has been configured to not send keep-alives, and unless the UE is directly connected to an IP-CAN for which usage of NAT is not defined, it shall include a "keep" header field parameter with no value in the Via header field, in order to indicate support of sending keep-alives associated with, and during the lifetime of, the emergency session, as described in RFC 6223 [143];

NOTE 2: The UE inserts the same IP address and port number into the Contact header field and the Via header field, and sends all IP packets to the P-CSCF from this IP address and port number.

8) if the UE has its location information available, or a URI that points to the location information, the UE shall include a Geolocation header field in the INVITE request in the following way:

- if the UE is aware of the URI that points to where the UE's location is stored, include the URI as the Geolocation header field value, as described in RFC 6442 [89]; or

- if the UE is aware of its location information, include the location information in a PIDF location object, in accordance with RFC 4119 [90], include the location object in a message body with the content type application/pidf+xml, and include a Content ID URL, referring to the message body, as the Geolocation header field value, as described RFC 6442 [89], and include a Content-Disposition header field with a disposition type "render" value and a "handling" header field parameter with an "optional" value, as described in RFC 3261 [26];

9) if the UE includes a Geolocation header field, the UE shall also include a Geolocation-Routing header field with a "yes" header field value, which indicates that the location of the UE can be used by other entities to make routing decisions, as described in RFC 6442 [89];

10) if the UE has neither geographical location information available, nor a URI that points to the location information, the UE shall not insert a Geolocation header field in the INVITE request; and

NOTE 3: It is suggested that UE's only use the option of providing a URI when the domain part belongs to the current P-CSCF or S-CSCF provider. This is an issue on which the network operator needs to provide guidance to the end user. A URI that is only resolvable to the UE which is making the emergency call is inapplicable in this area.

11) if support of the current location discovery during an emergency call is allowed in the IP-CAN specific annex and the UE supports the current location discovery during an emergency call, the UE shall include a Recv-Info header field as described in RFC 6086 [25], indicating the g.3gpp.current-location-discovery info package name and shall include an Accept header field indicating the "application/vnd.3gpp.current-location-discovery+xml" MIME type.

NOTE 4: During the dialog, the points of attachment to the IP-CAN of the UE can change (e.g. UE connects to different cells). The UE will populate the P-Access-Network-Info header field in any request or response within a dialog with the current point of attachment to the IP-CAN (e.g. the current cell information).

The UE shall build a proper preloaded Route header field value for all new dialogs. The UE shall build a Route header field value containing only the P-CSCF URI (containing the unprotected port number and the IP address acquired at the time of the P-CSCF discovery procedures which was used in registration of the contact address (or registration flow).

NOTE 5: If the UE is provisioned with or receives a FQDN at the time of the P-CSCF discovery procedures, the FQDN is resolved to an IP address at the time of the P-CSCF discovery procedures.

When a SIP transaction times out, i.e. timer B, timer F or timer H expires at the UE, the UE may behave as if timer F expired, as described in subclause 5.1.1.4.

NOTE 6: It is an implementation option whether these actions are also triggered by other means.

NOTE 7: A number of header fields can reveal information about the identity of the user. Where privacy is required, implementers should also give consideration to other header fields that can reveal identity information. RFC 3323 [33] subclause 4.1 gives considerations relating to a number of header fields.

NOTE 8: RFC 3261 [26] provides for the use of the Priority header field with a suggested value of "emergency". It is not precluded that emergency sessions contain this value, but such usage will have no impact on the processing within the IM CN subsystem.

If the response for the initial INVITE request indicates that the UE is behind NAT, and the INVITE request was sent over TCP connection, the UE shall keep the TCP connection during the entire duration of the emergency session. In this case the UE will receive all responses to the emergency requests and the requests inside the established emergency session over this TCP connection.

If the Via header field of any provisional response, or of the final 200 (OK) response, for the initial INVITE request contains a "keep" header field parameter with a value, unless the UE detects that it is not behind a NAT, the UE shall start to send keep-alives associated with the session towards the P-CSCF, as described in RFC 6223 [143].

11.4.5.3 Test description

11.4.5.3.1 Pre-test conditions

System Simulator:

- 2 NR Cells

- NR Cell 1 and NR Cell 11 as defined in TS 38.508-1 [4], Table 4.4.2-3.

- On all cells when active: System information combination NR-1 as defined in TS 38.508-1 [4], subclause 4.4.3.1.2. SIB1 indicates ims-EmergencySupport.

UE:

None.

Preamble:

- Cell configuration " in accordance with TS 38.508-1 [4], Table 4.4.2-3:

- NR Cell 1 "Serving cell"

- NR Cell 11 "Non-Suitable "Off" cell"

- The UE is in test state 1N-A as defined in TS 38.508-1 [4], subclause 4.4A.2 on NR Cell 1

- During the initial registration:

- In the list of tracking areas provided by the AMF (IE 'TAI list') contains only the TAI of NR Cell 1.

11.4.5.3.2 Test procedure sequence

Table 11.4.5.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS configures:  - NR Cell 11 as "Serving cell"  - NR Cell 1 as "Non-Suitable "Off" cell". | - | - | - | - |
| - | EXCEPTION: The following messages are to be observed on NR Cell 11 unless explicitly stated otherwise. | - | - | - | - |
| 2 | The UE transmits an *RRCSetupRequest* message. | --> | NR RRC: RRCSetupRequest | - | - |
| 3 | SS transmit an *RRCSetup* message. | <-- | NR RRC: *RRCSetup* | - | - |
| 4 | The UE transmits an *RRCSetupComplete* message to confirm the successful completion of the connection establishment and a REGISTRATION REQUEST message indicating "mobility registration updating" is sent to update the registration of the actual tracking area. | --> | NR RRC: RRCSetupComplete  5GMM: REGISTRATION REQUEST | - | - |
| 5 | SS sends a REGISTRATION REJECTmessage containing 5GMM cause value = #15 (No suitable cells in tracking area). | <-- | NR RRC: DLInformationTransfer  5GMM: REGISTRATION REJECT | - | - |
| 6 | The SS transmits an *RRCRelease* message. | <-- | NR RRC: RRCRelease | - | - |
| 7 | Make the UE attempt an IMS emergency call dialling an emergency number e.g. 112 or 911). (NOTE 1) | - | - | - | - |
| 8 | Check: Does the UE performs Generic Test Procedure for IMS Emergency call establishment without IMS Emergency registration as specified in TS 38.508-1 [4], subclause 4.9.12? | - | - | 1 | P |
| 9 | Make the UE release the emergency call. (NOTE 1) | - | - | - | - |
| 10 | Void | - | - | - | - |
| 10A | Void |  |  |  |  |
| 10A1- 10A3 | Steps 1-3 of the Generic test procedure for IMS MO Emergency call release with ‘*release emergency PDU session’* as specified in TS 38.508-1 [4], subclause 4.9.12A take place. | - | - | - | - |
| 10B-10C | Void | - | - | - | - |
| 10C1 | Start Timer T2=5 seconds. NOTE: This is an arbitrary value to wait for UE to transmit PDU SESSION RELEASE REQUEST | - | - | - | - |
| 10C2a1 | The UE transmits a PDU SESSION RELEASE REQUEST message. | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM:PDU SESSION RELEASE REQUEST | - | - |
| 10C2a2 | Stop timer T2 | - | - | - | - |
| 10C2b1 | Timer T2 expires | - | - | - | - |
| 10C3 | The SS transmits a PDU SESSION RELEASE COMMAND message. | <-- | NR RRC: DLInformationTransfer  5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION RELEASE COMMAND | - | - |
| 10C4 | The UE transmits a PDU SESSION RELEASE COMPLETE message | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION RELEASE COMPLETE | - | - |
| 10D | Start Timer T1=5 seconds. NOTE: This is an arbitrary value to wait for UE to initiate deregistration. | - | - | - | - |
| - | EXCEPTION: Steps 10Ea1-10Eb1 describes optional behaviour that depends on the UE implementation. the "lower case letter" identifies a step sequence that take place if a specific prior event takes place. | - | - | - | - |
| 10Ea1 | The UE transmits a DEREGISTRATION REQUEST message with De-registration type IE set to “Normal de-registration”. | --> | NR RRC: ULInformationTransfer 5GMM: DEREGISTRATION REQUEST | - | - |
| 10Ea2 | The SS transmits a DEREGISTRATION ACCEPT message. | <-- | NR RRC: DLInformationTransfer 5GMM: DEREGISTRATION ACCEPT | - | - |
| 10Ea3 | Stop Timer T1. | - | - | - | - |
| 10Eb1 | Timer T1 expires. (NOTE 3) | - | - | - | - |
| 11-12b1 | Void | - | - | - | - |
| 12A | The SS transmits an *RRCRelease* message. | <-- | NR RRC: RRCRelease | - | - |
| 12B | Make the UE attempt an IMS non-emergency call. (NOTE 2) | - | - | - | - |
| 12C | Check: Does the UE transmit an *RRCSetupRequest* message for initial registration procedure on NR Cell 11 within the next 10 seconds? | --> | NR RRC: RRCSetupRequest | 2 | F |
| 13 | The SS configures:  - NR Cell 1 as "Suitable neighbour intra-frequency cell"  - NR Cell 11 as "Non-suitable cell". | - | - | - | - |
| 14 | Check: Does the UE transmit an *RRCSetupRequest* message on NR Cell 1 | - | - | 2 | P |
| 15-16 | Steps 3-4 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. (NOTE 4) | - | *-* | - | - |
| - | EXCEPTION: Steps 17a1 to 17b3a1 describe behaviour that depends on events happening prior to their execution; the "lower case letter" identifies a step sequence that take place if a specific prior event takes place. | - | *-* | - | - |
| 17a1-17a16a1 | IF 5GS registration type is set as Initial Registration in step 16, THEN Steps 5 to 20a1 of the generic test procedure in TS 38.508-1 Table 4.5.2.2-2 are performed on NR Cell 1. | - | *-* | - | - |
| 17b1-17b3a1 | IF 5GS registration type is set as Mobility Registration in step 16, THEN Steps 4 to 6a1 of the generic test procedure in TS 38.508-1 Table 4.9.5.2.2-1 are performed on NR Cell 1. | - | *-* | - | - |
| NOTE 1: This could be done by e.g. MMI or AT command.  NOTE 2: This could be done by e.g. MMI or AT command.  NOTE 3: Timer T1 at step 10Eb1 will expire in case of UE local deregistration or without deregistration.  NOTE 4: UE shall send the registration request with security header type ‘0000’ Plain 5GS NAS message or ‘0001’ integrity protected NAS message if UE initiated deregistration procedure or local deregistration between steps 10Ea1 and 10Eb1. | | | | | |

Table 11.4.5.3.2-2: Void

Table 11.4.5.3.2-3: Void

11.4.5.3.3 Specific message contents

Table 11.4.5.3.3-1: REGISTRATION REJECT (step 5, Table 11.4.5.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] table 4.7.1-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | ‘00001111’B | #15 (No suitable cells in tracking area). |  |

Table 11.4.5.3.3-2: MO INVITE (Step 8, table 11.4.5.3.2-1)

|  |
| --- |
| Derivation Path: TS 34.229-5[41] A.6, step 1, conditions A6 of TS 34.229-1 [35] cl A.2.1 |

Table 11.4.5.3.3-3: 180 Ringing (Step 8, table 11.4.5.3.2-1)

|  |
| --- |
| Derivation Path: TS 34.229-5[41] A.6, step 3, conditions A7 of TS 34.229-1 [35] cl A.2.6 |

Table 11.4.5.3.3-4: 200 OK (Step 8, table 11.4.5.3.2-1)

|  |
| --- |
| Derivation Path: TS 34.229-5[41] A.6, step 4, conditions A7 of TS 34.229-1 [35] cl A.3.1 |

### 11.4.6 5GMM-REGISTERED.NON-ALLOWED-SERVICE / Emergency call establishment and release / Handling of non-allowed tracking areas

11.4.6.1 Test Purpose (TP)

(1)

**with** { UE in 5GMM-REGISTERED.NON-ALLOWED-SERVICE state and 5GMM-IDLE mode }

**ensure that** {

**when** { UE is requested to make an Emergency call }

**then** { UE establishes the Emergency call }

}

(2)

**with** { UE in 5GMM-REGISTERED.NON-ALLOWED-SERVICE state and 5GMM-CONNECTED mode having established an Emergency call }

**ensure that** {

**when** { UE is requested to release the Emergency call }

**then** { UE releases the Emergency call, **and**, the UE considers the current cell as belonging to non-allowed tracking areas }

}

11.4.6.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501 [22], subclause 5.3.5, TS 22.101 [42], subclause 10.1.1. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, subclause 5.3.5]

When the UE receives a Service area list IE with a non-allowed area indication during a registration procedure or a generic UE configuration update procedure, the UE shall delete the old list of "non-allowed tracking areas" and store the tracking areas in the non-allowed area as the list of "non-allowed tracking areas". If the UE has a stored list of "allowed tracking areas", the UE shall delete that list.

...

If the UE is successfully registered to a PLMN and has a stored list of "non-allowed tracking areas":

...

b) while camped on a cell whose TAI is in the list of "non-allowed tracking areas", the UE shall enter the state 5GMM-REGISTERED.NON-ALLOWED-SERVICE, and:

1) if the UE is in 5GMM-IDLE mode over 3GPP access, the UE:

...

ii) shall not initiate a service request procedure except for emergency services, high priority access, responding to paging or notification or indicating a change of 3GPP PS data off UE status; and

[TS 22.101, subclause 10.1.1]

The ME shall identify an emergency number dialled by the end user as a valid emergency number and initiate emergency call establishment if it occurs under one or more of the following conditions. If it occurs outside of the following conditions, the ME should not initiate emergency call establishment but normal call establishment. Emergency number identification takes place before and takes precedence over any other (e.g. supplementary service related) number analysis.

a) 112 and 911 shall always be available. These numbers shall be stored on the ME.

b) Any emergency call number stored on a SIM/USIM when the SIM/USIM is present.

c) 000, 08, 110, 999, 118 and 119 when a SIM/USIM is not present. These numbers shall be stored on the ME.

d) Additional emergency call numbers that may have been downloaded by the serving network when the SIM/USIM is present.

11.4.6.3 Test description

11.4.6.3.1 Pre-test conditions

System Simulator:

- 2 NR Cells

- NR Cell 1 and NR Cell 11 as defined in TS 38.508-1 [4] Table 4.4.2-3.

- Maximum of 1 cell is active at any point of time.

- On all cells when active: System information combination NR-2 as defined in TS 38.508-1 [4], subclause 4.4.3.1.2. SIB1 indicates ims-EmergencySupport.

UE:

None.

Preamble:

- Cells power level configuration in accordance with TS 38.508-1 [4], Table 6.2.2.1-3:

- NR Cell 1 "Serving cell"

- NR Cell 11 "Non-Suitable "Off" cell"

- The UE is in test state 1N-A as defined in TS 38.508-1 [4], subclause 4.4A.2 on NR Cell 1

- During the initial registration:

- The list of tracking areas provided by the AMF (IE 'TAI list') contains only the TAI of NR Cell 1 whereas the TAI of NR Cell 11 is indicated in the Service area list IE with non-allowed areas as specified in Table 11.4.6.3.3-1.

11.4.6.3.2 Test procedure sequence

Table 11.4.6.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS configures:  - NR Cell 11 as "Serving cell"  - NR Cell 1 as "Non-Suitable "Off" cell" | - | - | - | - |
| - | The following messages are to be observed on NR Cell 11 unless explicitly stated otherwise. | - | - | - | - |
| 2 | The UE performs a registration for mobility procedure and the RRC connection is released according to generic test procedure in TS 38.508-1 [4] Table 4.9.5.2.2-1, which indicates that the UE is camped on NR Cell 11. | - | - | - | - |
| 3 | Make the UE attempt an IMS emergency call dialling an emergency number e.g. 112 or 911. (NOTE 1) | - | - | - | - |
| 4 | Check: Does the UE performs Generic Test Procedure for IMS Emergency call establishment with IMS Emergency registration as specified in TS 38.508-1 [4], subclause 4.9.11? | - | - | 1 | P |
| 5 | Make the UE release the emergency call. (NOTE 1) | - | - | - | - |
| 6 | The Generic test procedure for IMS MO Emergency call release as specified in TS 38.508-1 [4], subclause 4.9.12A takes place. | - | - | - | - |
| 7 | SS releases the RRC connection | <-- | NR RRC: RRCRelease | - | - |
| 8 | Make the UE attempt an IMS none-emergency call. (NOTE 1) |  |  |  |  |
| 9 | Check: Does the UE transmit in the next 10 sec an *RRCSetupRequest* message? | --> | NR RRC: RRCSetupRequest | 2 | F |
| NOTE 1: This could be done by e.g. MMI or AT command. | | | | | |

11.4.6.3.3 Specific message contents

Table 11.4.6.3.3-1: REGISTRATION ACCEPT (Preamble, step 2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-7. | | | |
| Information Element | Value/remark | Comment | Condition |
| Service area list |  |  |  |
| Allowed type (octet 1) | '1'B | TAIs in the list are in the non-allowed area |  |
| Type of list (octet 1) | '00'B | list of TACs belonging to one PLMN, with non-consecutive TAC values |  |
| Number of elements (octet 1) | '00000'B | 1 element |  |
| MCC | As defined for NR Cell 11 in TS 38.508-1 [4], Table 4.4.2-3. |  |  |
| MNC | As defined for NR Cell 11 in TS 38.508-1 [4], Table 4.4.2-3. |  |  |
| TAC 1 | As defined for NR Cell 11 in TS 38.508-1 [4], Table 4.4.2-3. |  |  |

### 11.4.7 Handling of Local and Extended emergency numbers / Mobility

11.4.7.1 Test Purpose (TP)

(1)

**with** { UE in 5GMM-REGISTERED.NORMAL-SERVICE state and 5GMM-IDLE mode, UE receives a Local emergency numbers list in the REGISTRATION ACCEPT message, provided in the Emergency number list IE }

**ensure that** {

**when** { UE is requested to make an outgoing call using any of the emergency numbers received in the Local emergency numbers list }

**then** { UE establishes an IMS Emergency call }

}

(2)

**with** { UE in 5GMM-REGISTERED.NORMAL-SERVICE state and 5GMM-IDLE mode, UE receives an Extended local emergency numbers list in the REGISTRATION ACCEPT message, provided in the Extended emergency number list IE }

**ensure that** {

**when** { UE is requested to make an outgoing call using any of the emergency numbers received in the Extended local emergency numbers list }

**then** { UE establishes an IMS Emergency call }

}

(3)

**with** { UE in 5GMM-REGISTERED.NORMAL-SERVICE state and 5GMM-IDLE mode, having stored a Local emergency numbers list and an Extended local emergency numbers list }

**ensure that** {

**when** { UE receives a new Local emergency numbers list in the REGISTRATION ACCEPT message, provided in the Emergency number list IE }

**then** { UE replaces the previously stored Local emergency numbers list }

}

(4)

**with** { UE in 5GMM-REGISTERED.NORMAL-SERVICE state and 5GMM-IDLE mode, having stored a Local emergency numbers list and an Extended local emergency numbers list }

**ensure that** {

**when** { UE receives a new Extended local emergency numbers list, in the REGISTRATION ACCEPT message, provided in the Extended emergency number list IE }

**then** { UE replaces the previously stored Extended local emergency numbers list }

}

(5)

**with** { UE in 5GMM-REGISTERED.NORMAL-SERVICE state and 5GMM-IDLE mode, having stored a Local emergency numbers list }

**ensure that** {

**when** { UE moves within the same PLMN from which the currently stored Local emergency numbers list provided in an Emergency number list IE were received, and, no Emergency number list IE is contained in the REGISTRATION ACCEPT message received during a Mobility and periodic update procedure }

**then** { UE keeps the stored Local emergency numbers list in the user equipment }

}

(6)

**with** { UE in 5GMM-REGISTERED.NORMAL-SERVICE state and 5GMM-IDLE mode, having stored an Extended local emergency numbers list }

**ensure that** {

**when** { UE moves within the same PLMN from which the currently stored Extended local Emergency Numbers List provided in an Extended emergency number list IE were received, and, no Extended emergency number list IE is contained in the REGISTRATION ACCEPT message received during a Mobility and periodic update procedure }

**then** { UE keeps the stored Extended local Emergency Numbers List in the user equipment }

}

(7)

**with** { UE in 5GMM-REGISTERED.NORMAL-SERVICE state and 5GMM-IDLE mode, having stored a Local emergency numbers list}

**ensure that** {

**when** { UE moves to a new PLMN in the same country as the PLMN from which the currently stored Local emergency numbers list provided in an Emergency number list IE were received, and, no Emergency number list IE is contained in the REGISTRATION ACCEPT message received in the new PLMN }

**then** { UE keeps the stored Local emergency numbers list in the user equipment }

}

(8)

**with** { UE in 5GMM-REGISTERED.NORMAL-SERVICE state and 5GMM-IDLE mode, having stored an Extended local emergency numbers list }

**ensure that** {

**when** { UE moves to a new PLMN in the same country as the PLMN from which the currently stored Extended Emergency Numbers List provided in an Extended emergency number list IE were received, and the Extended Emergency Number List Validity (EENLV) field within the Extended emergency number list IE indicated "Extended local Emergency Numbers List is valid in the country of the PLMN from which this IE is received", and, no Extended emergency number list IE is contained in the REGISTRATION ACCEPT message received in the new PLMN }

**then** { UE keeps the stored Extended local Emergency Numbers List in the user equipment }

}

(9)

**with** { UE in 5GMM-REGISTERED.NORMAL-SERVICE state and 5GMM-IDLE mode, having stored a Local emergency numbers list and an Extended local emergency numbers list }

**ensure that** {

**when** { UE moves to a new PLMN in the same country as the PLMN from which the currently stored Extended Emergency Numbers List provided in an Extended emergency number list IE were received, and the Extended Emergency Number List Validity (EENLV) field within the Extended emergency number list IE indicated "Extended local Emergency Numbers List is valid only in the PLMN from which this IE is received", and, no Extended emergency number list IE is contained in the REGISTRATION ACCEPT message received in the new PLMN }

**then** { UE deletes the stored Extended local Emergency Numbers List, **and**, keeps the stored Local emergency numbers list in the user equipment }

}

(10)

**with** { UE in 5GMM-REGISTERED.NORMAL-SERVICE state and 5GMM-IDLE mode, having stored a Local emergency numbers list }

**ensure that** {

**when** { UE moves to a new PLMN in a different country as the PLMN from which the currently stored Local emergency numbers list provided in an Emergency number list IE was received, and, no Emergency number list IE is contained in the REGISTRATION ACCEPT message received in the new PLMN }

**then** { UE deletes the stored Local emergency numbers list in the user equipment }

}

(11)

**with** { UE in 5GMM-REGISTERED.NORMAL-SERVICE state and 5GMM-IDLE mode, having stored an Extended local emergency numbers list }

**ensure that** {

**when** { UE moves to a new PLMN in a different country as the PLMN from which the currently stored Extended Emergency Numbers List provided in an Extended emergency number list IE were, and, no Extended emergency number list IE is contained in the REGISTRATION ACCEPT message received in the new PLMN }

**then** { UE deletes the stored Extended emergency numbers list in the user equipment }

}

11.4.7.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 38.331 [12], subclause 5.3.3.3, TS 24.501 [22], subclause 5.3.12, TS 24.301 [21], subclause 5.3.7, TS 22.101 [42], subclause 10.1.1. Unless otherwise stated these are Rel-15 requirements.

[TS 38.331, subclause 5.3.3.3]

The UE shall set the contents of *RRCSetupRequest* message as follows:

...

1> set the *establishmentCause* in accordance with the information received from upper layers;

The UE shall submit the *RRCSetupRequest* message to lower layers for transmission.

[TS 24.501, subclause 5.3.12]

The network may send a Local emergency numbers list or an Extended local emergency numbers list or both, in the REGISTRATION ACCEPT message, by including the Emergency number list IE and the Extended emergency number list IE, respectively. The Local emergency numbers list can be updated as described in 3GPP TS 24.301 [15], subclause 5.3.7.

The user equipment shall store the Local emergency numbers list and the Extended local emergency numbers list, as provided by the network. The Local emergency numbers list stored in the user equipment shall be replaced on each receipt of the Emergency number list IE. The Extended local emergency numbers list stored in the user equipment shall be replaced on each receipt of the Extended emergency number list IE. The received Local emergency numbers list or the received Extended local emergency numbers list or both shall be provided to the upper layers.

...

The emergency number(s) received in the Emergency number list IE are valid only in networks in the same country as the PLMN from which this IE is received. If no Emergency number list IE is contained in the REGISTRATION ACCEPT message, then the stored Local emergency numbers list in the user equipment shall be kept, except if the user equipment has successfully registered to a PLMN in a country different from that of the PLMN that sent the list.

The emergency number(s) received in the Extended emergency number list IE are valid only in:

- networks in the same country as the PLMN from which this IE is received, if the Extended Emergency Number List Validity (EENLV) field within the Extended emergency number list IE indicates "Extended local Emergency Numbers List is valid in the country of the PLMN from which this IE is received"; and

- the PLMN from which this IE is received, if the EENLV field within the Extended emergency number list IE indicates "Extended local Emergency Numbers List is valid only in the PLMN from which this IE is received".

If no Extended local Emergency Numbers List is contained in the REGISTRATION ACCEPT message, and the registered PLMN has not changed, then the stored Extended local Emergency Numbers List in the user equipment shall be kept. If no Extended local Emergency Numbers List is contained in the REGISTRATION ACCEPT message, but the registered PLMN has changed, then:

- if the last received indication in the EENLV field within the Extended emergency number list IE indicates "Extended local Emergency Numbers List is valid only in the PLMN from which this IE is received", the stored Extended local Emergency Numbers List in the user equipment shall be deleted; and

- if the last received indication in the EENLV field within the Extended emergency number list IE indicates "Extended local Emergency Numbers List is valid in the country of the PLMN from which this IE is received" the list shall be kept except if the user equipment has successfully registered to a PLMN in a country different from that of the PLMN that sent the stored list.

NOTE: To prevent the misrouting of emergency calls, all operators within a country need to follow the regulation or agree on the setting of the Extended emergency number list IE in accordance to national agreement – either to indicate validity within a country or to indicate validity only within the PLMN.

The Local emergency numbers list and the Extended local emergency numbers list shall be deleted at switch off or removal of the USIM. The user equipment shall be able to store up to ten entries in the Local emergency numbers list and up to twenty entries in the Extended local emergency numbers list, received from the network.

For the use of the Local emergency numbers list and the Extended local emergency numbers list by the UE see 3GPP TS 24.301 [15], subclause 5.3.7.

[TS 24.301, subclause 5.3.7]

The Local Emergency Numbers List and the Extended local Emergency Numbers list contain additional Local emergency numbers used by the serving network. These lists can be downloaded by the network to the UE at successful registration and subsequent registration updates. There is only one Local Emergency Numbers List and only one Extended local Emergency Numbers list in the UE. The Local Emergency Numbers List can be updated with EMM procedures if the UE is in S1 mode, with GMM and MM procedures if the UE is in A/Gb or Iu mode, and with 5GMM procedures, as specified in 3GPP TS 24.501 [54], if UE is in N1 mode. The Extended local Emergency Numbers List can be updated with EMM procedures if the UE is in S1 mode and with 5GMM procedures, as specified in 3GPP TS 24.501 [54], if UE is in N1 mode.

The UE shall use the stored Local Emergency Numbers List and the stored Extended local Emergency Numbers List received from the network in addition to the emergency numbers stored on the USIM or user equipment to detect that the number dialled is an emergency number.

If the UE determines that the number dialled is an emergency number, the procedures specified in 3GPP TS 23.167 [45] and 3GPP TS 24.229 [13D] are utilised to select a domain for the emergency session attempt.

If the domain selected for the emergency session attempt is the PS domain, then the UE shall perform the session establishment procedures specified in 3GPP TS 24.229 [13D] to initiate an emergency session.

[TS 22.101, subclause 10.1.1]

The ME shall identify an emergency number dialled by the end user as a valid emergency number and initiate emergency call establishment if it occurs under one or more of the following conditions. If it occurs outside of the following conditions, the ME should not initiate emergency call establishment but normal call establishment. Emergency number identification takes place before and takes precedence over any other (e.g. supplementary service related) number analysis.

a) 112 and 911 shall always be available. These numbers shall be stored on the ME.

b) Any emergency call number stored on a SIM/USIM when the SIM/USIM is present.

c) 000, 08, 110, 999, 118 and 119 when a SIM/USIM is not present. These numbers shall be stored on the ME.

d) Additional emergency call numbers that may have been downloaded by the serving network when the SIM/USIM is present.

11.4.7.3 Test description

11.4.7.3.1 Pre-test conditions

System Simulator:

- 4 NR Cells

- NR Cell 1, NR Cell 3, NR Cell 11, NR Cell 12 as defined in TS 38.508-1 [4], Table 4.4.2-3, with the exception that cells' PLMNs are defined in Table 11.4.7.3.1-1 below.

Table 11.4.7.3.1-1: PLMN identifiers

|  |  |
| --- | --- |
| NR Cell | PLMN name |
| 1 | PLMN1 |
| 3 | PLMN15 |
| 11 | PLMN1 |
| 12 | PLMN2 |
| NOTE 1: PLMN1 is stored in EFIMSI on the test USIM card.  NOTE 2: PLMN1 and PLMN15 are in the same country; PLMN2 is in a different country. | |

- System information combination NR-1 as defined in TS 38.508-1 [4], subclause 4.4.3.1.2. SIB1 indicates *ims-EmergencySupport*.

NOTE: No more than 1 cell is active at any time throughout the test.

UE:

- The UE is equipped with a test USIM with USIM Configuration 20 as defined in TS 38.508-1 [4] Table 6.4.1-20 (USIM contains two Emergency Numbers: 144, 117).

Preamble:

- Cells signal level in accordance with TS 38.508-1 [4], Table 6.2.2.1-3:

- NR Cell 12 "Serving cell"

- NR Cell 1 "Non-Suitable "Off" cell"

- NR Cell 11 "Non-Suitable "Off" cell"

- NR Cell 3 "Non-Suitable "Off" cell"

- The UE is in test state 1N-A as defined in TS 38.508-1 [4], subclause 4.4A.2 on NR Cell 12.

- During the initial registration:

- Local emergency number(s) and Extended local emergency number(s) are provided by the Network as specified in Table 11.4.7.3.3-1.

11.4.7.3.2 Test procedure sequence

Table 11.4.7.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| - | The following messages are to be observed on NR Cell 12 unless explicitly stated otherwise. | - | - | - | - |
| 1 | Make the UE attempt an IMS call dialling number 120. (NOTE 1)  The number is expected to be stored in the Local emergency number list being received in the REGISTRATION ACCEPT message in the Preamble. | - | - | - | - |
| 2 | Check: Does the UE performs Generic Test Procedure for IMS Emergency call establishment with IMS emergency registration as specified in TS 38.508-1 [4], subclause 4.9.11? | - | - | 1 | - |
| 3 | Make the UE release the emergency call. (NOTE 1) | - | - | - | - |
| 4 | The Generic test procedure for IMS MO Emergency call release as specified in TS 38.508-1 [4], subclause 4.9.12A takes place. | - | - | - | - |
| 5 | SS releases the RRC connection | <-- | NR RRC: RRCRelease | - | - |
| 6 | Make the UE attempt an IMS call dialling number 10. (NOTE 1)  The number is expected to be stored in the Extended local emergency number list being received in the REGISTRATION ACCEPT message in the Preamble. | - | - | - | - |
| 7 | Check: Does the UE performs Generic Test Procedure for IMS Emergency call establishment with IMS emergency registration as specified in TS 38.508-1 [4], subclause 4.9.11? | - | - | 2 | - |
| 8 | Make the UE release the emergency call. (NOTE 1) | - | - | - | - |
| 9 | The Generic test procedure for IMS MO Emergency call release as specified in TS 38.508-1 [4], subclause 4.9.12A takes place. | - | - | - | - |
| 10 | SS releases the RRC connection | <-- | NR RRC: RRCRelease | - | - |
| - | The SS configures:  - NR Cell 1 as "Serving cell"  - NR Cell 12 as "Non-Suitable "Off" cell"  - NR Cell 11 as "Non-Suitable "Off" cell"  - NR Cell 3 as "Non-Suitable "Off" cell" | - | - | - | - |
| - | The following messages are to be observed on NR Cell 1 unless explicitly stated otherwise. | - | - | - | - |
| 11 | The UE performs the Registration procedure for mobility registration update as specified in TS 38.508-1 [4] subclause 4.9.5.  During the procedure the Network provides new Local emergency number list and Extended local emergency number list (EENLV=Extended Local Emergency Numbers List is valid in the country of the PLMN from which this IE is received) in the REGISTRATION ACCEPT message. | - | - | - | - |
| 12 | Make the UE attempt an IMS call dialling number 1001. (NOTE 1)  The number is expected to be stored in the Local emergency number list being received in the REGISTRATION ACCEPT message in step 11. | - | - | - | - |
| 13 | Check: Does the UE performs Generic Test Procedure for IMS Emergency call establishment with IMS emergency registration as specified in TS 38.508-1 [4], subclause 4.9.11? | - | - | 3 | - |
| 14 | Make the UE release the emergency call. (NOTE 1) | - | - | - | - |
| 15 | The Generic test procedure for IMS MO Emergency call release as specified in TS 38.508-1 [4], subclause 4.9.12A takes place. | - | - | - | - |
| 16 | SS releases the RRC connection | <-- | NR RRC: RRCRelease | - | - |
| 17 | Make the UE attempt an IMS call dialling number 120. (NOTE 1)  The number was initially stored in the Local emergency number list being received in the REGISTRATION ACCEPT message in the Preamble but is expected to have been removed from the list when a new list was received in the REGISTRATION ACCEPT message in step 11. | - | - | - | - |
| 18 | Check: Does the UE performs Generic Test Procedure for IMS MO speech call establishment as specified in TS 38.508-1 [4], subclause 4.9.15? | - | - | 3 | - |
| 19 | Make the UE release the call. (NOTE 1) | - | - | - | - |
| 20 | The Generic test procedure for IMS MO call release as specified in TS 38.508-1 [4], subclause 4.9.17 takes place. | - | - | - | - |
| 21 | SS releases the RRC connection | <-- | NR RRC: RRCRelease | - | - |
| 22 | Make the UE attempt an IMS call dialling number 12345. (NOTE 1)  The number is expected to be stored in the Extended local emergency number list being received in the REGISTRATION ACCEPT message in step 11. | - | - | - | - |
| 23 | Check: Does the UE performs Generic Test Procedure for IMS Emergency call establishment with IMS emergency registration as specified in TS 38.508-1 [4], subclause 4.9.11? | - | - | 4 | - |
| 24 | Make the UE release the emergency call. (NOTE 1) | - | - | - | - |
| 25 | The Generic test procedure for IMS MO Emergency call release as specified in TS 38.508-1 [4], subclause 4.9.12A takes place. | - | - | - | - |
| 26 | SS releases the RRC connection | <-- | NR RRC: RRCRelease | - | - |
| 27 | Make the UE attempt an IMS call dialling number 10. (NOTE 1)  The number was initially stored in the Extended local emergency number list being received in the REGISTRATION ACCEPT message in the Preamble but is expected to have been removed from the list when a new list was received in the REGISTRATION ACCEPT message in step 11. | - | - | - | - |
| 28 | Check: Does the UE performs Generic Test Procedure for IMS MO speech call establishment as specified in TS 38.508-1 [4], subclause 4.9.15? | - | - | 4 | - |
| 29 | Make the UE release the call. (NOTE 1) | - | - | - | - |
| 30 | The Generic test procedure for IMS MO call release as specified in TS 38.508-1 [4], subclause 4.9.17 takes place. | - | - | - | - |
| 31 | SS releases the RRC connection | <-- | NR RRC: RRCRelease | - | - |
| - | The SS configures:  - NR Cell 11 as "Serving cell"  - NR Cell 1 as "Non-Suitable "Off" cell"  - NR Cell 12 as "Non-Suitable "Off" cell"  - NR Cell 3 as "Non-Suitable "Off" cell" | - | - | - | - |
| - | The following messages are to be observed on NR Cell 11 unless explicitly stated otherwise. | - | - | - | - |
| 32 | The UE performs the Registration procedure for mobility registration update as specified in TS 38.508-1 [4] subclause 4.9.5.  During the procedure the Network does not send new Local emergency number list and Extended local emergency number list in the REGISTRATION ACCEPT message. | - | - | - | - |
| 33 | Make the UE attempt an IMS call dialling number 1001. (NOTE 1)  The number is expected to be stored in the Local emergency number list being received in the REGISTRATION ACCEPT message in step 11. | - | - | - | - |
| 34 | Check: Does the UE performs Generic Test Procedure for IMS Emergency call establishment with IMS emergency registration as specified in TS 38.508-1 [4], subclause 4.9.11? | - | - | 5 | - |
| 35 | Make the UE release the emergency call. (NOTE 1) | - | - | - | - |
| 36 | The Generic test procedure for IMS MO Emergency call release as specified in TS 38.508-1 [4], subclause 4.9.12A takes place. | - | - | - | - |
| 37 | SS releases the RRC connection | <-- | NR RRC: RRCRelease | - | - |
| 38 | Make the UE attempt an IMS call dialling number 12345. (NOTE 1)  The number is expected to be stored in the Extended local emergency number list being received in the REGISTRATION ACCEPT message in step 11. | - | - | - | - |
| 39 | Check: Does the UE performs Generic Test Procedure for IMS Emergency call establishment with IMS emergency registration as specified in TS 38.508-1 [4], subclause 4.9.11? | - | - | 6 | - |
| 40 | Make the UE release the emergency call. (NOTE 1) | - | - | - | - |
| 41 | The Generic test procedure for IMS MO Emergency call release as specified in TS 38.508-1 [4], subclause 4.9.12A takes place. | - | - | - | - |
| 42 | SS releases the RRC connection | <-- | NR RRC: RRCRelease | - | - |
| - | The SS configures:  - NR Cell 3 as "Serving cell"  - NR Cell 1 as "Non-Suitable "Off" cell"  - NR Cell 11 as "Non-Suitable "Off" cell"  - NR Cell 12 as "Non-Suitable "Off" cell" | - | - | - | - |
| - | The following messages are to be observed on NR Cell 3 unless explicitly stated otherwise. | - | - | - | - |
| 43 | The UE performs the Registration procedure for mobility registration update as specified in TS 38.508-1 [4] subclause 4.9.5.  During the procedure the Network does not send new Local emergency number list and Extended local emergency number list in the REGISTRATION ACCEPT message. | - | - | - | - |
| 44 | Make the UE attempt an IMS call dialling number 1001. (NOTE 1)  The number is expected to be stored in the Local emergency number list being received in the REGISTRATION ACCEPT message in step 11. | - | - | - | - |
| 45 | Check: Does the UE performs Generic Test Procedure for IMS Emergency call establishment with IMS emergency registration as specified in TS 38.508-1 [4], subclause 4.9.11? | - | - | 7 | - |
| 46 | Make the UE release the emergency call. (NOTE 1) | - | - | - | - |
| 47 | The Generic test procedure for IMS MO Emergency call release as specified in TS 38.508-1 [4], subclause 4.9.12A takes place. | - | - | - | - |
| 48 | SS releases the RRC connection | <-- | NR RRC: RRCRelease | - | - |
| 49 | Make the UE attempt an IMS call dialling number 12345. (NOTE 1)  The number is expected to be stored in the Extended local emergency number list being received in the REGISTRATION ACCEPT message in step 11. | - | - | - | - |
| 50 | Check: Does the UE performs Generic Test Procedure for IMS Emergency call establishment with IMS emergency registration as specified in TS 38.508-1 [4], subclause 4.9.11? | - | - | 8 | - |
| 51 | Make the UE release the emergency call. (NOTE 1) | - | - | - | - |
| 52 | The Generic test procedure for IMS MO Emergency call release as specified in TS 38.508-1 [4], subclause 4.9.12A takes place. | - | - | - | - |
| 53 | SS releases the RRC connection | <-- | NR RRC: RRCRelease | - | - |
| - | The SS configures:  - NR Cell 12 as "Serving cell"  - NR Cell 1 as "Non-Suitable "Off" cell"  - NR Cell 11 as "Non-Suitable "Off" cell"  - NR Cell 3 as "Non-Suitable "Off" cell" | - | - | - | - |
| - | The following messages are to be observed on NR Cell 12 unless explicitly stated otherwise. | - | - | - | - |
| 54 | The UE performs the Registration procedure for mobility registration update as specified in TS 38.508-1 [4] subclause 4.9.5.  During the procedure the Network does not send new Local emergency number list and Extended local emergency number list in the REGISTRATION ACCEPT message. | - | - | - | - |
| 55 | Make the UE attempt an IMS call dialling number 1001. (NOTE 1)  The number was initially stored in the Local emergency number list being received in the REGISTRATION ACCEPT message in step 11 but is expected to have been removed from the list when no new list was received in the REGISTRATION ACCEPT message in step 54. | - | - | - | - |
| 56 | Check: Does the UE performs Generic Test Procedure for IMS MO speech call establishment as specified in TS 38.508-1 [4], subclause 4.9.15? | - | - | 10 | - |
| 57 | Make the UE release the call. (NOTE 1) | - | - | - | - |
| 58 | The Generic test procedure for IMS MO call release as specified in TS 38.508-1 [4], subclause 4.9.17 takes place. | - | - | - | - |
| 59 | SS releases the RRC connection | <-- | NR RRC: RRCRelease | - | - |
| 60 | Make the UE attempt an IMS call dialling number 12345. (NOTE 1)  The number was initially stored in the Extended local emergency number list being received in the REGISTRATION ACCEPT message in step 11 but is expected to have been removed from the list when no new list was received in the REGISTRATION ACCEPT message in step 54. | - | - | - | - |
| 61 | Check: Does the UE performs Generic Test Procedure for IMS MO speech call establishment as specified in TS 38.508-1 [4], subclause 4.9.15? | - | - | 11 | - |
| 62 | Make the UE release the call. (NOTE 1) | - | - | - | - |
| 63 | The Generic test procedure for IMS MO call release as specified in TS 38.508-1 [4], subclause 4.9.17 takes place. | - | - | - | - |
| 64 | SS releases the RRC connection | <-- | NR RRC: RRCRelease | - | - |
| - | The SS configures:  - NR Cell 1 as "Serving cell"  - NR Cell 12 as "Non-Suitable "Off" cell"  - NR Cell 11 as "Non-Suitable "Off" cell"  - NR Cell 3 as "Non-Suitable "Off" cell" | - | - | - | - |
| - | The following messages are to be observed on NR Cell 1 unless explicitly stated otherwise. | - | - | - | - |
| 65 | The UE performs the Registration procedure for mobility registration update as specified in TS 38.508-1 [4] subclause 4.9.5.  During the procedure the Network provides new Local emergency number list and Extended local emergency number list (EENLV=Extended Local Emergency Numbers List is valid in the PLMN from which this IE is received) in the REGISTRATION ACCEPT message. | - | - | - | - |
| - | The SS configures:  - NR Cell 3 as "Serving cell"  - NR Cell 1 as "Non-Suitable "Off" cell"  - NR Cell 11 as "Non-Suitable "Off" cell"  - NR Cell 12 as "Non-Suitable "Off" cell" | - | - | - | - |
| - | The following messages are to be observed on NR Cell 3 unless explicitly stated otherwise. | - | - | - | - |
| 66 | The UE performs the Registration procedure for mobility registration update as specified in TS 38.508-1 [4] subclause 4.9.5.  During the procedure the Network does not send new Local emergency number list and Extended local emergency number list in the REGISTRATION ACCEPT message. | - | - | - | - |
| 67 | Make the UE attempt an IMS call dialling number 12345. (NOTE 1)  The number was initially stored in the Extended local emergency number list being received in the REGISTRATION ACCEPT message in step 65 but is expected to have been removed from the list when no new list was received in the REGISTRATION ACCEPT message in step 66. | - | - | - | - |
| 68 | Check: Does the UE performs Generic Test Procedure for IMS MO speech call establishment as specified in TS 38.508-1 [4], subclause 4.9.15? | - | - | 9 | - |
| 69 | Make the UE release the call. (NOTE 1) | - | - | - | - |
| 70 | The Generic test procedure for IMS MO call release as specified in TS 38.508-1 [4], subclause 4.9.17 takes place. | - | - | - | - |
| 71 | SS releases the RRC connection | <-- | NR RRC: RRCRelease | - | - |
| 72 | Make the UE attempt an IMS call dialling number 1001. (NOTE 1)  The number was initially stored in the Local emergency number list being received in the REGISTRATION ACCEPT message in step 65 and is not expected to have been removed from the list when no new list was received in the REGISTRATION ACCEPT message in step 66. | - | - | - | - |
| 73 | Check: Does the UE performs Generic Test Procedure for IMS Emergency call establishment with IMS emergency registration as specified in TS 38.508-1 [4], subclause 4.9.11? | - | - | 9 | - |
| 74 | Make the UE release the emergency call. (NOTE 1) | - | - | - | - |
| 75 | The Generic test procedure for IMS MO Emergency call release as specified in TS 38.508-1 [4], subclause 4.9.12A takes place. | - | - | - | - |
| 76 | SS releases the RRC connection | <-- | NR RRC: RRCRelease | - | - |
| NOTE 1: This could be done by e.g. MMI or AT command. | | | | | |

11.4.7.3.3 Specific message contents

Table 11.4.7.3.3-1: REGISTRATION ACCEPT (Preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-7. | | | |
| Information Element | Value/remark | Comment | Condition |
| Emergency number list |  |  |  |
| Emergency Number information | 120  TS 24.008 [43], 10.5.3.13. | Number is different to any emergency number stored permanently in the ME AND the numbers stored in the USIM, as indicated in TS 22.101 [42] clause 10.1.1 a)-c). |  |
| Extended emergency number list |  |  |  |
| EENLV | '0' | Extended Local Emergency Numbers List is valid in the country of the PLMN from which this IE is received |  |
| Emergency Number information | 10  TS 24.301 [21], 9.9.3.37A. | Number is different to any emergency number stored permanently in the ME AND the numbers stored in the USIM, as indicated in TS 22.101 [42] clause 10.1.1 a)-c). |  |

Table 11.4.7.3.3-2: REGISTRATION ACCEPT (step 11, Table 11.4.7.3.2-1; step 4, TS 38.508-1 [4], Table 4.9.5.2.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-7. | | | |
| Information Element | Value/remark | Comment | Condition |
| Emergency number list |  |  |  |
| Emergency Number information | 1 number: 1001  TS 24.008 [43], 10.5.3.13. | Number is different to any emergency number stored permanently in the ME AND the numbers stored in the USIM, as indicated in TS 22.101 [42] clause 10.1.1 a)-c). |  |
| Extended emergency number list |  |  |  |
| EENLV | '0' | Extended Local Emergency Numbers List is valid in the country of the PLMN from which this IE is received |  |
| Emergency Number information | 1 number: 12345  TS 24.301 [21], 9.9.3.37A. | Number is different to any emergency number stored permanently in the ME AND the numbers stored in the USIM, as indicated in TS 22.101 [42] clause 10.1.1 a)-c). |  |

Table 11.4.7.3.3-3: REGISTRATION ACCEPT (step 65, Table 11.4.7.3.2-1; step 4, TS 38.508-1 [4], Table 4.9.5.2.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-7. | | | |
| Information Element | Value/remark | Comment | Condition |
| Emergency number list |  |  |  |
| Emergency Number information | 1 number: 1001  TS 24.008 [43], 10.5.3.13. | Number is different to any emergency number stored permanently in the ME AND the numbers stored in the USIM, as indicated in TS 22.101 [42] clause 10.1.1 a)-c). |  |
| Extended emergency number list |  |  |  |
| EENLV | '1' | Extended Local Emergency Numbers List is valid in the PLMN from which this IE is received |  |
| Emergency Number information | 1 number: 12345  TS 24.301 [21], 9.9.3.37A. | Number is different to any emergency number stored permanently in the ME AND the numbers stored in the USIM, as indicated in TS 22.101 [42] clause 10.1.1 a)-c). |  |

### 11.4.8 Handling of Local and extended emergency numbers / Switch-off and maximum local numbers storage

11.4.8.1 Test Purpose (TP)

(1)

**with** { UE in 5GMM-REGISTERED.NORMAL-SERVICE state and 5GMM-IDLE mode, having stored a Local emergency numbers list }

**ensure that** {

**when** { UE is switched off or the USIM is removed }

**then** { UE deletes the stored Local emergency numbers list in the user equipment }

}

(2)

**with** { UE in 5GMM-REGISTERED.NORMAL-SERVICE state and 5GMM-IDLE mode, having stored an Extended local emergency numbers list }

**ensure that** {

**when** { UE is switched off or the USIM is removed }

**then** { UE deletes the stored Extended local Emergency Numbers List in the user equipment }

}

(3)

**with** { UE in 5GMM-REGISTERED.NORMAL-SERVICE state and 5GMM-IDLE mode, UE receives a Local emergency numbers list with 10 entries in the REGISTRATION ACCEPT message, provided in the Emergency number list IE and the UE has stored them in local emergency numbers list }

**ensure that** {

**when** { UE is requested to make an outgoing call using any of the emergency numbers received in the Local emergency numbers list }

**then** { UE establishes an IMS Emergency call }

}

(4)

**with** { UE in 5GMM-REGISTERED.NORMAL-SERVICE state and 5GMM-IDLE mode, UE receives an Extended local emergency numbers list with 20 entries, in the REGISTRATION ACCEPT message, provided in the Extended emergency number list IE and the UE has stored them in Extended local emergency numbers lists }

**ensure that** {

**when** { UE is requested to make an outgoing call using any of the emergency numbers received in the Extended local emergency numbers list }

**then** { UE establishes an IMS Emergency call }

}

11.4.8.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 38.331 [12], subclause 5.3.3.3, TS 24.501 [22], subclause 5.3.12, TS 24.301 [21], subclause 5.3.7, TS 22.101 [42], subclause 10.1.1. The following represents a copy/paste extraction of the requirements relevant to the test purpose; any references within the copy/paste text should be understood within the scope of the core spec they have been copied from. Unless otherwise stated these are Rel-15 requirements.

[TS 38.331 [12], subclause 5.3.3.3]

The UE shall set the contents of *RRCSetupRequest* message as follows:

...

1> set the *establishmentCause* in accordance with the information received from upper layers;

The UE shall submit the *RRCSetupRequest* message to lower layers for transmission.

[TS 24.501 [22], subclause 5.3.12]

The network may send a Local emergency numbers list or an Extended local emergency numbers list or both, in the REGISTRATION ACCEPT message, by including the Emergency number list IE and the Extended emergency number list IE, respectively. The Local emergency numbers list can be updated as described in 3GPP TS 24.301 [15], subclause 5.3.7.

The user equipment shall store the Local emergency numbers list and the Extended local emergency numbers list, as provided by the network. The Local emergency numbers list stored in the user equipment shall be replaced on each receipt of the Emergency number list IE. The Extended local emergency numbers list stored in the user equipment shall be replaced on each receipt of the Extended emergency number list IE. The received Local emergency numbers list or the received Extended local emergency numbers list or both shall be provided to the upper layers.

...

The Local emergency numbers list and the Extended local emergency numbers list shall be deleted at switch off or removal of the USIM. The user equipment shall be able to store up to ten entries in the Local emergency numbers list and up to twenty entries in the Extended local emergency numbers list, received from the network.

For the use of the Local emergency numbers list and the Extended local emergency numbers list by the UE see 3GPP TS 24.301 [15], subclause 5.3.7.

[TS 24.301 [21], subclause 5.3.7]

The Local Emergency Numbers List and the Extended local Emergency Numbers list contain additional Local emergency numbers used by the serving network. These lists can be downloaded by the network to the UE at successful registration and subsequent registration updates. There is only one Local Emergency Numbers List and only one Extended local Emergency Numbers list in the UE. The Local Emergency Numbers List can be updated with EMM procedures if the UE is in S1 mode, with GMM and MM procedures if the UE is in A/Gb or Iu mode, and with 5GMM procedures, as specified in 3GPP TS 24.501 [54], if UE is in N1 mode. The Extended local Emergency Numbers List can be updated with EMM procedures if the UE is in S1 mode and with 5GMM procedures, as specified in 3GPP TS 24.501 [54], if UE is in N1 mode.

The UE shall use the stored Local Emergency Numbers List and the stored Extended local Emergency Numbers List received from the network in addition to the emergency numbers stored on the USIM or user equipment to detect that the number dialled is an emergency number.

If the UE determines that the number dialled is an emergency number, the procedures specified in 3GPP TS 23.167 [45] and 3GPP TS 24.229 [13D] are utilised to select a domain for the emergency session attempt.

If the domain selected for the emergency session attempt is the PS domain, then the UE shall perform the session establishment procedures specified in 3GPP TS 24.229 [13D] to initiate an emergency session.

[TS 22.101 [42], subclause 10.1.1]

The ME shall identify an emergency number dialled by the end user as a valid emergency number and initiate emergency call establishment if it occurs under one or more of the following conditions. If it occurs outside of the following conditions, the ME should not initiate emergency call establishment but normal call establishment. Emergency number identification takes place before and takes precedence over any other (e.g. supplementary service related) number analysis.

a) 112 and 911 shall always be available. These numbers shall be stored on the ME.

b) Any emergency call number stored on a SIM/USIM when the SIM/USIM is present.

c) 000, 08, 110, 999, 118 and 119 when a SIM/USIM is not present. These numbers shall be stored on the ME.

d) Additional emergency call numbers that may have been downloaded by the serving network when the SIM/USIM is present.

11.4.8.3 Test description

11.4.8.3.1 Pre-test conditions

System Simulator:

- 2 NR Cells

- NR Cell 1 and NR Cell 12 as defined in TS 38.508-1 [4], Table 4.4.2-3. System information combination NR-1 as defined in TS 38.508-1 [4], subclause 4.4.3.1.2. SIB1 indicates *ims-EmergencySupport*.

- No more than 1 cell is active at any time throughout the test.

UE:

- The UE is equipped with a test USIM with USIM Configuration 20 as defined in TS 38.508-1 [4], Table 6.4.1-20 (USIM contains two Emergency Numbers: 144, 117).

Preamble:

- Cells signal level in accordance with TS 38.508-1 [4], Table 6.2.2.1-3:

- NR Cell 1 "Serving cell"

- NR Cell 12 "Non-Suitable "Off" cell"

- The UE is in state SWITCHED\_OFF as defined in TS 38.508-1 [4], subclause 4.5.5.

- During the initial registration on NR Cell 1:

- Local emergency number(s) and Extended local emergency number(s) are provided by the Network as specified in Table 11.4.8.3.3-1.

11.4.8.3.2 Test procedure sequence

Table 11.4.8.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| - | The following messages are to be observed on NR Cell 1 unless explicitly stated otherwise. | - | - | - | - |
| 1 | Power on the UE. | - | - | - | - |
| 2 | The Generic test procedure for NR RRC\_IDLE described in TS 38.508-1 [4], Table 4.5.2.2-2 is performed. The UE performs registration and the RRC connection is released.  During the procedure the SS does not send new Local emergency number list and Extended local emergency number list in the REGISTRATION ACCEPT message. | - | - | - | - |
| 3 | Make the UE attempt an IMS call dialling number 120. (NOTE 1)  The number was initially stored in the Local emergency number list being received in the REGISTRATION ACCEPT message in the Preamble but is expected to have been removed from the list upon switch-off. | - | - | - | - |
| 4 | Check: Does the UE performs Generic Test Procedure for IMS MO speech call establishment as specified in TS 38.508-1 [4], subclause 4.9.15? | - | - | 1 | - |
| 5 | Make the UE release the call. (NOTE 1) | - | - | - | - |
| 6 | The Generic test procedure for IMS MO call release as specified in TS 38.508-1 [4], subclause 4.9.17 takes place. | - | - | - | - |
| 7 | SS releases the RRC connection. | <-- | NR RRC: RRCRelease | - | - |
| 8 | Make the UE attempt an IMS call dialling number 10. (NOTE 1)  The number was initially stored in the Extended local emergency number list being received in the REGISTRATION ACCEPT message in the Preamble but is expected to have been removed from the list upon switch-off. | - | - | - | - |
| 9 | Check: Does the UE performs Generic Test Procedure for IMS MO speech call establishment as specified in TS 38.508-1 [4], subclause 4.9.15? | - | - | 2 | - |
| 10 | Make the UE release the call. (NOTE 1) | - | - | - | - |
| 11 | The Generic test procedure for IMS MO call release as specified in TS 38.508-1 [4], subclause 4.9.17 takes place. | - | - | - | - |
| 12 | SS releases the RRC connection. | <-- | NR RRC: RRCRelease | - | - |
| - | The SS configures:  - NR Cell 12 as "Serving cell"  - NR Cell 1 as "Non-Suitable "Off" cell" | - | - | - | - |
| - | The following messages are to be observed on NR Cell 12 unless explicitly stated otherwise. | - | - | - | - |
| 13 | The UE performs the Registration procedure for mobility registration update as specified in TS 38.508-1 [4] subclause 4.9.5.  During the procedure the UE receives new Local emergency number list with 10 entries and Extended local emergency number list with 20 entries in the REGISTRATION ACCEPT message. | - | - | - | - |
| - | EXCEPTION: Steps 14-18 are repeated 10 times. Each iteration shall be started with different number being dialled. The following Local emergency numbers received in the REGISTRATION ACCEPT message in step 13 shall be used: 120 ... 129. | - | - | - | - |
| 14 | Make the UE attempt an IMS call dialling one of the numbers specified in the EXCEPTION step above. (NOTE 1) | - | - | - | - |
| 15 | Check: Does the UE performs Generic Test Procedure for IMS Emergency call establishment with IMS emergency registration as specified in TS 38.508-1 [4], subclause 4.9.11? | - | - | 3 | - |
| 16 | Make the UE release the emergency call. (NOTE 1) | - | - | - | - |
| 17 | The Generic test procedure for IMS MO Emergency call release as specified in TS 38.508-1 [4], subclause 4.9.12A takes place. | - | - | - | - |
| 18 | SS releases the RRC connection. | <-- | NR RRC: RRCRelease | - | - |
| - | EXCEPTION: Steps 19-23 are repeated 20 times. Each iteration shall be started with different number being dialled. The following Extended local emergency numbers received in the REGISTRATION ACCEPT message in step 13 shall be used: 130 ... 149. | - | - | - | - |
| 19 | Make the UE attempt an IMS call dialling one of the numbers specified in the EXCEPTION step above. (NOTE 1) | - | - | - | - |
| 20 | Check: Does the UE performs Generic Test Procedure for IMS Emergency call establishment with IMS emergency registration as specified in TS 38.508-1 [4], subclause 4.9.11? | - | - | 4 | - |
| 21 | Make the UE release the emergency call. (NOTE 1) | - | - | - | - |
| 22 | The Generic test procedure for IMS MO Emergency call release as specified in TS 38.508-1 [4], subclause 4.9.12A takes place. | - | - | - | - |
| 23 | SS releases the RRC connection. | <-- | NR RRC: RRCRelease | - | - |
| NOTE 1: This could be done by e.g. MMI or AT command. | | | | | |

11.4.8.3.3 Specific message contents

Table 11.4.8.3.3-1: REGISTRATION ACCEPT (Preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-7. | | | |
| Information Element | Value/remark | Comment | Condition |
| Emergency number list |  |  |  |
| Emergency Number information | 120  TS 24.008 [43], 10.5.3.13. | Number is different to any emergency number stored permanently in the ME AND the numbers stored in the USIM, as indicated in TS 22.101 [42] clause 10.1.1 a)-c). |  |
| Extended emergency number list |  |  |  |
| EENLV | '0' | Extended Local Emergency Numbers List is valid in the country of the PLMN from which this IE is received |  |
| Emergency Number information | 10  TS 24.301 [21], 9.9.3.37A. | Number is different to any emergency number stored permanently in the ME AND the numbers stored in the USIM, as indicated in TS 22.101 [42] clause 10.1.1 a)-c). |  |

Table 11.4.8.3.3-2: REGISTRATION ACCEPT (step 13, Table 11.4.8.3.2-1; step 4, TS 38.508-1 [4], Table 4.9.5.2.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-7. | | | |
| Information Element | Value/remark | Comment | Condition |
| Emergency number list |  |  |  |
| Emergency Number information | 10 numbers: 120 ... 129  TS 24.008 [43], 10.5.3.13. | Numbers different to any emergency number stored permanently in the ME AND the numbers stored in the USIM, as indicated in TS 22.101 [42] clause 10.1.1 a)-c). |  |
| Extended emergency number list |  |  |  |
| EENLV | '0' | Extended Local Emergency Numbers List is valid in the country of the PLMN from which this IE is received |  |
| Emergency Number information | 20 numbers:  130 ... 149  TS 24.301 [21], 9.9.3.37A. | Numbers different to any emergency number stored permanently in the ME AND the numbers stored in the USIM, as indicated in TS 22.101 [42] clause 10.1.1 a)-c). |  |

### 11.4.9 5GMM-DEREGISTERED.LIMITED-SERVICE No suitable cells in tracking area / Emergency call establishment and release

11.4.9.1 Test Purpose (TP)

(1)

**with** { UE in 5GMM-DEREGISTERED.LIMITED-SERVICE state after receiving REGISTRATION REJECT message with 5GMM cause value #15 'No suitable cells in tracking area' }

**ensure that** {

**when** { UE is requested to make an Emergency call }

**then** { UE establishes an RRC connection with the RRC *establishmentCause* set to "emergency", **and**, attempts an Initial registration for emergency services by sending a REGISTRATION REQUEST message with IE Service type set to "emergency services", **and**, accepts and applies security with NULL security and integrity algorithms, **and**, after successful completion of the registration for emergency services establishes an emergency PDU session by sending an UL NAS TRANSPORT message with Request type set to "initial emergency request" and a PDU SESSION ESTABLISHMENT REQUEST }

}

(2)

**with** { UE in 5GMM-DEREGISTERED.LIMITED-SERVICE state after receiving REGISTRATION REJECT message with 5GMM cause value #15 'No suitable cells in tracking area' and having established an Emergency call }

**ensure that** {

**when** { UE is requested to release the Emergency call }

**then** { UE releases the Emergency call, **and**, the UE considers the current cell as belonging to 5GS forbidden tracking areas for roaming }

}

11.4.9.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 38.331 [12], subclause 5.3.3.3, TS 23.501 [37], subclause 5.16.4.1, TS 23.122 [38], subclause 3.4.2, TS 24.501 [22], subclauses 5.5.1.2.5, 4.4.4.1, 5.1.3.2.1.3.3, 5.3.2, 5.4.2.3, 5.5.1.2.2, 6.4.1.2, TS 22.101 [42], subclause 10.1.1. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, subclause 5.5.1.2.5]

If the initial registration request cannot be accepted by the network, the AMF shall send a REGISTRATION REJECT message to the UE including an appropriate 5GMM cause value.

...

The UE shall take the following actions depending on the 5GMM cause value received in the REGISTRATION REJECT message.

...

#15 (No suitable cells in tracking area).

The UE shall set the 5GS update status to 5U3 ROAMING NOT ALLOWED (and shall store it according to subclause 5.1.3.2.2). The UE shall reset the registration attempt counter and shall enter the state 5GMM-REGISTERED.LIMITED-SERVICE. The UE shall search for a suitable cell in another tracking area according to 3GPP TS 38.304 [28].

The UE shall store the current TAI in the list of "5GS forbidden tracking areas for roaming" and shall remove the current TAI from the stored TAI list, if present.

If the UE is operating in single-registration mode, the UE shall handle the EMM parameters EMM state, EPS update status and tracking area updating attempt counter as specified in 3GPP TS 24.301 [15] for the case when the normal tracking area updating procedure is rejected with the EMM cause with the same value.

[TS 23.122, subclause 3.4.2]

The MS is not allowed to request 5GS services except emergency services when camped on a cell of a TA of which belongs to the list of "5GS forbidden tracking areas for regional provision of service".

[TS 36.331, subclause 5.3.3.3]

The UE shall set the contents of *RRCSetupRequest* message as follows:

...

1> set the *establishmentCause* in accordance with the information received from upper layers;

The UE shall submit the *RRCSetupRequest* message to lower layers for transmission.

[TS 23.501, subclause 5.16.4.1]

UEs that are in limited service state, as specified in TS 23.122 [17], or that camp normally on a cell but failed to register successfully to the network under conditions specified in TS 24.501 [47], initiate the Registration procedure by indicating that the registration is to receive Emergency Services, referred to as Emergency Registration, and a Follow-on request is included in the Registration Request to initiate PDU Session Establishment procedure with a Request Type indicating "Emergency Request". UEs that had registered for normal services and do not have emergency PDU Sessions established and that are subject to Mobility Restriction in the present area or RAT (e.g. because of restricted tracking area) shall initiate the UE Requested PDU Session Establishment procedure to receive Emergency Services, i.e. with a Request Type indicating "Emergency Request". Based on local regulation, the network supporting Emergency Services for UEs in limited service state provides Emergency Services to these UE, regardless whether the UE can be authenticated, has roaming or Mobility Restrictions or a valid subscription.

[TS 24.501, subclause 4.4.4.1]

The use of "null integrity protection algorithm" 5G-IA0 (see subclause 9.11.3.32) in the current 5G NAS security context is only allowed for an unauthenticated UE for which establishment of emergency services is allowed. For setting the security header type in outbound NAS messages, the UE and the AMF shall apply the same rules irrespective of whether the "null integrity protection algorithm" or any other integrity protection algorithm is indicated in the 5G NAS security context.

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

[TS 24.501, subclause 5.1.3.2.1.3.3]

The substate 5GMM-DEREGISTERED.LIMITED-SERVICE is chosen in the UE, when it is known that a selected cell for 3GPP access or TA for non-3GPP access is unable to provide normal service (e.g. the selected cell over 3GPP access is in a forbidden PLMN or is in a forbidden tracking area or TA for non-3GPP access is forbidden).

[TS 24.501, subclause 5.3.2]

The UE provides the SUPI to the network in concealed form. The SUCI is a privacy preserving identifier containing the concealed SUPI. When the SUPI contains a network specific identifier, the SUCI shall take the form of an NAI as specified in 3GPP TS 23.003 [4].

A UE supporting N1 mode includes a SUCI:

a) in the REGISTRATION REQUEST message when the UE is attempting initial registration procedure and a valid 5G-GUTI is not available; or

...

The UE shall use the "null-scheme" as specified in 3GPP TS 33.501 [24] to generate the SUCI, if the following applies:

a) the UE performs a registration procedure for emergency services or initiates a de-registration procedure before the registration procedure for emergency services was completed successfully; and

[TS 24.501, subclause 5.4.2.3]

If the UE is registered for emergency services, performing initial registration for emergency services or establishing an emergency PDU session and the SECURITY MODE COMMAND message is received with ngKSI value "000" and 5G-IA0 and 5G-EA0 as selected 5G NAS security algorithms, the UE shall locally derive and take in use 5G NAS security context. The UE shall delete existing current 5G NAS security context.

The UE shall accept a SECURITY MODE COMMAND message indicating the "null integrity protection algorithm" 5G-EA0 as the selected 5G NAS integrity algorithm only if the message is received when the UE is registered for emergency services, performing initial registration for emergency services or establishing an emergency PDU session.

[TS 24.501, subclause 5.5.1.2.2]

The UE in state 5GMM-DEREGISTERED shall initiate the registration procedure for initial registration by sending a REGISTRATION REQUEST message to the AMF,

...

b) when the UE performs initial registration for emergency services;

...

If the UE initiates an initial registration for emergency services or needs to prolong the established NAS signalling connection after the completion of the initial registration procedure (e.g. due to uplink signalling pending), the UE shall set the Follow-on request indicator to 1.

[TS 24.501, subclause 6.4.1.2]

In order to initiate the UE-requested PDU session establishment procedure, the UE shall create a PDU SESSION ESTABLISHMENT REQUEST message.

NOTE 0: When IMS voice is available over either 3GPP access or non-3GPP access, the "voice centric" UE in 5GMM-REGISTERED state will receive a request from upper layers to establish the PDU session for IMS signalling, if the conditions for performing an initial registration with IMS indicated in 3GPP TS 24.229 [14] subclause U.3.1.2 are satisfied.

If the UE requests to establish a new PDU session, the UE shall allocate a PDU session ID which is not currently being used by another PDU session over either 3GPP access or non-3GPP access.

The UE shall allocate a PTI value currently not used and shall set the PTI IE of the PDU SESSION ESTABLISHMENT REQUEST message to the allocated PTI value.

...

If the UE requests to establish a new emergency PDU session, the UE shall set the SSC mode IE of the PDU SESSION ESTABLISHMENT REQUEST message to "SSC mode 1".

...

The UE shall transport:

a) the PDU SESSION ESTABLISHMENT REQUEST message;

b) the PDU session ID of the PDU session being established, or being handed over or being transferred;

..

e) the request type which is set to:

...

3) "initial emergency request", if the UE requests to establish a new emergency PDU session; and

...

If the request type is set to "initial emergency request" or "existing emergency PDU session", neither DNN nor S-NSSAI is transported by the UE using the NAS transport procedure as specified in subclause 5.4.5.

[TS 22.101, subclause 10.1.1]

The ME shall identify an emergency number dialled by the end user as a valid emergency number and initiate emergency call establishment if it occurs under one or more of the following conditions. If it occurs outside of the following conditions, the ME should not initiate emergency call establishment but normal call establishment. Emergency number identification takes place before and takes precedence over any other (e.g. supplementary service related) number analysis.

a) 112 and 911 shall always be available. These numbers shall be stored on the ME.

11.4.9.3 Test description

11.4.9.3.1 Pre-test conditions

System Simulator:

- 1 NR Cell

- NR Cell 1, as defined in TS 38.508-1 [4], Table 4.4.2-3.

- System information combination NR-1 as defined in TS 38.508-1 [4], subclause 4.4.3.1.2. SIB1 indicates *ims-EmergencySupport*.

UE:

None.

Preamble:

- The UE is in test state 0N-B (Switched Off) as defined in TS 38.508-1 [4], subclause 4.4A.2.

11.4.9.3.2 Test procedure sequence

Table 11.4.9.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Switch the UE on. | - | - | - | - |
| 2-4 | Steps 2-4 of Table 4.5.2.2-2 NR RRC\_IDLE in TS38.508-1 [4] take place (the UE initiates an initial registration procedure). | - | - | - | - |
| 5 | SS sends a REGISTRATION REJECTmessage containing 5GMM cause value = #15 (No suitable cells in tracking area). | <-- | NR RRC: DLInformationTransfer  5GMM: REGISTRATION REJECT | - | - |
| 6 | The SS transmits an *RRCRelease* message. | <-- | NR RRC: RRCRelease | - | - |
| 7 | Make the UE attempt an IMS emergency call dialling a number which is stored on the ME (e.g. 112 or 911). (NOTE 1) | - | - | - | - |
| 8 | Check: Does the UE performs Generic Test Procedure for IMS Emergency call establishment without IMS emergency registration as specified in TS 38.508-1 [4], subclause 4.9.12? | - | - | 1 | P |
| 9 | Make the UE release the emergency call. (NOTE 1) | - | - | - | - |
| 10 | Void | - | - | - | - |
| 10A-10C | Steps 1-3 of the Generic test procedure for IMS MO Emergency call release as specified in TS 38.508-1 [4], subclause 4.9.12A  take place. | - | - | - | - |
| 11 | Start Timer T1=5 seconds.  NOTE: This is an arbitrary value to wait for UE initiated detach. | - | - | - | - |
| - | EXCEPTION: In parallel to step 12 below, the steps specified in Tables 11.4.9.3.2-2, and 11.4.9.3.2-3 may take place | - | - | - | - |
| 12 | Timer T1=5 seconds expires | - | - | - | - |
| 12a1-12b3 | Void | - | - | - | - |
| 13 | SS releases the RRC connection | <-- | NR RRC: RRCRelease | - | - |
| 13A | Make the UE attempt an IMS none-emergency call. (NOTE 2) | - | - | - | - |
| 14 | Check: Does the UE transmit an *RRCSetupRequest* message in the next 10 seconds?  NOTE: This is an arbitrary value to wait for catching not allowed UE behaviour. | --> | NR RRC: RRCSetupRequest | 2 | F |
| NOTE 1: This could be done by e.g. MMI or AT command.  NOTE 2: This could be done by e.g. MMI or AT command. | | | | | |

Table 11.4.9.3.2-2: Parallel Behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE transmits a DEREGISTRATION REQUEST message with De-registration type IE set to "Normal de-registration". | --> | NR RRC: ULInformationTransfer  5GMM: DEREGISTRATION REQUEST | - | - |
| 2 | The SS transmits a DEREGISTRATION ACCEPT message. | <-- | NR RRC: DLInformationTransfer  5GMM: DEREGISTRATION ACCEPT | - | - |

Table 11.4.9.3.2-3: Parallel Behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE transmits a PDU SESSION RELEASE REQUEST message. | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM:PDU SESSION RELEASE REQUEST | - | - |
| 2 | The SS transmits a PDU SESSION RELEASE COMMAND message. | <-- | NR RRC: *DLInformationTransfer*  *5GMM: DL NAS TRANSPORT*5GSM: PDU SESSION RELEASE COMMAND | - | - |
| 3 | Check: Does the UE transmit a PDU SESSION RELEASE COMPLETE message? | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION RELEASE COMPLETE | - | - |

11.4.9.3.3 Specific message contents

Table 11.4.9.3.3-1: REGISTRATION REJECT (step 5, Table 11.4.9.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] table 4.7.1-9. | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM cause | ‘00001111’B | #15 (No suitable cells in tracking area). |  |

Table 11.4.9.3.3-2:REGISTRATION REQUEST (step 8, Table 11.4.9.3.2-1; step 3, TS 38.508-1 [4], Table 4.9.12.2.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-6, condition EMERGENCY. | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS mobile identity | SUCI | The UE shall use the "null-scheme" as specified in 3GPP TS 33.501 [20] to generate the SUCI |  |

Table 11.4.9.3.3-3:DEREGISTRATION REQUEST (Step 12a1, Table 11.4.9.3.2-1)

|  |
| --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-12, Condition NORMAL. |

Table 11.4.9.3.3-4:Void

### 11.4.10 Void

### 11.4.10a 5GMM-REGISTERED.NORMAL-SERVICE / N26 interface not supported / N1 mode to S1 mode transfer of an existing emergency PDU session

11.4.10a.1 Test Purpose (TP)

(1)

**with** { UE in 5GMM-REGISTERED.NORMAL-SERVICE state and 5GMM-IDLE mode with Interworking without N26 interface supported, **and**, the UE has an emergency PDU session established }

**ensure that** {

**when** { UE performs a inter-system change from the N1 to S1 mode }

**then** { UE correctly transfers the existing emergency PDU session into an emergency PDN connection }

}

11.4.10a.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501 [22], subclause 6.1.4.2, TS 22.101 [42], subclause 10.1.1. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, subclause 6.1.4.2]

When the network does not support N26 interface, the SMF does not provide the UE with the mapped EPS bearer context for a PDU session.

NOTE 1: Since the SMF does not provide the UE with the mapped EPS bearer context for a PDU session, the UE does not know whether interworking with EPS is supported for a PDU session before attempting to transfer the PDU session from N1 mode to S1 mode.

NOTE 2: It is up to UE implementation to decide which PDU session(s) to be attempted to transfer from N1 mode to S1 mode, e.g. based on UE policy or UE local configuration.

...

Upon inter-system change from N1 mode to S1 mode in EMM-IDLE mode, the UE shall use the parameters from each PDU session which the UE intends to transfer to EPS to create the contents of a PDN CONNECTIVITY REQUEST message as follows:

a) if the PDU session is an emergency PDU session, the request type shall be set to "handover of emergency bearer services". Otherwise the request type shall be set to "handover";

b) the PDU session type of the PDU session shall be mapped to the PDN type of the default EPS bearer context as follows:

1) the PDN type shall be set to "non-IP" if the PDU session type is "Ethernet" or "Unstructured";

2) the PDN type shall be set to "IPv4" if the PDU session type is "IPv4";

3) the PDN type shall be set to "IPv6" if the PDU session type is "IPv6"; and

4) the PDN type shall be set to "IPv4v6" if the PDU session type is "IPv4v6";

c) the DNN of the PDU session shall be mapped to the APN of the default EPS bearer context; and

d) the PDU session ID parameter in the PCO IE shall be set to the PDU session identity of the PDU session.

...

After inter-system change from N1 mode to S1 mode, the UE shall associate the PDU session identity with the default EPS bearer context.

[TS 22.101, subclause 10.1.1]

The ME shall identify an emergency number dialled by the end user as a valid emergency number and initiate emergency call establishment if it occurs under one or more of the following conditions. If it occurs outside of the following conditions, the ME should not initiate emergency call establishment but normal call establishment. Emergency number identification takes place before and takes precedence over any other (e.g. supplementary service related) number analysis.

a) 112 and 911 shall always be available. These numbers shall be stored on the ME.

11.4.10a.3 Test description

11.4.10a.3.1 Pre-test conditions

System Simulator:

- 2 cells

- NR Cell 1 as defined in TS 38.508-1 [4] Table 4.4.2-3. System information combination NR-6 as defined in TS 38.508-1 [4], subclause 4.4.3.1.2.

- E-UTRA Cell 1 as defined in TS 36.508 [7] Table 4.4.2-2. System information combination 31 as defined in TS 36.508 [7], subclause 4.4.3.1.1.

UE:

None.

Preamble:

With E-UTRA Cell 1 "Non-suitable "Off" cell" and NR Cell 1 "Serving cell" in accordance with TS 38.508-1 [4], Table 6.2.2.1-3, the UE is brought to state 1N-A, RRC\_IDLE Connectivity (NR), in accordance with the procedure described in TS 38.508-1 [4], subclause 4.5.2 (Table 4.5.2.2-2 and depending on UE implementation Table 4.5.2.2-4). Interworking without N26 interface supported in accordance with the definition specified in TS 38.508-1 [4], subclause 4.5.1.

11.4.10a.3.2 Test procedure sequence

Table 11.4.10a.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Make the UE attempt an IMS emergency call dialling an emergency number. (NOTE 1) | - | - | - | - |
| - | The following messages are to be observed on NR Cell 1 unless explicitly stated otherwise. | - | - | - | - |
| 2 | The UE performs Generic Test Procedure for IMS Emergency call establishment with IMS emergency registration as specified in TS 38.508-1 [4], subclause 4.9.11. | - | - | - | - |
| 2A | Make the UE release the IMS emergency call. (NOTE 1) | - | - | - | - |
| 2B | Generic Test Procedure for IMS MO call release in 5GC as defined in TS 38.508-1 [4], Table 4.9.17.2.2-1 takes place.  The dedicated voice bearer is released but the Emergency session is not. | - | - | - | - |
| 3 | SS releases the RRC connection. | <-- | NR RRC: *RRCRelease* | - | - |
| 4 | The SS configures:  - E-UTRA Cell 1 as "Serving cell"  - NR Cell 1 as "Non-suitable "off" cell". | - | - | - | - |
| - | The following messages are to be observed on E-UTRA Cell 1 unless explicitly stated otherwise. | - | - | - | - |
| 5-10 | Void | - | - | - | - |
| - | EXCEPTION: Steps 10AAa1 to 10AAb3 describe behaviour that depends on the UE implementation; the "lower case letter" identifies a step sequence that take place depending on the UE implementation. | - | - | - | - |
| 10AAa1 | If the UE tries to preserve the IP address of the PDN connection then check does the UE transmit an ATTACH REQUEST message? | --> | RRC: *RRCConnectionSetupComplete* NAS: ATTACH REQUEST | - | - |
| 10AAb1 | Else check: does the UE transmit a TRACKING AREA UPDATE REQUEST message? | --> | RRC: *RRCConnectionSetupComplete* NAS: TRACKING AREA UPDATE REQUEST | - | - |
| 10AAb2 | The SS transmits a TRACKING AREA UPDATE REJECT message to UE. | <-- | RRC: *DLInformationTransfer*  NAS: TRACKING AREA UPDATE REQUEST REJECT | - | - |
| 10AAb3 | The UE transmits an ATTACH REQUEST message. | --> | RRC: *ULInformationTransfer*  NAS: ATTACH REQUEST | - | - |
| 10AB-10AM | Steps 5 to 16 of the generic test procedure for UE registration (TS 36.508 [7] Table 4.5.2.3-1). | - | - | - | - |
| - | EXCEPTION: In parallel to step 10Aa1 below the steps described in table 11.4.10a.3.2-2 take place. | - | - | - | - |
| 10Aa1 | The generic procedure for UE-requested PDN connection establishment, specified in TS 38.508-1 [4], 4.5A.2B, takes place performing establishment of UE-requested PDN connection(s) with ExpectedNumberOfNewPDNConnections = pc\_noOf\_PDNsSameConnection.  NOTE: The pc\_noOf\_PDNsSameConnection covers the "normal" PDNs the UE will establish when it attaches to EPC. This does not include the PDN connection for Emergency services - this is handled separately and in parallel in Table 11.4.10a.3.2-2. | - | - | - | - |
| 10Ab2a1-10Ab2a8 | Void | - | - | - | - |
| 11 | Wait 3 sec. | - | - | - | - |
| 12 | The SS transmits a DEACTIVATE EPS BEARER CONTEXT REQUEST including the EPS bearer identity of the default EPS bearer of the Emergency PDN. | <-- | DEACTIVATE EPS BEARER CONTEXT REQUEST | - | - |
| 13 | The UE transmit a DEACTIVATE EPS BEARER CONTEXT ACCEPT. | --> | DEACTIVATE EPS BEARER CONTEXT ACCEPT | - | - |
| 14 | SS releases the RRC connection. | <-- | RRC: *RRCConnectionRelease* | - | - |
| NOTE 1: This could be done by e.g. MMI or AT command. | | | | | |

Table 11.4.10a.3.2-2: Parallel behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Check: Does the UE transmit a PDN CONNECTIVITY REQUEST message to request an additional PDN, with 'Request type' set to 'handover of emergency bearer services'? | --> | PDN CONNECTIVITY REQUEST | 1 | P |
| 2-4 | Steps 10-12 from the Generic Test Procedure for IMS Emergency call establishment in EUTRA: Normal Service as specified in TS 36.508 [7], Table 4.5A.4.3-1 take place with the exception that the parallel to Table 4.5A.4.3-1 step 11 behaviour does not take place.  The default bearer for the Emergency connection is established. | - | - | - | - |
| - | EXCEPTION: Step 5a1 describes a step sequence depending on UE implementation. | - | - | - | - |
| 5a1 | IMS re-registration on E-UTRAN as specified in TS 34.229-1 [35] subclause C.46, takes place. | - | - | - | - |

11.4.10a.3.3 Specific message contents

Table 11.4.10a.3.3-1: REGISTRATION ACCEPT (Preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 with condition EMERGENCY | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS network feature support | ‘0100 1101 0000 0000’B | IMS voice over PS session supported over 3GPP access,  Emergency services supported in NR connected to 5GCN and E-UTRA connected to 5GCN.  Interworking without N26 interface supported (octet 3, bit 7)  All other features set to "not supported". | Interworking without N26 interface supported |

Table 11.4.10a.3.3-2: PDN CONNECTIVITY REQUEST (step 1, Table 11.4.10a.3.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7.3-20. | | | |
| Information Element | Value/remark | Comment | Condition |
| Request type | '110''B | 'handover of emergency bearer services' |  |
| PDN type | The PDU session type of the emergency PDU session established prior to the N1 to S1 move | The PDU session established in step 2, Table 11.4.10a.3.2-1 |  |
| Access point name | sos |  |  |
| Protocol configuration options | Only the values indicated below are checked |  |  |
| protocol identifier |  |  |  |
| length of the protocol identifier contents of the unit |  |  |  |
| protocol identifier contents |  |  |  |
| Additional parameters list |  |  |  |
| container identifier | 001AH | (PDU session ID) |  |
| container identifier contents | The PDU session ID of the emergency PDU session established prior to the N1 to S1 move. |  |  |

Table 11.4.10a.3.3-3: ATTACH ACCEPT (step 10AK; step 14, TS 36.508 [7], Table 4.5.2.3-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 36.508 [7] Table 4.7.2-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| EPS network feature support | '0000 0011 0100 1000'B | - IMS voice over PS session in S1 mode supported  - emergency bearer services in S1 mode supported  - ePCO supported  - Interworking without N26 interface supported |  |

Table 11.4.10a.3.3-4: ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST (step 10AK; step 14, TS 36.508 [7], Table 4.5.2.3-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7] Table 4.7.3-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol configuration options |  |  |  |
| Container ID n+2 | Not present | Session-AMBR are not present |  |
| Container ID n+3 | Not present | QoS rules are not present |  |
| Container ID n+4 | Not present | Qos flow descriptions are not present |  |

### 11.4.11 5GMM-REGISTERED.NORMAL-SERVICE / N26 interface not supported / S1 mode to N1 mode transfer of an existing emergency PDN connection

11.4.11.1 Test Purpose (TP)

(1)

**with** { UE in EMM-REGISTERED and EMM-IDLE on an E-UTRA cell, **and**, the UE has an emergency PDN connection established }

**ensure that** {

**when** { UE performs a inter-system change from the S1 to N1 mode, to an NR Cell belonging to a NWK supporting Interworking without N26 interface }

**then** { UE correctly transfers the existing emergency PDN connection into an emergency PDU session }

}

11.4.11.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501 [22], subclause 6.1.4.2, TS 22.101 [42], subclause 10.1.1. Unless otherwise stated these are Rel-15 requirements.

[TS 24.501, subclause 6.1.4.2]

When the network does not support N26 interface, the SMF does not provide the UE with the mapped EPS bearer context for a PDU session.

NOTE 1: Since the SMF does not provide the UE with the mapped EPS bearer context for a PDU session, the UE does not know whether interworking with EPS is supported for a PDU session before attempting to transfer the PDU session from N1 mode to S1 mode.

NOTE 2: It is up to UE implementation to decide which PDU session(s) to be attempted to transfer from N1 mode to S1 mode, e.g. based on UE policy or UE local configuration.

...

Upon inter-system change from S1 mode to N1 mode in 5GMM-IDLE mode, the UE uses the parameters from the default EPS bearer context of each PDN connection which the UE intends to transfer to 5GS and for which the UE has allocated a PDU session identity to create a PDU SESSION ESTABLISHMENT REQUEST message as follows:

a) if the PDN connection is for emergency bearer services, the request type shall be set to "existing emergency PDU session". Otherwise the request type shall be set to "existing PDU session";

b) the PDN type of the default EPS bearer context shall be mapped to the PDU session type of the PDU session as follows:

...

2) if the PDN type is "IPv4" the PDU session type is set to "IPv4";

3) if the PDN type is "IPv6", the PDU session type is set to "IPv6"; and

4) the PDN type shall be set to "IPv4v6" if the PDU session type is "IPv4v6";

c) the APN of the default EPS bearer context shall be mapped to the DNN of the PDU session;

d) the PDU session ID shall be set to the PDU session identity included by the UE in the Protocol configuration options IE or Extended protocol configuration options IE in the PDN CONNECTIVITY REQUEST message, or to the PDU session ID associated with the default EPS bearer context; and

e) the S-NSSAI of the PDU session shall be set to the S-NSSAI included by the network in the Protocol configuration options IE or Extended protocol configuration options IE in the ACTIVATE DEFAULT EPS BEARER REQUEST message, if provided by the network, or the S-NSSAI associated with the default EPS bearer context, if available.

NOTE 5: If T3584 is running or deactivated for the S-NSSAI and optionally the DNN combination, the UE is allowed to initiate ESM procedures in EPS with or without APN corresponding to that DNN, and if the APN is congested in EPS, the MME can send a back-off timer for the APN to the UE as specified in 3GPP TS 24.301 [15].

The UE shall locally release the PDN connection(s) and EPS bearer(s) associated with the 3GPP access which have not been transferred to 5GS.

[TS 22.101, subclause 10.1.1]

The ME shall identify an emergency number dialled by the end user as a valid emergency number and initiate emergency call establishment if it occurs under one or more of the following conditions. If it occurs outside of the following conditions, the ME should not initiate emergency call establishment but normal call establishment. Emergency number identification takes place before and takes precedence over any other (e.g. supplementary service related) number analysis.

a) 112 and 911 shall always be available. These numbers shall be stored on the ME.

11.4.11.3 Test description

11.4.11.3.1 Pre-test conditions

System Simulator:

- 2 cells

- E-UTRA Cell 1 as defined in TS 36.508 [7] Table 4.4.2-2. System information combination 31 as defined in TS 36.508 [7], subclause 4.4.3.1.1.

- NR Cell 1 as defined in TS 38.508-1 [4] Table 4.4.2-3. System information combination NR-6 as defined in TS 38.508-1 [4], subclause 4.4.3.1.2.

UE:

None.

Preamble:

- With NR Cell 1 "Serving cell" and E-UTRA Cell 1 "Non-suitable "Off" cell", the UE is brought to state 1N-A, RRC\_IDLE Connectivity (NR), in accordance with the procedure described in TS 38.508-1 [4], subclause 4.5.2 (Table 4.5.2.2-2 and depending on UE implementation Table 4.5.2.2-4). 5G-GUTI and ngKSI are assigned and security context established. During the registration the NWK indicates Interworking without N26 interface supported in accordance with the definition specified in TS 38.508-1 [4], subclause 4.5.1.

- the UE is switched-off

- With E-UTRA Cell 1 "Serving cell" and NR Cell 1 "Non-suitable "Off" cell", the UE is brought to state RRC\_IDLE Connectivity (*E-UTRA/EPC*) in accordance with the procedure described in TS 38.508-1 [4], Table 4.5.2.2-1. 4G GUTI and eKSI are assigned and security context established

11.4.11.3.2 Test procedure sequence

Table 11.4.11.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Make the UE attempt an IMS emergency call dialling an emergency number. (NOTE 1) | - | - | - | - |
| - | The following messages are to be observed on E-UTRA Cell 1 unless explicitly stated otherwise. | - | - | - | - |
| 2-15 | Steps 2-15, from the Generic Test Procedure for IMS Emergency call establishment in EUTRA: Normal Service as specified in TS 36.508 [7], subclause 4.5A.4 take place. | - | - | - | - |
| 15A | Make the UE release the IMS emergency call. (NOTE 1) | - | - | - | - |
| 15B | The Generic test procedure for MO release of IMS call - EPS as defined in TS 34.229-1 [35], subclause C.32, takes place. | - | - | - | - |
| 15C | The Generic Test Procedure for EPS Bearer Deactivation TS 36.508 [7], subclause 4.5A.15, take place.  The SS deactivates the dedicated for IMS voice EPS bearer context of the Emergency PDN connection. The default bearer is kept i.e. the Emergency session is not released. | - | - | - | - |
| 16 | SS releases the RRC connection on E-UTRA. | <-- | RRC: RRCConnectionRelease | - | - |
| 17 | The SS configures:  - NR Cell 1 as "Serving cell"  - E-UTRA Cell 1 as "Non-suitable "off" cell". | - | - | - | - |
| - | The following messages are to be observed on NR Cell 1 unless explicitly stated otherwise. | - | - | - | - |
| 18-28 | Steps 1-11 from the test procedure for UE for Tracking area updating / Inter-system change from S1 mode to N1 mode in 5GMM/EMM-IDLE mode as specified in TS 38.508-1 [4], Table 4.9.9, take place. | - | - | - | - |
| - | EXCEPTION: In parallel to step 29a1 below the steps described in table 11.4.11.3.2-2 take place. | - | - | - | - |
| 29a1 | Step 14a1 from the test procedure for UE for Tracking area updating / Inter-system change from S1 mode to N1 mode in 5GMM/EMM-IDLE mode as specified in TS 38.508-1 [4], Table 4.9.9.2.2-1, takes place performing establishment of UE-requested PDU session(s) with ExpectedNumberOfNewPDUSessions = pc\_noOf\_PDUsSameConnection  NOTE: The pc\_noOf\_PDUsSameConnection covers the "normal" PDUs the UE will establish when it attaches to 5GC. This does not include the PDU connection for Emergency services - this is handled separately and in parallel in Table 11.4.11.3.2-2. | - | - | - | - |
| 29a2a1-29b3a9 | Void | - | - | - | - |
| 30 | Wait 3 sec. | - | - | - | - |
| 31 | The SS transmits a *RRCReconfiguration* message and a PDU SESSION RELEASE COMMAND message to release the Emergency session. | <-- | NR RRC: RRCReconfiguration  5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION RELEASE COMMAND | - | - |
| - | EXCEPTION: Depending upon UE implementation, step 32 and 33 can occur in any order. | - | - | - | - |
| 32 | The UE transmits a RRCReconfigurationComplete | - | NR RRC: RRCReconfigurationComplete | - | - |
| 33 | Does the UE transmit a PDU SESSION RELEASE COMPLETE message? | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION RELEASE COMPLETE | - | - |
| 34 | SS releases the RRC connection. | <-- | NR RRC: RRCRelease | - | - |
| NOTE 1: This could be done by e.g. MMI or AT command. | | | | | |

Table 11.4.11.3.2-2: Parallel behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Check: Does the UE transmit an UL NAS TRANSPORT message with 'Request type' set to "existing emergency PDU session", and, a PDU SESSION ESTABLISHMENT REQUEST? | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 1 | P |
| 2 | The SS transmits an *RRCReconfiguration* message and an PDU SESSION ESTABLISHMENT ACCEPT. | <-- | NR RRC: RRCReconfiguration  5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |
| 2A | The UE transmits an *RRCReconfigurationComplete* message. | --> | NR RRC: *RRCReconfigurationComplete* | - | - |
| - | EXCEPTION: Step 2Ba1 describes behaviour depending on UE implementation; the "lower case letter" identifies step sequence that take place if the UE performs a specific action. | - | - | - | - |
| 2Ba1 | If initiated by the UE, the generic procedure for IP address allocation in the user plane, specified in clause 4.5A.3 of TS 38.508-1 [4], takes place performing IP address allocation in the user plane. | - | - | - | - |
| - | EXCEPTION: Step 3a1 describes a step sequence depending on UE implementation. | - | - | - | - |
| 3a1 | IMS re-registration on NR as specified in TS 34.229-5 [41], annex A.12, takes place. | - | - | - | - |

11.4.11.3.3 Specific message contents

Table 11.4.11.3.3-1: REGISTRATION ACCEPT (Preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS network feature support | ‘0**1**00 1101 0000 0000’B | IMS voice over PS session supported over 3GPP access,  Emergency services supported in NR connected to 5GCN and E-UTRA connected to 5GCN.  Interworking without N26 interface supported (octet 3, bit 7)  All other features set to "not supported". | Interworking without N26 interface supported |

Table 11.4.11.3.3-2: PDU SESSION ESTABLISHMENT REQUEST (step 1, Table 11.4.11.3.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.2-1. | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | Shall be set to the PDU session identity included by the UE in the Protocol configuration options IE or Extended protocol configuration options IE in the PDN CONNECTIVITY REQUEST message, or to the PDU session ID associated with the default EPS bearer context |  |  |
| PTI | A value currently not used |  |  |
| SSC mode | '001'B | SSC mode 1 |  |

Table 11.4.11.3.3-3:UL NAS TRANSPORT (step 1, Table 11.4.11.3.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-10 with condition INITIAL\_PDU\_REQUEST. | | | |
| Information Element | Value/remark | Comment | Condition |
| Request type | '100'B | existing emergency PDU session |  |
| S-NSSAI | Not Present |  |  |
| DNN | Not Present |  |  |

Table 11.4.11.3.3-4: ATTACH ACCEPT (preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 36.508 [7] Table 4.7.2-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| EPS network feature support | '0000 0011 0100 1000'B | - IMS voice over PS session in S1 mode supported  - emergency bearer services in S1 mode supported  - ePCO supported  - Interworking without N26 interface supported |  |

Table 11.4.11.3.3-5: ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST (step 10; TS 36.508 [7], Table 4.5.2.3-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7] Table 4.7.3-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| Protocol configuration options |  |  |  |
| Container ID n+2 | Not present | Session-AMBR are not present |  |
| Container ID n+3 | Not present | QoS rules are not present |  |
| Container ID n+4 | Not present | Qos flow descriptions are not present |  |
| Container ID n+5 | Not present | S-NSSAI are not present |  |

Table 11.4.11.3.3-6: REGISTRATION REQUEST (step 20; TS 38.508-1 [4], Table 4.9.9.2.3-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session status | Not present or any allowed value |  |  |

### 11.4.12 5GMM-REGISTERED.NORMAL-SERVICE / 5GMM-IDLE / Emergency call / Disabling N1 mode / Emergency call establishment over EPS / Success

Editor’s Note: This test may fail a conformant UE after test completion due to UE specific implementation of handling N1 enablement signalling

11.4.12.1 Test Purpose (TP)

(1)

***with*** { UE supporting both S1 mode and N1 mode and operating in single-registration mode, and, the Network has indicated "interworking without N26 interface not supported", and, the Network has indicated "Emergency service Fallback not supported" regardless whether the UE supports emergency service fallback or not, and, the UE is in NR RRC\_IDLE state }

**ensure that** {

***when*** { User initiates an Emergency call and the UE completes Access control checking in 5GMM-IDLE mode }

***then*** { UE selects the E-UTRA cell, and, requests the establishment of an Emergency call by transmitting an *RRCConnectionRequest* message with *establishmentCause* set to 'emergency' }

}

(2)

***with*** { UE establishes RRC connection in E-UTRA }

**ensure that** {

***when*** { UE performs a TAU procedure caused by RAT change }

***then*** { UE transmits TRACKING AREA UPDATE REQUEST with N1 mode capability set to ‘N1 mode not supported’ }

}

11.4.12.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501 [22], clauses 4.9.2, 5.6.1.4; TS 24.301 [21], subclauses 4.4.2.3, 5.5.3.2.2 and TS 24.229 [44] clause U.2.2.6.4. Unless otherwise stated these are Rel-15 requirements.

NOTE: Conformance requirements in regard to establishing an emergency call in EPS are not provided. This can be found in IMS Emergency tests specified in TS 36.523-1 [13].

[TS 24.501, subclause 4.9.2]

The UE shall only disable the N1 mode capability for 3GPP access when in 5GMM-IDLE mode.

[TS 24.501, subclause 5.6.1.4]

For case h) in subclause 5.6.1.1, the UE shall treat the indication from the lower layers when the UE has changed to S1 mode or E-UTRA connected to 5GCN (see 3GPP TS 23.502 [9]) as successful completion of the procedure and stop timer T3517.

[TS 24.301, subclause 4.4.2.3]

Secure exchange of NAS messages via a NAS signalling connection is usually established by the MME during the attach procedure by initiating a security mode control procedure. After successful completion of the security mode control procedure, all NAS messages exchanged between the UE and the MME are sent integrity protected using the current EPS security algorithms, and except for the messages specified in subclause 4.4.5, all NAS messages exchanged between the UE and the MME are sent ciphered using the current EPS security algorithms.

...

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

1) if the tracking area updating procedure is initiated as specified in 3GPP TS 24.501 [54], the UE shall transmit a TRACKING AREA UPDATE REQUEST message integrity protected with the current 5G NAS security context and the UE shall derive a mapped EPS security context (see subclause 8.6.1 of 3GPP TS 33.501 [56]). The UE shall include the eKSI indicating the 5G NAS security context value in the TRACKING AREA UPDATE REQUEST message.

After receiving the TRACKING AREA UPDATE REQUEST message including the eKSI, the MME forwards the TRACKING AREA UPDATE REQUEST message to the source AMF, if possible, to obtain the mapped EPS security context from the AMF as specified in 3GPP TS 33.501 [56]. The MME re-establishes the secure exchange of NAS messages by either:

- replying with a TRACKING AREA UPDATE ACCEPT message that is integrity protected and ciphered using the mapped EPS NAS security context. From this time onward, all NAS messages exchanged between the UE and the MME are sent integrity protected and except for the messages specified in subclause 4.4.5, all NAS messages exchanged between the UE and the MME are sent ciphered; or

[TS 24.301, subclause 5.5.3.2.2]

The UE in state EMM-REGISTERED shall initiate the tracking area updating procedure by sending a TRACKING AREA UPDATE REQUEST message to the MME,

...

z) when the UE performs inter-system change from N1 mode to S1 mode in EMM-IDLE mode, the UE operates in single-registration mode, and conditions specified in 3GPP TS 24.501 [54] apply;

...

zd) when the UE performs inter-system change from N1 mode to S1 mode in EMM-CONNECTED mode.

For all cases except case b, the UE shall set the EPS update type IE in the TRACKING AREA UPDATE REQUEST message to "TA updating". For case b, the UE shall set the EPS update type IE to "periodic updating".

...

When initiating a tracking area updating procedure while in S1 mode, the UE shall use the current EPS NAS integrity key to integrity protect the TRACKING AREA UPDATE REQUEST message, unless the UE is performing inter-system change from N1 mode to S1 mode.

...

If a UE has established PDN connection(s) and uplink user data pending to be sent via user plane when it initiates the tracking area updating procedure, or uplink signalling not related to the tracking area updating procedure when the UE does not support control plane CIoT EPS optimization, it may also set an "active" flag in the TRACKING AREA UPDATE REQUEST message to indicate the request to establish the user plane to the network and to keep the NAS signalling connection after the completion of the tracking area updating procedure.

...

If the UE has a current EPS security context, the UE shall include the eKSI (either KSIASME or KSISGSN) in the NAS Key Set Identifier IE in the TRACKING AREA UPDATE REQUEST message. Otherwise, the UE shall set the NAS Key Set Identifier IE to the value "no key is available". If the UE has a current EPS security context, the UE shall integrity protect the TRACKING AREA UPDATE REQUEST message with the current EPS security context. Otherwise the UE shall not integrity protect the TRACKING AREA UPDATE REQUEST message.

...

For the case z and zd, the TRACKING AREA UPDATE REQUEST message shall be integrity protected using the 5GS security context available in the UE. The UE shall include a GUTI, mapped from 5G-GUTI (see 3GPP TS 23.501 [54] and 3GPP TS 23.003 [2]), in the Old GUTI IE in the TRACKING AREA UPDATE REQUEST message. In addition, the UE shall include Old GUTI type IE with GUTI set to "Native GUTI", and the UE shall include a UE status IE with a 5GMM registration status set to "UE is in 5GMM-REGISTERED state".

When the tracking area updating procedure is initiated in EMM-IDLE mode, the UE may also include an EPS bearer context status IE in the TRACKING AREA UPDATE REQUEST message, indicating which EPS bearer contexts are active in the UE. The UE shall include the EPS bearer context status IE in TRACKING AREA UPDATE REQUEST message:

- ...

- for the case z; and

...

If the UE initiates the first tracking area updating procedure following an initial registration in N1 mode and the UE is operating in the single-registration mode, the UE shall include a UE radio capability information update needed IE in the TRACKING AREA UPDATE REQUEST message.

...

If the UE supports NB-S1 mode, Non-IP PDN type, or N1 mode, then the UE shall support the extended protocol configuration options IE.

For all cases except case b, if the UE supports the extended protocol configuration options IE, then the UE shall set the ePCO bit to "extended protocol configuration options supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message.

...

For all cases except case b, if the UE supports dual connectivity with NR, then the UE shall set the DCNR bit to "dual connectivity with NR supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message and shall include the UE additional security capability IE in the TRACKING AREA UPDATE REQUEST message.

...

For all cases except case b, if the UE supports N1 mode, the UE shall set the N1mode bit to "N1 mode supported" in the UE network capability IE of the TRACKING AREA UPDATE REQUEST message and shall include the UE additional security capability IE in the TRACKING AREA UPDATE REQUEST message.

[TS 24.229, subclause U.2.2.6.4]

NOTE: This subclause covers only the case where the UE selects the IM CN subsystem in accordance with the conventions and rules specified in 3GPP TS 23.167 [4B] and describes the IP-CAN specific procedure. It does not preclude the use of CS domain. When a CS system based on 3GPP TS 24.008 [8] is to be used, clause B.5 applies.

When the UE operates in single-registration mode as described in 3GPP TS 24.501 [258] and the UE recognises that a call request is an emergency call, if:

1) the IM CN subsystem is selected in accordance with the conventions and rules specified in 3GPP TS 23.167 [4B]; and

2) the UE is currently registered to the 5GS services while the UE is in an NR cell connected to 5GCN;

then the following treatment is applied:

1) if the EMC indicates "Emergency services not supported":

…

b) if the UE supports emergency services fallback as specified in 3GPP TS 23.501 [257] and the emergency services fallback is not available (i.e., "ESFB is N" as described in 3GPP TS 23.167 [4B]) and if:

…

ii) the EMF is set to "Emergency services fallback not supported" or the UE is not capable of accessing 5GCN via E-UTRA, the UE shall disable the N1 mode capability for 3GPP access as specified in 3GPP TS 24.501 [257] and attempt to select an E-UTRA cell connected to EPC. If the UE finds a suitable E-UTRA cell connected to EPC and the network provides the UE with the EMC BS set to "emergency bearer services in S1 mode supported" as described in 3GPP TS 24.301 [8J], the UE shall perform the procedures as described in subclause L.2.2.6 to establish a PDN connection for emergency bearer services; and

c) if the UE does not support emergency services fallback as specified in 3GPP TS 23.501 [257], the UE shall disable the N1 mode capability for 3GPP access as specified in 3GPP TS 24.501 [257] and attempt to select an E-UTRA cell connected to EPC. If the UE finds a suitable E-UTRA cell connected to EPC and the network provides the UE with the EMC BS set to "emergency bearer services in S1 mode supported" as described in 3GPP TS 24.301 [8J], the UE shall perform the procedures as described in subclause L.2.2.6 to establish a PDN connection for emergency bearer services;

11.4.12.3 Test description

11.4.12.3.1 Pre-test conditions

System Simulator:

- 2 cells

- NR Cell 1 as defined in TS 38.508-1 [4] Table 4.4.2-3. System information combination NR-6 as defined in TS 38.508-1 [4], subclause 4.4.3.1.2.

- E-UTRA Cell 1 as defined in TS 36.508 [7] Table 4.4.2-2. System information combination 31 as defined in TS 36.508 [7], subclause 4.4.3.1.1.

- Power levels are constant and as defined in Tables 11.4.12.3.1-1/2.

Table 11.4.12.3.1-1: Time instances of cell power level and parameter changes for FR1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter name | Unit | NR Cell 1 | E-UTRA Cell 1 | Remark |
| T0 | SS/PBCH SSS EPRE | dBm/SCS | -88 | - |  |
| RS EPRE | dBm/15kHz | - | -91 |
| T1 | SS/PBCH SSS EPRE | dBm/SCS | Off | - |  |
|  | RS EPRE | dBm/15kHz | - | -91 |  |

Table 11.4.12.3.1-2: Time instances of cell power level and parameter changes for FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter name | Unit | NR Cell 1 | E-UTRA Cell 1 | Remark |
| T0 | SS/PBCH SSS EPRE | dBm/SCS | -82 | - |  |
| RS EPRE | dBm/15kHz | - | -91 |
| T1 | SS/PBCH SSS EPRE | dBm/SCS | Off | - |  |
|  | RS EPRE | dBm/15kHz | - | -91 |  |

UE:

None.

Preamble:

- With E-UTRA Cell 1 "Serving cell" and NR Cell 1 "Non-suitable "Off" cell" in accordance with TS 38.508-1 [4], Table 6.2.2.1-3, the UE is brought to state RRC\_IDLE using generic procedure parameters Connectivity (*E-UTRA/EPC*) and Unrestricted nr PDN (*On*) in accordance with the procedure described in TS 38.508-1 [4], clause 4.5.2. 4G GUTI and eKSI are assigned and security context established.

- the UE is switched-off.

- With E-UTRA Cell 1 "Non-suitable "Off" cell" and NR Cell 1 "Serving cell" in accordance with TS 38.508-1 [4], Table 6.2.2.1-3, the UE is brought to state 1N-A, NR RRC\_IDLE Connectivity (NR) in accordance with the procedure described in TS 38.508-1 [4], Table 4.5.2.2-2. 5G-GUTI and ngKSI are assigned and security context established.

11.4.12.3.2 Test procedure sequence

Table 11.4.12.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 0 | Set the power levels according to “T0” as per Table 11.4.12.3.1-1/2. | - | - | - | - |
| 1 | Make the UE initiate an Emergency call. | - | - | - | - |
| 2 | Check: Does the UE transmit an *RRCConnectionRequest* message with 'establishmentCause' set to 'emergency' on E-UTRA cell 1? | --> | RRC: RRCConnectionRequest | 1 | P |
| 3 | SS transmits an *RRCConnectionSetup* message. | <-- | RRC: RRCConnectionSetup | - | - |
| 4 | Check: Does the UE transmit an *RRCConnectionSetupComplete* message to confirm the successful completion of the connection establishment and a TRACKING AREA UPDATE REQUEST message is sent to update the registration of the actual tracking area.  For some consequences related to the content of the TRACKING AREA UPDATE REQUEST message see the Notes in TS.36.508 [7], Table 4.5A.2.1-1. | --> | RRC: *RRCConnectionSetupComplete* NAS: TRACKING AREA UPDATE REQUEST | 2 | P |
| 5-8 | Steps 5-8 from the Generic Procedure for IMS Emergency call establishment in EUTRA: Normal Service as specified in TS 36.508 [7], Table 4.5A.4.3-1 are performed. | - | - | - | - |
| 9 | SS responds with TRACKING AREA UPDATE ACCEPT message. | <-- | RRC: DLInformationTransfer  NAS: TRACKING AREA UPDATE ACCEPT | - | - |
| 10 | The UE transmits a TRACKING AREA UPDATE COMPLETE message. | --> | RRC: ULInformationTransfer  NAS: TRACKING AREA UPDATE COMPLETE | - | - |
| 11-17 | Steps 9-15 from the Generic Procedure for IMS Emergency call establishment in EUTRA: Normal Service as specified in TS 36.508 [7], Table 4.5A.4.3-1 are performed. | - | - | - | - |
| 18 | The SS waits 1 second. | - | - | - | - |
| 18A | Set the power levels according to “T1” as per Table 11.4.12.3.1-1/2. | - | - | - | - |
| 19 | Release IMS Call as specified in the generic procedure in TS 34.229-1 [35] subclause C.32. | - | - | - | - |
| 20 | The SS releases the RRC connection. | <-- | E-UTRA RRC: RRCConnectionRelease | - | - |
| 21 | SS starts Timer T1=60s. | - | - | - | - |
| - | EXCEPTION: Steps 22a1 to 22b1 describe behaviour that depends on the UE implementation. |  |  |  |  |
| 22a1 | The UE transmits an RRCConnectionRequest. | --> | RRC: RRCConnectionRequest | - | - |
| 22a2 | Stop Timer T1 |  |  |  |  |
| 22a3-22a7 | Steps 2-6 of 36.508 Table 6.4.2.7-1 are executed. | - | - | - | - |
| 22b1 | Timer T1 expires. | - | - | - | - |

11.4.12.3.3 Specific message contents

Table 11.4.12.3.3-1: REGISTRATION REQUEST (Preamble; TS 38.508-1 [4], Table 4.5.2.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GMM capability |  |  |  |
| S1 mode (octet 3, bit 1) | '1'B | S1 mode supported |  |

Table 11.4.12.3.3-2: REGISTRATION ACCEPT (Preamble; TS 38.508-1 [4], Table 4.5.2.2-2)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS network feature support |  |  |  |
| Emergency service support indicator for 3GPP access (EMC) (octet 3, bit 3 and bit 4) | '00'B | Emergency services not supported |  |
| Emergency service fallback indicator for 3GPP access (EMF) (octet 3, bit 5 and bit 6) | '00'B | Emergency services fallback not supported |  |

Table 11.4.12.3.3-3: RRCConnectionRequest (step 2, Table 11.4.12.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.6.1-16 | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCConnectionRequest ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcConnectionRequest-r8 SEQUENCE { |  |  |  |
| establishmentCause | emergency |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.4.12.3.3-4: TRACKING AREA UPDATE REQUEST (step 4, Table 11.4.12.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7.2-27 with condition NR | | | |
| Information Element | Value/remark | Comment | Condition |
| UE network capability |  |  |  |
| All octets with the exception of octet 9, bit 6 | Any allowed value |  |  |
| N1 mode supported (N1mode) (octet 9, bit 6) | '0'B | N1 mode  not supported |  |
| UE additional security capability | Any allowed value |  | ENDC supported |
|  | Not present |  | ENDC not supported |

Table 11.4.12.3.3-5: PDN CONNECTIVITY REQUEST (step 11, Table 11.4.12.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7.3.20 with condition NOT(Interworking\_with\_5GS). | | | |
| Information Element | Value/Remark | Comment | Condition |
| Request type | '0100'B | emergency |  |
| Access point name | Not present |  |  |

Table 11.4.12.3.3-6: ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST (step 12, Table 11.4.12.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 36.508 [7], Table 4.7.3-6 and table 4.6.1-8 with condition UM-DRB-ADD(2). | | | |
| Information Element | Value/Remark | Comment | Condition |
| EPS bearer identity | an additional EPS Bearer Id different from default EPS Bearer Id or/and any mapped EPS bearer |  |  |
| Access point name | sos | APN value as recommended by IR.88 clause 6.4 [39] |  |

### 11.4.13 5GMM-REGISTERED.NORMAL-SERVICE / 5GMM-IDLE / Emergency call / obtaining new IP address different than the IP address

11.4.13.1 Test Purpose (TP)

(1)

**with** { UE in 5GMM-REGISTERED.NORMAL-SERVICE state and 5GMM-IDLE mode }

**ensure that** {

**when** { UE is requested to make an outgoing emergency call }

**then** { UE performs IMS emergency registration and sets up an IMS emergency call }

}

(2)

**with** { UE in 5GMM-REGISTERED.NORMAL-SERVICE state and 5GMM-CONNECTED mode having established an Emergency call }

**ensure that** {

**when** { UE receives an IMS BYE message to release an emergency call }

**then** { UE releases the emergency call}

}

(3)

**with** { UE has ended an Emergency call and IMS emergency registration not having expired }

**ensure** **that** {

**when** { UE obtains new P-CSCF address(es) from the network }

**then** { UE performs a new initial IMS emergency registration }

}

11.4.13.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.229 [44], clause 5.1.1.2.1, 5.1.1.5.1, 5.1.6.2A, 5.1.6.8.3. Unless otherwise stated these are Rel-15 requirements.

[TS 24.229 clause 5.1.6.2A]:

The UE shall perform a new initial emergency registration, as specified in subclause 5.1.6.2, if the UE determines that:

- it has previously performed an emergency registration which has not yet expired; and

- it has obtained an IP address from the serving IP-CAN, as specified in subclause 9.2.1, different than the IP address used for the emergency registration.

[TS 24.229 clause 5.1.1.2.1]:

On sending an unprotected REGISTER request, the UE shall populate the header fields as follows:

a) a From header field set to the SIP URI that contains:

1) if the UE supports RFC 6140 [191] and performs the functions of an external attached network, the main URI of the UE; else

2) the public user identity to be registered;

b) a To header field set to the SIP URI that contains:

1) if the UE supports RFC 6140 [191] and performs the functions of an external attached network, the main URI of the UE; else

2) the public user identity to be registered;

c) a Contact header field set to include SIP URI(s) containing the IP address or FQDN of the UE in the hostport parameter. If the UE:

1) supports GRUU (see table A.4, item A.4/53);

2) supports multiple registrations;

3) has an IMEI available; or

4) has an MEID available;

the UE shall include a "+sip.instance" header field parameter containing the instance ID. Only the IMEI shall be used for generating an instance ID for a multi-mode UE that supports both 3GPP and 3GPP2 defined radio access networks.

NOTE 2: The requirement placed on the UE to include an instance ID based on the IMEI or the MEID when the UE does not support GRUU and does not support multiple registrations does not imply any additional requirements on the network.

If the UE supports multiple registrations it shall include a "reg-id" header field parameter as described in RFC 5626 [92].

The UE shall include all supported ICSI values (coded as specified in subclause 7.2A.8.2) in a g.3gpp.icsi-ref media feature tag as defined in subclause 7.9.2 and RFC 3840 [62] for the IMS communication services it intends to use, and IARI values (coded as specified in subclause 7.2A.9.2), for the IMS applications it intends to use in a g.3gpp.iari-ref media feature tag as defined in subclause 7.9.3 and RFC 3840 [62].

The UE shall include the media feature tags as defined in RFC 3840 [62] for all supported streaming media types.

If the UE supports RFC 6140 [191] and performs the functions of an external attached network, for the registration of bulk number contacts the UE shall include a Contact URI without a user portion and containing the "bnc" URI parameter.

If the UE has no specific reason not to include a user part in the URI of the contact address (e.g. some UE performing the functions of an external attached network), the UE should include a user part in the URI of the contact address such that the user part is globally unique and does not reveal any private information;

NOTE 3: A time-based UUID (Universal Unique Identifier) generated as per subclause 4.2 of RFC 4122 [154] is globally unique and does not reveal any private information.

d) a Via header field set to include the sent-by field containing the IP address or FQDN of the UE and the port number where the UE expects to receive the response to this request when UDP is used. For TCP, the response is received on the TCP connection on which the request was sent. For the UDP, the UE shall also include a "rport" header field parameter with no value in the Via header field. Unless the UE has been configured to not send keep-alives, and unless the UE is directly connected to an IP-CAN for which usage of NAT is not defined, it shall include a "keep" header field parameter with no value in the Via header field, in order to indicate support of sending keep-alives associated with the registration, as described in RFC 6223 [143];

NOTE 4: When sending the unprotected REGISTER request using UDP, the UE transmit the request from the same IP address and port on which it expects to receive the response to this request.

e) a registration expiration interval value of 600 000 seconds as the value desired for the duration of the registration;

NOTE 5: The registrar (S-CSCF) might decrease the duration of the registration in accordance with network policy. Registration attempts with a registration period of less than a predefined minimum value defined in the registrar will be rejected with a 423 (Interval Too Brief) response.

f) a Request-URI set to the SIP URI of the domain name of the home network used to address the REGISTER request;

g) the Supported header field containing the option-tag "path", and

1) if GRUU is supported, the option-tag "gruu"; and

2) if multiple registrations is supported, the option-tag "outbound".

h) if a security association or TLS session exists, and if available to the UE (as defined in the access technology specific annexes for each access technology), a P-Access-Network-Info header field set as specified for the access network technology (see subclause 7.2A.4);

i) a Security-Client header field to announce the media plane security mechanisms the UE supports, if any, labelled with the "mediasec" header field parameter specified in subclause 7.2A.7;

NOTE 6: The "mediasec" header field parameter indicates that security mechanisms are specific to the media plane.

j) if the UE supports RFC 6140 [191] and performs the functions of an external attached network, for the registration of bulk number contacts the UE shall include a Require header field containing the option-tag "gin"; and

k) if the UE supports RFC 6140 [191] and performs the functions of an external attached network, for the registration of bulk number contacts the UE shall include a Proxy-Require header field containing the option-tag "gin".

On receiving a 401 (Unauthorized) response to the REGISTER request, the UE shall:

a) if available, store the announcement of media plane security mechanisms the P-CSCF (IMS-ALG) supports labelled with the "mediasec" header field parameter specified in subclause 7.2A.7 and received in the Security-Server header field, if any. Once the UE chooses a media security mechanism from the list received in the Security-Server header field from the server, the UE may initiate that mechanism on a media level when it initiates new media in an existing session.

NOTE 7: The "mediasec" header field parameter indicates that security mechanisms are specific to the media plane.

On receiving the 200 (OK) response to the REGISTER request, the UE shall:

a) store the expiration time of the registration for the public user identities found in the To header field value and bind it either to the respective contact address of the UE or to the registration flow and the associated contact address (if the multiple registration mechanism is used);

NOTE 8: If the UE supports RFC 6140 [191] and performs the functions of an external attached network, the To header field will contain the main URI of the UE.

b) store as the default public user identity the first URI on the list of URIs present in the P-Associated-URI header field and bind it to the respective contact address of the UE and the associated set of security associations or TLS session;

NOTE 9: When using the respective contact address and associated set of security associations or TLS session, the UE can utilize additional URIs contained in the P-Associated-URI header field and bound it to the respective contact address of the UE and the associated set of security associations or TLS session, e.g. for application purposes.

c) treat the identity under registration as a barred public user identity, if it is not included in the P-Associated-URI header field;

d) store the list of service route values contained in the Service-Route header field and bind the list either to the contact address or to the registration flow and the associated contact address (if the multiple registration mechanism is used), and the associated set of security associations or TLS session over which the REGISTER request was sent;

NOTE 10: When multiple registration mechanism is not used, there will be only one list of service route values bound to a contact address. However, when multiple registration mechanism is used, there will be different list of service route values bound to each registration flow and the associated contact address.

NOTE 11: The UE will use the stored list of service route values to build a proper preloaded Route header field for new dialogs and standalone transactions (other than REGISTER method) when using either the respective contact address or the registration flow and the associated contact address (if the multiple registration mechanism is used), and the associated set of security associations or TLS session.

e) if the UE indicated support for GRUU in the Supported header field of the REGISTER request then:

- if the UE did not use the procedures specified in RFC 6140 [191] for registration, find the Contact header field within the response that matches the one included in the REGISTER request. If this contains a "pub-gruu" header field parameter or a "temp-gruu" header field parameter or both, then store the value of those parameters as the GRUUs for the UE in association with the public user identity and the contact address that was registered; and

- if the UE used the procedures specified in RFC 6140 [191] for registration then find the Contact header field within the response that matches the one included in the REGISTER request. If this contains a "pub-gruu" header field parameter then store the value of the "pub-gruu" header field parameter for use for generating public GRUUs for registering UAs as specified in RFC 6140 [191]. If this contains a "temp-gruu-cookie" header field parameter then store the value of the "temp-gruu-cookie" header field parameter for use for generating temporary GRUUs for registering UAs as specified in RFC 6140 [191];

NOTE 12: When allocating public GRUUs to registering UAs the functionality within the UE that performs the role of registrar will add an "sg" SIP URI parameter that uniquely identifies that UA to the public GRUU it received in the "pub-gruu" header field parameter. The procedures for generating a temporary GRUU using the "temp-gruu-cookie" header field parameter are specified in subclause 7.1.2.2 of RFC 6140 [191].

f) if the REGISTER request contained the "reg-id" and "+sip.instance" Contact header field parameter and the "outbound" option tag in a Supported header field, the UE shall check whether the option-tag "outbound" is present in the Require header field:

- if no option-tag "outbound" is present, the UE shall conclude that the S-CSCF does not support the registration procedure as described in RFC 5626 [92], and the S-CSCF has followed the registration procedure as described in RFC 5627 [93] or RFC 3261 [26], i.e., if there is a previously registered contact address, the S-CSCF replaced the old contact address and associated information with the new contact address and associated information (see bullet e) above). Upon detecting that the S-CSCF does not support the registration procedure as defined in RFC 5626 [92], the UE shall refrain from registering any additional IMS flows for the same private identity as described in RFC 5626 [92]; or

NOTE 13: Upon replaces the old contact address with the new contact address, the S-CSCF performs the network initiated deregistration procedure for the previously registered public user identities and the associated old contact address as described in subclause 5.4.1.5. Hence, the UE will receive a NOTIFY request informing the UE about the deregistration of the old contact address.

- if an option-tag "outbound" is present, the UE may establish additional IMS flows for the same private identity, as defined in RFC 5626 [92];

g) if available, store the announcement of media plane security mechanisms the P-CSCF (IMS-ALG) supports labelled with the "mediasec" header field parameter specified in subclause 7.2A.7 and received in the Security-Server header field, if any. Once the UE chooses a media security mechanism from the list received in the Security-Server header field from the server, it may initiate that mechanism on a media level when it initiates new media in an existing session;

NOTE 14: The "mediasec" header field parameter indicates that security mechanisms are specific to the media plane.

h) if the Via header field contains a "keep" header field parameter with a value, unless the UE detects that it is not behind a NAT, start to send keep-alives associated with the registration towards the P-CSCF, as described in RFC 6223 [143];

i) if a Feature-Caps header field, as specified in RFC 6809 [190], is received, a UE supporting the Feature-Caps header field shall consider the ICSI values received in the Feature-Caps header field of 200 (OK) response as supported by the IM subsystem for the established registration or registration flow (if the multiple registration mechanism is used);

NOTE 15: The UE and related applications can use the ICSI values received in the Feature-Caps header field of 200 (OK) response to improve the user experience.

j) void; and

k) if the 200 (OK) response includes a Feature-Caps header field, as specified in RFC 6809 [190], with a "+g.3gpp.verstat" header field parameter and if the UE supports calling number verification status determination, determine that the home network supports calling number verification using signature verification and attestation information, as defined in subclause 3.1.

[TS 24.229 clause 5.1.6.8.3]:

After a successful initial emergency registration, the UE shall apply the procedures as specified in subclause 5.1.2A and 5.1.3 with the following additions:

1) the UE shall insert in the INVITE request, a From header field that includes the public user identity registered via emergency registration or the tel URI associated with the public user identity registered via emergency registration, as described in subclause 4.2;

2) the UE shall include a service URN in the Request-URI of the INVITE request in accordance with subclause 5.1.6.8.1;

3) the UE shall insert in the INVITE request, a To header field with the same emergency service URN as in the Request-URI;

4) if available to the UE, and if defined for the access type as specified in subclause 7.2A.4, the P-Access-Network-Info header field shall contain a location identifier such as the cell id, line id or the identity of the WLAN access node, which is relevant for routeing the IMS emergency call;

NOTE 1: The IMS emergency specification in 3GPP TS 23.167 [4B] describes several methods how the UE can get its location information from the access network or from a server. Such methods are not in the scope of this specification.

5) the UE shall insert in the INVITE request, one or two P-Preferred-Identity header field(s) that include the public user identity registered via emergency registration or the tel URI associated with the public user identity registered via emergency registration as described in subclause 4.2;

NOTE 2: Providing two P-Preferred-Identity header fields is usually supported by UE acting as enterprise network.

6) void;

7) if the UE has its location information available, or a URI that points to the location information, then the UE shall include a Geolocation header field in the INVITE request in the following way:

- if the UE is aware of the URI that points to where the UE's location is stored, include the URI as the Geolocation header field value, as described in RFC 6442 [89]; or

- if the UE is aware of its location information, include the location information in a PIDF location object, in accordance with RFC 4119 [90], include the location object in a message body with the content type application/pidf+xml, and include a Content ID URL, referring to the message body, as the Geolocation header field value, as described RFC 6442 [89], and include a Content-Disposition header field with a disposition type "render" value and a "handling" header field parameter with an "optional" value, as described in RFC 3261 [26];

8) if the UE includes a Geolocation header field, the UE shall also include a Geolocation-Routing header field with a "yes" header field value, which indicates that the location of the UE can be used by other entities to make routing decisions, as described in RFC 6442 [89];

NOTE 3: It is suggested that UE's only use the option of providing a URI when the domain part belongs to the current P-CSCF or S-CSCF provider. This is an issue on which the network operator needs to provide guidance to the end user. A URI that is only resolvable to the UE which is making the emergency call is not desirable.

9) if the UE has neither geographical location information available, nor a URI that points to the location information, the UE shall not insert a Geolocation header field in the INVITE request; and

10) if support of the current location discovery during an emergency call is allowed in the IP-CAN specific annex and the UE supports the current location discovery during an emergency call, the UE shall include a Recv-Info header field as described in RFC 6086 [25], indicating the g.3gpp.current-location-discovery info package name and shall include an Accept header field indicating the "application/vnd.3gpp.current-location-discovery+xml" MIME type.

NOTE 4: RFC 3261 [26] provides for the use of the Priority header field with a suggested value of "emergency". It is not precluded that emergency sessions contain this value, but such usage will have no impact on the processing within the IM CN subsystem.

[TS 24.229 clause 5.1.1.4.1]:

The UE can perform the reregistration of a previously registered public user identity via an initial registration as specified in subclause 5.1.1.2, when binding the previously registered public user identity to new contact address or to the registration flow and the associated contact address (if the multiple registration mechanism is used).

[TS 24.229 clause 5.1.1.2.2]

On sending a REGISTER request, as defined in subclause 5.1.1.2.1, the UE shall additionally populate the header fields as follows:

a) an Authorization header field, with:

- the "username" header field parameter, set to the value of the private user identity;

- the "realm" header field parameter, set to the domain name of the home network;

- the "uri" header field parameter, set to the SIP URI of the domain name of the home network;

- the "nonce" header field parameter, set to an empty value; and

- the "response" header field parameter, set to an empty value;

NOTE 1: If the UE specifies its FQDN in the hostport parameter in the Contact header field and in the sent-by field in the Via header field, then it has to ensure that the given FQDN will resolve (e.g., by reverse DNS lookup) to the IP address that is bound to the security association.

NOTE 2: The UE associates two ports, a protected client port and a protected server port, with each pair of security association. For details on the selection of the port values see 3GPP TS 33.203 [19].

b) additionally for the Contact header field, if the REGISTER request is protected by a security association, include the protected server port value in the hostport parameter;

c) additionally for the Via header field, for UDP, if the REGISTER request is protected by a security association, include the protected server port value in the sent-by field; and

d) a Security-Client header field set to specify the signalling plane security mechanism the UE supports, the IPsec layer algorithms the UE supports and the parameters needed for the security association setup. The UE shall support the setup of two pairs of security associations as defined in 3GPP TS 33.203 [19]. The syntax of the parameters needed for the security association setup is specified in annex H of 3GPP TS 33.203 [19]. The UE shall support the "ipsec-3gpp" security mechanism, as specified in RFC 3329 [48]. The UE shall support the IPsec layer algorithms for integrity and confidentiality protection as defined in 3GPP TS 33.203 [19], and shall announce support for them according to the procedures defined in RFC 3329 [48].

On receiving the 200 (OK) response to the REGISTER request defined in subclause 5.1.1.2.1, the UE shall additionally:

1) If the UE supports multiple registrations and the REGISTER request contained the "+sip.instance" header field parameter and the "reg-id" header field parameter in the Contact header field, and the "outbound" option-tag in the Supported header field, the UE shall check whether the option-tag "outbound" is present in the Require header field. If the option-tag "outbound" is present, then the UE shall use the bidirectional flow as defined in RFC 5626 [92] as follows:

a) for UDP, the bidirectional flow consists of two unidirectional flows, i.e. the first unidirectional flow is identified with the UE's protected client port, the P-CSCF's protected server port, and the respective IP addresses. The UE uses this flow to send the requests and responses to the P-CSCF. The second unidirectional flow is identified with the P-CSCF's protected client port, the UE's protected server port and the IP addresses. The second unidirectional flow is used by the UE to receive the requests and responses from the P-CSCF; or

b) for TCP, the bidirectional flow is the TCP connection between the UE and the P-CSCF. This TCP connection was established by the UE, i.e. from the UE's protected client port and the UE's IP address to the P-CSCF's protected server port and the P-CSCF's IP address. This TCP connection is used to exchange SIP messages between the UE and the P-CSCF; and

2) set the security association lifetime to the longest of either the previously existing security association lifetime (if available), or the lifetime of the just completed registration plus 30 seconds.

NOTE 3: If the UE receives Authentication-Info, it will proceed as described in RFC 3310 [49].

When a 401 (Unauthorized) response to a REGISTER is received the UE shall behave as described in subclause 5.1.1.5.1.

[TS 24.229 clause 5.1.1.5.1]:

On receiving a 401 (Unauthorized) response to the REGISTER request, the UE shall:

1) extract the RAND and AUTN parameters;

2) check the validity of a received authentication challenge, as described in 3GPP TS 33.203 [19] i.e. the locally calculated XMAC must match the MAC parameter derived from the AUTN part of the challenge; and the SQN parameter derived from the AUTN part of the challenge must be within the correct range; and

3) check the existence of the Security-Server header field as described in RFC 3329 [48]. If the Security-Server header field is not present or it does not contain the parameters required for the setup of the set of security associations (see annex H of 3GPP TS 33.203 [19]), the UE shall abandon the authentication procedure and send a new REGISTER request with a new Call-ID.

In the case that the 401 (Unauthorized) response to the REGISTER request is deemed to be valid the UE shall:

1) calculate the RES parameter and derive the keys CK and IK from RAND as described in 3GPP TS 33.203 [19];

2) set up a temporary set of security associations for this registration based on the static list and parameters the UE received in the 401 (Unauthorized) response and its capabilities sent in the Security-Client header field in the REGISTER request. The UE sets up the temporary set of security associations using the most preferred mechanism and algorithm returned by the P-CSCF and supported by the UE and using IK and CK (only if encryption enabled) as the shared key. The UE shall use the parameters received in the Security-Server header field to setup the temporary set of security associations. The UE shall set a temporary SIP level lifetime for the temporary set of security associations to the value of reg-await-auth timer;

3) store the announcement of the media plane security mechanisms the P-CSCF (IMS-ALG) supports received in the Security-Server header field and labelled with the "mediasec" header field parameter specified in subclause 7.2A.7, if any; and

NOTE 1: The "mediasec" header field parameter indicates that security mechanisms are specific to the media plane.

4) send another REGISTER request towards the protected server port indicated in the response using the temporary set of security associations to protect the message. The header fields are populated as defined for the initial REGISTER request that was challenged with the received 401 (Unauthorized) response, with the addition that the UE shall include an Authorization header field containing:

- the "realm" header field parameter set to the value as received in the "realm" WWW-Authenticate header field parameter;

- the "username" header field parameter, set to the value of the private user identity;

- the "response" header field parameter that contains the RES parameter, as described in RFC 3310 [49];

- the "uri" header field parameter, set to the SIP URI of the domain name of the home network;

- the "algorithm" header field parameter, set to the value received in the 401 (Unauthorized) response; and

- the "nonce" header field parameter, set to the value received in the 401 (Unauthorized) response.

The UE shall also insert the Security-Client header field that is identical to the Security-Client header field that was included in the previous REGISTER request (i.e. the REGISTER request that was challenged with the received 401 (Unauthorized) response). The UE shall also insert the Security-Verify header field into the request, by mirroring in it the content of the Security-Server header field received in the 401 (Unauthorized) response. The UE shall set the Call-ID of the security association protected REGISTER request which carries the authentication challenge response to the same value as the Call-ID of the 401 (Unauthorized) response which carried the challenge.

NOTE 2: The Security-Client header field contains signalling plane security mechanism and if the UE supports media plane security, then media plane security mechanisms are contained, too.

On receiving the 200 (OK) response for the security association protected REGISTER request registering a public user identity with the associated contact address, the UE shall:

- change the temporary set of security associations to a newly established set of security associations, i.e. set its SIP level lifetime to the longest of either the previously existing set of security associations SIP level lifetime, or the lifetime of the just completed registration plus 30 seconds; and

- if this is the only set of security associations available toward the P-CSCF, use the newly established set of security associations for furthermessages sent towards the P-CSCF. If there are additional sets of security associations (e.g. due to registration of multiple contact addresses), the UE can either use them or use the newly established set of security associations for furthermessages sent towards the P-CSCF as appropriate.

11.4.13.3 Test description

11.4.13.3.1 Pre-test conditions

System Simulator:

- 1 NR Cell

- NR Cell 1 as defined in TS 38.508-1 [4] Table 4.4.2-3. System information combination NR-1 as defined in TS 38.508-1 [4], subclause 4.4.3.1.2. SIB1 indicates *ims-EmergencySupport*.

UE:

- None

Preamble:

- Cells power level configuration in accordance with TS 38.508-1 [4], Table 6.2.2.1-3:

- NR Cell 1 "Serving cell"

- The UE is in test state 1N-A with IMS registered as defined in TS 38.508-1 [4], subclause 4.4A.2 on NR Cell 1.

11.4.13.3.2 Test procedure sequence

Table 11.4.13.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| - | The following messages are to be observed on NR Cell 1 unless explicitly stated otherwise. | - | - | - | - |
| 1 | Make the UE attempt an IMS emergency call. | - | - | - | - |
| 2 | Check: Does the UE perform Test Procedure for IMS Emergency call establishment with IMS emergency registration as specified in TS 38.508-1 [4], subclause 4.9.11? | - | - | 1 | P |
| 3 | SS waits 5 seconds and then sends IMS message BYE to release the emergency call.  (Step 1 of annex A.8 in TS 34.229-5[41]) | - | - | - | - |
| 4 | Check: Does the UE perform steps 2 of Test Procedure for IMS MT Emergency call release as specified in TS 38.508-1 [4], subclause 4.9.12B? | - | - | 2 | P |
| 5-7 | Void | - | *-* | - | - |
| 8 | The SS transmits a PDU SESSION MODIFICATION COMMAND message containing new P-CSCF addresses. | <-- | 5GSM: PDU SESSION MODIFICATION COMMAND | - | - |
| 9 | The UE transmits a PDU SESSION MODIFICATION COMPLETE message. | --> | 5GSM: PDU SESSION MODIFICATION COMPLETE | - | - |
| 10 | Void | - | - | - | - |
| 11-14 | Check: Does the UE correctly initiate and complete emergency registration using the new P-CSCF addresses?  (Steps 1-4 of Annex A.3 in TS 34.229-5[41]) | - | - | 3 | P |

11.4.13.3.3 Specific message contents

Table 11.4.13.3.3-1: 200OK for REGISTER (Step 2, Table 11.4.13.3.2-1)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Derivation Path: TS 34.229-1 [35], Annex A.1.3 with condition A3. | | | | |
| Header/param | Cond | Value/remark | Rel | Reference |
| **Contact** |  |  |  |  |
| expires |  | 60 |  |  |

Table 11.4.13.3.3-2: PDU SESSION MODIFICATION COMMAND (step 8, Table 11.4.13.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| Extended protocol configuration options |  |  |  |
| Container ID 1 | ‘0001’H |  | P-CSCF\_IPv6 |
| Length of container ID 1 contents |  | Length value determined by test implementation |  |
| Container ID 1 contents | IPv6 address | P-CSCF IPv6 Address different to that allocated in the PDU SESSION ESTABLISHMENT REQUEST |  |
| Container ID 1 | ‘000C’H |  | P-CSCF\_IPv4 |
| Length of container ID 1 contents |  | Length value determined by test implementation |  |
| Container ID 1 contents | IPv4 address | P-CSCF IPv4 Address different to that allocated in the PDU SESSION ESTABLISHMENT REQUEST |  |

|  |  |
| --- | --- |
| Condition | Explanation |
| P-CSCF\_IPv6 | If in the PDU SESSION ESTABLISHMENT REQUEST for the emergency session, the IE Extended protocol configuration options contains a configuration protocol option = '0001H' (“P-CSCF IPv6 Address Request", length of contents = 0) |
| P-CSCF\_IPv4 | If in the PDU SESSION ESTABLISHMENT REQUEST for the emergency session, the IE Extended protocol configuration options contains a configuration protocol option = '000CH' (“P-CSCF IPv4 Address Request", length of contents = 0) |

### 11.4.14 5GMM-REGISTERED.NORMAL-SERVICE / 5GMM-IDLE / Emergency call /Deregistration upon emergency registration expiration

11.4.14.1 Test Purpose (TP)

(1)

**with** { UE has ended Emergency call and IMS emergency registration not having expired }

**ensure** **that** {

**when** { half of the emergency registration expiration time has passed }

**then** { UE does not attempt IMS emergency re-registration }

}

11.4.14.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.229 [44], clause 5.1.6.4, 5.1.6.6. Unless otherwise stated these are Rel-15 requirements.

[TS 24.229 clause 5.1.6.4]:

The UE shall perform user-initiated emergency reregistration as specified in subclause 5.1.1.4 if half of the time for the emergency registration has expired and:

- the UE has emergency related ongoing dialog; or

- standalone transactions exist; or

- the user initiates an emergency call.

The UE shall not perform user-initiated emergency reregistration in any other cases.

[TS 24.229 clause 5.1.6.6]:

Once the UE registers a public user identity and an associated contact address via emergency registration, the UE shall not perform user-initiated deregistration of the respective public user identity and the associated contact address.

NOTE: The UE will be deregistered when the emergency registration expires.

11.4.14.3 Test description

11.4.14.3.1 Pre-test conditions

System Simulator:

- 1 NR Cell

- NR Cell 1 as defined in TS 38.508-1 [4] Table 4.4.2-3. System information combination NR-1 as defined in TS 38.508-1 [4], subclause 4.4.3.1.2. SIB1 indicates *ims-EmergencySupport*.

UE:

- None

Preamble:

- Cells power level configuration in accordance with TS 38.508-1 [4], Table 6.2.2.1-3:

- NR Cell 1 "Serving cell"

- The UE is in test state 1N-A with IMS registered as defined in TS 38.508-1 [4], subclause 4.4A.2 on NR Cell 1.

11.4.14.3.2 Test procedure sequence

Table 11.4.14.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| - | The following messages are to be observed on NR Cell 1 unless explicitly stated otherwise. | - | - | - | - |
| 1 | Make the UE attempt an IMS emergency call. (NOTE 1) | - | - | - | - |
| 2 | The UE performs steps1 -8 of Generic Test Procedure for IMS Emergency call establishment with IMS emergency registration as specified in TS 38.508-1 [4], subclause 4.9.11. | - | - | - | - |
| - | EXCEPTION: In parallel to the events described in step 3 below the events specified in steps 1a1-2 of Table 11.4.14.3.2-2 take place. | - | - | - | - |
| 3 | The UE performs steps 9 -10 of Generic Test Procedure for IMS Emergency call establishment with IMS emergency registration as specified in TS 38.508-1 [4], subclause 4.9.11. | - | - | - | - |
| - | EXCEPTION: In parallel to the events described in step 4 below the events specified in step 3 of Table 11.4.14.3.2-2 take place. | - | - | - | - |
| 4 | The UE performs steps11 -13 of Generic Test Procedure for IMS Emergency call establishment with IMS emergency registration as specified in TS 38.508-1 [4], subclause 4.9.11. | - | - | - | - |
| 5 | The UE performs Generic Test Procedure for IMS MT Emergency call release as specified in TS 38.508-1 [4], subclause 4.9.12B.2.2-1. | - | - | - | - |
| 6 | The SS releases RRC connection. | <-- | NR RRC: RRCRelease | - | - |
| 7 | Check: Does the UE transmit an *RRCSetupRequest* message with 'establishmentCause' set to 'emergency' for IMS emergency Reregistration in the next 20 seconds? | --> | NR RRC: *RRCSetupRequest* | 1 | F |
| NOTE 1: This could be done by e.g. MMI or AT command. | | | | | |

Table 11.4.14.3.2-2: IMS signalling and Emergency call establishment

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message/PDU/SDU |  |  |
| - | EXCEPTION: Step 1a1 describes behaviour depending UE implementation; the "lower case letter" identifies a step sequence that take place if the UE performs a specific action. | - | - | - | - |
| 1a1 | The generic procedure for IP address allocation in the user plane specified in subclause in TS 38.508-1[4] 4.5A.3 takes place. | - | - | - | - |
| 2 | Generic Test Procedure for IMS Emergency registration / 5GS as defined in TS 34.229-5 [47], annex A.3 is performed. | - | - | - | - |
| 3 | Generic test procedure for setting up IMS Emergency Voice Call / 5G as defined in TS 34.229-5 [47], annex A.6 is performed. | - | - | - | - |

11.4.14.3.3 Specific message contents

Table 11.4.14.3.3-1: REGISTER (Step 1a1, Table 11.4.14.3.2-2)

|  |
| --- |
| Derivation Path: TS 34.229-1 [35], Annex A.1.7 with conditions A1 and A7. |

Table 11.4.14.3.3-2: 200OK for REGISTER (Step 1a1, Table 11.4.14.3.2-2)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Derivation Path: TS 34.229-1 [35], Annex A.1.3 with condition A3. | | | | |
| Header/param | Cond | Value/remark | Rel | Reference |
| **Contact** |  |  |  |  |
| expires |  | 30 |  |  |

Table 11.4.14.3.3-3:INVITE (Step 3, Table 11.4.14.3.2-2)

|  |
| --- |
| Derivation Path: TS 34.229-5 [47], Annex A.6, Step 1 with conditions A7 and A28 |

### 11.4.15 5GMM-REGISTERED.NORMAL-SERVICE / 5GMM-IDLE / Emergency call / SNPN

11.4.15.1 Test Purpose (TP)

(1)

**with** { UE in SNPN access mode and in 5GMM-REGISTERED.NORMAL-SERVICE state and 5GMM-IDLE mode }

**ensure that** {

**when** { UE is requested to make an outgoing emergency call }

**then** { UE performs IMS emergency registration and sets up an IMS emergency call }

}

(2)

**with** { UE in SNPN access mode and in 5GMM-REGISTERED.NORMAL-SERVICE state and 5GMM-CONNECTED mode having established an Emergency call }

**ensure that** {

**when** { UE receives an IMS BYE message to release an emergency call }

**then** { UE release the emergency call}

}

11.4.15.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.229 [44], clause 5.1.6.2A, 5.1.6.8.3. Unless otherwise stated these are Rel-15 requirements.

[TS 24.229 clause 5.1.6.2A]:

The UE shall perform a new initial emergency registration, as specified in subclause 5.1.6.2, if the UE determines that:

- it has previously performed an emergency registration which has not yet expired; and

- it has obtained an IP address from the serving IP-CAN, as specified in subclause 9.2.1, different than the IP address used for the emergency registration.

[TS 24.229 clause 5.1.6.8.3]:

After a successful initial emergency registration, the UE shall apply the procedures as specified in subclause 5.1.2A and 5.1.3 with the following additions:

1) the UE shall insert in the INVITE request, a From header field that includes the public user identity registered via emergency registration or the tel URI associated with the public user identity registered via emergency registration, as described in subclause 4.2;

2) the UE shall include a service URN in the Request-URI of the INVITE request in accordance with subclause 5.1.6.8.1;

3) the UE shall insert in the INVITE request, a To header field with the same emergency service URN as in the Request-URI;

4) if available to the UE, and if defined for the access type as specified in subclause 7.2A.4, the P-Access-Network-Info header field shall contain a location identifier such as the cell id, line id or the identity of the WLAN access node, which is relevant for routeing the IMS emergency call;

NOTE 1: The IMS emergency specification in 3GPP TS 23.167 [4B] describes several methods how the UE can get its location information from the access network or from a server. Such methods are not in the scope of this specification.

5) the UE shall insert in the INVITE request, one or two P-Preferred-Identity header field(s) that include the public user identity registered via emergency registration or the tel URI associated with the public user identity registered via emergency registration as described in subclause 4.2;

NOTE 2: Providing two P-Preferred-Identity header fields is usually supported by UE acting as enterprise network.

6) void;

7) if the UE has its location information available, or a URI that points to the location information, then the UE shall include a Geolocation header field in the INVITE request in the following way:

- if the UE is aware of the URI that points to where the UE's location is stored, include the URI as the Geolocation header field value, as described in RFC 6442 [89]; or

- if the UE is aware of its location information, include the location information in a PIDF location object, in accordance with RFC 4119 [90], include the location object in a message body with the content type application/pidf+xml, and include a Content ID URL, referring to the message body, as the Geolocation header field value, as described RFC 6442 [89], and include a Content-Disposition header field with a disposition type "render" value and a "handling" header field parameter with an "optional" value, as described in RFC 3261 [26];

8) if the UE includes a Geolocation header field, the UE shall also include a Geolocation-Routing header field with a "yes" header field value, which indicates that the location of the UE can be used by other entities to make routing decisions, as described in RFC 6442 [89];

NOTE 3: It is suggested that UE's only use the option of providing a URI when the domain part belongs to the current P-CSCF or S-CSCF provider. This is an issue on which the network operator needs to provide guidance to the end user. A URI that is only resolvable to the UE which is making the emergency call is not desirable.

9) if the UE has neither geographical location information available, nor a URI that points to the location information, the UE shall not insert a Geolocation header field in the INVITE request; and

10) if support of the current location discovery during an emergency call is allowed in the IP-CAN specific annex and the UE supports the current location discovery during an emergency call, the UE shall include a Recv-Info header field as described in RFC 6086 [25], indicating the g.3gpp.current-location-discovery info package name and shall include an Accept header field indicating the "application/vnd.3gpp.current-location-discovery+xml" MIME type.

NOTE 4: RFC 3261 [26] provides for the use of the Priority header field with a suggested value of "emergency". It is not precluded that emergency sessions contain this value, but such usage will have no impact on the processing within the IM CN subsystem.

11.4.15.3 Test description

11.4.15.3.1 Pre-test conditions

System Simulator:

- 1 SNPN cell, NR Cell 1, is configured broadcasting default SNPN IDs as indicated in TS 38.508-1 [4] Table 4.4.2-4.

- System information combination NR-26 as defined in TS 38.508-1 [4] clause 4.4.3.1.2 is used in NR cells.

UE:

- The UE is in Automatic SNPN selection mode.

- The UE is provisioned with a “list of subscriber data” to allow access to SNPN identified by NR Cell 1.

Preamble:

- Cells power level configuration in accordance with TS 38.508-1 [4], Table 6.2.2.1-3:

- NR Cell 1 "Serving cell"

- The UE is in test state 1N-A with IMS registered as defined in TS 38.508-1 [4], subclause 4.4A.2 on NR Cell 1.

11.4.15.3.2 Test procedure sequence

Table 11.4.15.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Make the UE attempt an IMS emergency call. | - | - | - | - |
| 2 | Check: Does the UE perform Test Procedure for IMS Emergency call establishment with IMS emergency registration as specified in TS 38.508-1 [4], subclause 4.9.11? | - | - | 1 | P |
| 3 | SS waits 5 seconds and then sends IMS message BYE to release the emergency call.  (Step 1 of Test Procedure for IMS MT Emergency call release as specified in TS 38.508-1 [4], subclause 4.9.12B) | - | - | - | - |
| 4 | Check: Does the UE perform step 2 of Test Procedure for IMS MT Emergency call release as specified in TS 38.508-1 [4], subclause 4.9.12B? | - | - | 2 | P |

11.4.15.3.3 Specific message contents

None.

## 11.5 eCall over IMS

### 11.5.1 eCall Only mode / T3444 / eCall inactivity procedure / Removal of eCall only restriction after an eCall over IMS / 5GS to EPS

11.5.1.1 Test Purpose (TP)

(1)

**with** { UE is switched ON with eCall only enabled USIM }

**ensure that** {

**when** { UE reads ims-EmergencySupport and eCallOverIMS-Support from SIB1 }

**then** { UE enters substate 5GMM-DEREGISTERED.eCALL-INACTIVE and shall not start registration procedure }

}

(2)

**with** { The UE is in the state 5GMM-DEREGISTERED.eCALL-INACTIVE }

**ensure that** {

**when** { UE is requested to make a manual eCall }

**then** { UE sends REGISTRATION REQUEST message with 5GS registration type set to 'initial registration' }

}

(3)

**with** { UE receives REGISTRATION ACCEPT message and IMS voice over PS session is supported over 3GPP access }

**ensure that** {

**when** { UE is in 5GMM-REGISTERED.NORMAL-SERVICE state and an initial IMS registration is performed }

**then** { the UE establishes a New emergency PDU session by sending an UL NAS TRANSPORT message with Request type set to "initial emergency request" and a PDU SESSION ESTABLISHMENT REQUEST }

}

(4)

**with** { UE receives an RRCRelease message and enters RRC\_IDLE state }

**ensure that** {

**when** { UE receives a Paging message with MT MMTEL voice call }

**then** {the UE answers the paging request for MT MMTEL voice call }

}

(5)

**with** { UE receives an RRCRelease message and enters RRC\_IDLE state }

**ensure that** {

**when** { UE starts T3444 for 12Hours and the periodic registration update timer T3512 expires }

**then** { the UE initiates the registration procedure for mobility and periodic registration update

and indicates "periodic registration updating" in the 5GS registration type IE }

}

(6)

**with** { UE in state 5GMM-REGISTERED and 5GMM-IDLE on a 5GC NR cell }

**ensure that** {

**when** { UE detects a suitable EPC E-UTRA cell after the serving NGC cell becomes not suitable when eCall Inactivity timer T3444 is running }

**then** { UE performs a Inter-system change from N1 mode to S1 mode by initiating and successfully  
completing a TAU procedure }

}

(7)

**with** { UE in state EMM-REGISTERED and EMM-IDLE on an E-UTRA cell }

**ensure that** {

**when** { UE detects a suitable NGC cell after the serving E-UTRA cell becomes not suitable when eCall Inactivity timer T3444 is running }

**then** { UE performs a Inter-system change from S1 mode to N1 mode by initiating and successfully  
completing a mobility and periodic registration update procedure }

}

(8)

**with** { UE is in RRC\_IDLE state }

**ensure that** {

**when** { eCall Inactivity timer T3444 expires }

**then** { The UE performs Deregistration procedure }

}

11.5.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in TS 24.501, clauses 5.1.3.2.1.3.8, 5.3.1.3, 5.5.3, TS 24.301, clauses 10.2 and TS 38.331, clauses 5.2.2.4.2, 6.2.2. Unless otherwise stated these are Rel-16 requirements.

[TS 24.501, clause 5.1.3.2.1.3.8]

The substate 5GMM-DEREGISTERED.eCALL-INACTIVE is chosen in the UE when:

a) the UE is configured for eCall only mode as specified in 3GPP TS 31.102 [22];

b) timer T3444 and timer T3445 have expired or are not running;

c) a PLMN has been selected as specified in 3GPP TS 23.122 [5];

d) the UE does not need to perform an eCall over IMS; and

e) the UE does not need to perform a call to a non-emergency MSISDN or URI for test or terminal reconfiguration service.

In this substate, the UE shall not initiate any signalling towards the network, except to originate an eCall over IMS, or a call to a non-emergency MSISDN or URI for test or terminal reconfiguration service.

[TS 24.501, clause 5.3.1.3]

The signalling procedure for the release of the N1 NAS signalling connection is initiated by the network.

In N1 mode, upon indication from lower layers that the access stratum connection has been released, the UE shall enter 5GMM-IDLE mode and consider the N1 NAS signalling connection released.

If the UE in 3GPP access is configured for eCall only mode as specified in 3GPP TS 31.102 [22] then:

- if the N1 NAS signalling connection that was released had been established for eCall over IMS, the UE shall start timer T3444; and

- if the N1 NAS signalling connection that was released had been established for a call to an HPLMN designated non-emergency MSISDN or URI for test or terminal reconfiguration service, the UE shall start timer T3445.

[TS 24.501, clause 5.5.3]

The eCall inactivity procedure is performed only in 3GPP access and applicable only to a UE configured for eCall only mode as specified in 3GPP TS 31.102 [22]. The procedure shall be started when:

a) the UE is in any 5GMM-REGISTERED substate except substates 5GMM-REGISTERED.PLMN-SEARCH or 5GMM-REGISTERED.NO-CELL-AVAILABLE;

b) the UE is in 5GMM-IDLE mode; and

c) one of the following conditions applies:

1) timer T3444 expires or is found to have already expired and timer T3445 is not running;

2) timer T3445 expires or is found to have already expired and timer T3444 is not running; or

3) timers T3444 and T3445 expire or are found to have already expired.

The UE shall then perform the following actions:

a) stop other running timers (e.g. T3511, T3512);

b) if the UE is currently registered to the network for 5GS services, perform a de-registration procedure;

c) delete any 5G-GUTI, TAI list, last visited registered TAI, list of equivalent PLMNs, and ngKSI; and

d) enter 5GMM-DEREGISTERED.eCALL-INACTIVE state.

[TS 24.301, clause 10.2]

| T3444 | NOTE 11 | All except EMM-NULL and 5GMM-NULL (defined in 3GPP TS 24.501 [54]) | - UE configured for eCall only mode enters EMM-IDLE mode after an eCall over IMS  - UE configured for eCall only mode moves from GERAN/UTRAN to E-UTRAN with timer T3242 (see 3GPP TS 24.008 [13]) running  - UE configured for eCall only mode enters 5GMM-IDLE mode (defined in 3GPP TS 24.501 [54]) after an eCall over IMS | - Removal of eCall only restriction  - Intersystem change from S1 mode to A/Gb or Iu mode | Perform eCall inactivity procedure in EPS as described in clause 5.5.4.  Perform eCall inactivity procedure in 5GS as described in 3GPP TS 24.501 [54]. |
| --- | --- | --- | --- | --- | --- |
| T3445 | NOTE 12 | All except EMM-NULL and 5GMM-NULL (defined in 3GPP TS 24.501 [54]) | - UE configured for eCall only mode enters EMM-IDLE mode after a call to a non-emergency MSISDN or URI for test or terminal reconfiguration service  - UE configured for eCall only mode moves from GERAN/UTRAN to E-UTRAN with timer T3243 (see 3GPP TS 24.008 [13]) running  - UE configured for eCall only mode enters 5GMM-IDLE mode (defined in 3GPP TS 24.501 [54]) after a call to a non-emergency MSISDN or URI for test or terminal reconfiguration service | Removal of eCall only restriction  - Intersystem change from S1 mode to A/Gb or Iu mode | Perform eCall inactivity procedure in EPS as described in clause 5.5.4.  Perform eCall inactivity procedure in 5GS as described in 3GPP TS 24.501 [54]. |

[TS 38.331, clause 5.2.2.4.2]

Upon receiving the *SIB1* the UE shall:

1> store the acquired *SIB1*;

…

4> forward the *eCallOverIMS-Support* to upper layers, if present;

[TS 38.331, clause 6.2.2]

eCallOverIMS-Support

Indicates whether the cell supports eCall over IMS services as defined in TS 23.501 [32]. If absent, eCall over IMS is not supported by the network in the cell.

11.5.1.3 Test description

11.5.1.3.1 Pre-test conditions

System Simulator:

- 2 cells

- NR Cell 1 as defined in TS 38.508-1 [4] Table 4.4.2-3. System information combination NR-6 as defined in TS 38.508-1 [4], sub-clause 4.4.3.1.2.

- E-UTRA Cell 1 as defined in TS 36.508 [7] Table 4.4.2-2. System information combination 31 as defined in TS 36.508 [7], sub-clause 4.4.3.1.1.

UE:

- the eCall capable UE is equipped with ‘eCall only’ enabled USIM configured as per TS 38.508-1 [4] Table 6.4.1-24.

Preamble:

- The UE is in test state 0-A (Switched Off) as defined in TS 38.508-1 [4], subclause 4.4A.2.

11.5.1.3.2 Test procedure sequence

Table 11.5.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS configures:  - NR Cell 1 as "Serving cell"  - E-UTRA Cell 1 as "Non-suitable "off" cell". | - | - | - | - |
| 2 | The UE is switched on. | - | - | - | - |
| 3 | Check: Does the UE send an *RRCSetupRequest* on NR Cell 1 within 120 seconds? | --> | NR RRC: RRCSetupRequest | 1 | F |
| 4 | A manual eCall is initiated. (Note 1) | - | - | - | - |
| 5 | Check: Does the UE send REGISTRATION REQUEST message with 5GS registration type set to 'initial registration'? | --> | 5GMM: REGISTRATION REQUEST | 2 | P |
| 6-14 | Steps 5-13 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 15 | The SS transmits a REGISTRATION ACCEPT message and assigns value of 7 hours for the timer T3512. | <-- | 5GMM: REGISTRATION ACCEPT | - | - |
| 16-20a1 | Steps 15-19a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 21 | Check: The UE transmits an *ULInformationTransfer* message with Request type set to "initial emergency request"  and a PDU SESSION ESTABLISHMENT REQUEST message? | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION  ESTABLISHMENT REQUEST | 3 | P |
| 22-26 | Steps 22-26 of Table 4.9.29.2.2-1 of the test procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 27 | Release eCall over IMS using the generic procedure described in TS 38.508-1 [4] subclause 4.9.12B. |  |  |  |  |
| 28 | Void | - | - | - | - |
| 29 | The SS releases the RRC connection. (Note 2) | <-- | NR RRC: RRCRelease | - | - |
| 30 | The SS waits 1 minute. | - | - | - | - |
| 31-43 | Steps 1 to 13 of the generic test procedure for IMS MT speech call establishment in 5GC specified in TS 38.508-1 [4] subclause 4.9.16 are performed. | - | - | 4 | P |
| 44 | Generic test procedure for IMS MT call release in 5GS described in TS 38.508-1 [4] subclause 4.9.18 takes place. | - | - | - | - |
| 45 | Void | - | - | - | - |
| 46 | The SS releases the RRC connection. (Note 3) | <-- | NR RRC: RRCRelease | - | - |
| 47 | Check: Does the UE transmit a REGISTRATION REQUEST message at the expiry of T3512? | --> | 5GMM: REGISTRATION REQUEST | 5 | P |
| 48 | The SS transmits a REGISTRATION ACCEPT message including T3512 value IE. | <-- | 5GMM: REGISTRATION ACCEPT | - | - |
| 49 | The UE transmits a REGISTRATION  COMPLETE message | --> | 5GMM: REGISTRATION COMPLETE |  |  |
| 50 | The SS releases the RRC connection. | <-- | NR RRC: RRCRelease | - | - |
| 51 | The SS configures:  - NR Cell 1 as " Non-suitable "off" cell"  - E-UTRA Cell 1 as "Serving cell". | - | - | - | - |
| 52 | Check: Does the UE perform on the E-UTRA Cell 1 the TAU procedure for Inter-system change from N1 mode to S1 mode as described in TS 38.508-1 [4], Table 4.9.7.2.2-1? | - | - | 6 | P |
| 53 | The SS configures:  - NR Cell 1 as "Serving cell"  - E-UTRA Cell 1 as "Non-suitable "off" cell". | - | - | - | - |
| 54 | Check: Does the UE perform on the NR Cell 1 the Test procedure for UE Tracking area updating for Inter-system change from S1 mode to N1 mode as described in TS 38.508-1 [4], Table 4.9.9.2.2-1? | - | - | 7 | P |
| 55 | Check: Does the UE transmit a DEREGISTRATION REQUEST message at expiry of T3444? | --> | 5GMM: DEREGISTRATION REQUEST | 8 | P |
| Note 1: The request to originate a manual eCall may be performed by MMI or AT command.  Note 2: Timer T3444 of 12hours starts.  Note 3: Timer T3512 of 7hours starts. | | | | | |

11.5.1.3.3 Specific message contents

Table 11.5.1.3.3-1: SIB1 for NR Cell 1 (All steps, Table 11.5.1.3.2-1)

|  |
| --- |
| Derivation path: TS 38.508-1 [4] table 4.6.1-28 Condition eCalloverIMSforNR |

Table 11.5.1.3.3-2: REGISTRATION ACCEPT (step 15, 48, 54 Table 11.5.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-7 | | | |
| Information Element | Value/Remark | Comment | Condition |
| T3512 value |  |  |  |
| Unit | '001'B | value is incremented in multiples of 1 hour |  |
| Timer value | '0 0111'B | 7 hours |  |

Table 11.5.1.3.3-3:UL NAS TRANSPORT (step 21, Table 11.5.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] table 4.7.1-10, condition INITIAL\_PDU\_REQUEST. | | | |
| Information Element | Value/remark | Comment | Condition |
| Request type | ‘011’B | initial emergency request |  |
| S-NSSAI | Not Present |  |  |
| DNN | Not Present |  |  |

Table 11.5.1.3.3-4: REGISTRATION REQUEST (step 47, Table 11.5.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type |  |  |  |
| 5GS registration type value | ‘011’B |  | PERIODIC |

Table 11.5.1.3.3-5: TRACKING AREA UPDATE REQUEST (Step 52, Table 11.5.1.3.2-1; step 3, TS 38.508-1 [4] Table 4.9.7.2.2-1)

|  |
| --- |
| Derivation Path: TS 38.508-1 [4] table 4.9.7.2.3-1 with condition First-N1-to-S1 = TRUE |

Table 11.5.1.3.3-6: DEREGISTRATION REQUEST (step 55, Table 11.5.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-12 | | | |
| Information Element | Value/remark | Comment | Condition |
| De-registration type |  |  |  |
| Switch off | ‘0’B | Normal de-registration |  |

### 11.5.2 eCall Only mode / T3445 / eCall inactivity procedure / Removal of eCall only restriction after a call to URI for test service / 5GS to EPS

11.5.2.1 Test Purpose (TP)

(1)

**with** { The UE is in the state 5GMM-DEREGISTERED.eCALL-INACTIVE }

**ensure that** {

**when** { UE is requested to make an eCall to URI for test service }

**then** { UE sends REGISTRATION REQUEST message with 5GS registration type set to 'initial registration' }

}

(2)

**with** { UE receives REGISTRATION ACCEPT message and IMS voice over PS session is supported over 3GPP access }

**ensure that** {

**when** { UE is in 5GMM-REGISTERED.NORMAL-SERVICE state and an initial registration is performed }

**then** { the UE establishes a new PDU session by sending an UL NAS TRANSPORT message with Request type set to "initial request" and a PDU SESSION ESTABLISHMENT REQUEST }

}

(3)

**with** { UE receives an RRCRelease message and enters RRC\_IDLE state }

**ensure that** {

**when** { UE receives a Paging message with MT MMTEL voice call }

**then** {the UE answers the paging request for MT MMTEL voice call }

}

(4)

**with** { UE receives an RRCRelease message and enters RRC\_IDLE state }

**ensure that** {

**when** { UE starts T3445 for 12Hours and the periodic registration update timer T3512 expires }

**then** { the UE initiates the registration procedure for mobility and periodic registration update

and indicates "periodic registration updating" in the 5GS registration type IE }

}

(5)

**with** { UE in state 5GMM-REGISTERED and 5GMM-IDLE on a 5GC NR cell }

**ensure that** {

**when** { UE detects a suitable EPC E-UTRA cell after the serving NGC cell becomes not suitable when eCall Inactivity timer T3445 is running }

**then** { UE performs a Inter-system change from N1 mode to S1 mode by initiating and successfully  
completing a TAU procedure }

}

(6)

**with** { UE in state EMM-REGISTERED and EMM-IDLE on an E-UTRA cell }

**ensure that** {

**when** { UE detects a suitable NGC cell after the serving E-UTRA cell becomes not suitable when eCall Inactivity timer T3445 is running }

**then** { UE performs a Inter-system change from S1 mode to N1 mode by initiating and successfully  
completing a mobility and periodic registration update procedure }

}

(7)

**with** { UE is in RRC\_IDLE state }

**ensure that** {

**when** { eCall Inactivity timer T3445 expires }

**then** { The UE performs Deregistration procedure }

}

11.5.2.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in TS 24.501, clauses 5.1.3.2.1.3.8, 5.3.1.3, 5.5.3, TS 24.301, clauses 10.2 and TS 38.331, clauses 5.2.2.4.2, 6.2.2. Unless otherwise stated these are Rel-16 requirements.

[TS 24.501, clause 5.1.3.2.1.3.8]

The substate 5GMM-DEREGISTERED.eCALL-INACTIVE is chosen in the UE when:

a) the UE is configured for eCall only mode as specified in 3GPP TS 31.102 [22];

b) timer T3444 and timer T3445 have expired or are not running;

c) a PLMN has been selected as specified in 3GPP TS 23.122 [5];

d) the UE does not need to perform an eCall over IMS; and

e) the UE does not need to perform a call to a non-emergency MSISDN or URI for test or terminal reconfiguration service.

In this substate, the UE shall not initiate any signalling towards the network, except to originate an eCall over IMS, or a call to a non-emergency MSISDN or URI for test or terminal reconfiguration service.

[TS 24.501, clause 5.3.1.3]

The signalling procedure for the release of the N1 NAS signalling connection is initiated by the network.

In N1 mode, upon indication from lower layers that the access stratum connection has been released, the UE shall enter 5GMM-IDLE mode and consider the N1 NAS signalling connection released.

If the UE in 3GPP access is configured for eCall only mode as specified in 3GPP TS 31.102 [22] then:

- if the N1 NAS signalling connection that was released had been established for eCall over IMS, the UE shall start timer T3444; and

- if the N1 NAS signalling connection that was released had been established for a call to an HPLMN designated non-emergency MSISDN or URI for test or terminal reconfiguration service, the UE shall start timer T3445.

[TS 24.501, clause 5.5.3]

The eCall inactivity procedure is performed only in 3GPP access and applicable only to a UE configured for eCall only mode as specified in 3GPP TS 31.102 [22]. The procedure shall be started when:

a) the UE is in any 5GMM-REGISTERED substate except substates 5GMM-REGISTERED.PLMN-SEARCH or 5GMM-REGISTERED.NO-CELL-AVAILABLE;

b) the UE is in 5GMM-IDLE mode; and

c) one of the following conditions applies:

1) timer T3444 expires or is found to have already expired and timer T3445 is not running;

2) timer T3445 expires or is found to have already expired and timer T3444 is not running; or

3) timers T3444 and T3445 expire or are found to have already expired.

The UE shall then perform the following actions:

a) stop other running timers (e.g. T3511, T3512);

b) if the UE is currently registered to the network for 5GS services, perform a de-registration procedure;

c) delete any 5G-GUTI, TAI list, last visited registered TAI, list of equivalent PLMNs, and ngKSI; and

d) enter 5GMM-DEREGISTERED.eCALL-INACTIVE state.

[TS 24.301, clause 10.2]

| T3444 | NOTE 11 | All except EMM-NULL and 5GMM-NULL (defined in 3GPP TS 24.501 [54]) | - UE configured for eCall only mode enters EMM-IDLE mode after an eCall over IMS  - UE configured for eCall only mode moves from GERAN/UTRAN to E-UTRAN with timer T3242 (see 3GPP TS 24.008 [13]) running  - UE configured for eCall only mode enters 5GMM-IDLE mode (defined in 3GPP TS 24.501 [54]) after an eCall over IMS | - Removal of eCall only restriction  - Intersystem change from S1 mode to A/Gb or Iu mode | Perform eCall inactivity procedure in EPS as described in clause 5.5.4.  Perform eCall inactivity procedure in 5GS as described in 3GPP TS 24.501 [54]. |
| --- | --- | --- | --- | --- | --- |
| T3445 | NOTE 12 | All except EMM-NULL and 5GMM-NULL (defined in 3GPP TS 24.501 [54]) | - UE configured for eCall only mode enters EMM-IDLE mode after a call to a non-emergency MSISDN or URI for test or terminal reconfiguration service  - UE configured for eCall only mode moves from GERAN/UTRAN to E-UTRAN with timer T3243 (see 3GPP TS 24.008 [13]) running  - UE configured for eCall only mode enters 5GMM-IDLE mode (defined in 3GPP TS 24.501 [54]) after a call to a non-emergency MSISDN or URI for test or terminal reconfiguration service | Removal of eCall only restriction  - Intersystem change from S1 mode to A/Gb or Iu mode | Perform eCall inactivity procedure in EPS as described in clause 5.5.4.  Perform eCall inactivity procedure in 5GS as described in 3GPP TS 24.501 [54]. |

[TS 38.331, clause 5.2.2.4.2]

Upon receiving the *SIB1* the UE shall:

1> store the acquired *SIB1*;

…

4> forward the *eCallOverIMS-Support* to upper layers, if present;

[TS 38.331, clause 6.2.2]

eCallOverIMS-Support

Indicates whether the cell supports eCall over IMS services as defined in TS 23.501 [32]. If absent, eCall over IMS is not supported by the network in the cell.

11.5.2.3 Test description

11.5.2.3.1 Pre-test conditions

System Simulator:

- 2 cells

- NR Cell 1 as defined in TS 38.508-1 [4] Table 4.4.2-3. System information combination NR-6 as defined in TS 38.508-1 [4], sub-clause 4.4.3.1.2.

- E-UTRA Cell 1 as defined in TS 36.508 [7] Table 4.4.2-2. System information combination 31 as defined in TS 36.508 [7], sub-clause 4.4.3.1.1.

UE:

- the eCall capable UE is equipped with ‘eCall only’ enabled USIM configured as per TS 38.508-1 [4] Table 6.4.1-24.

Preamble:

- The UE is in test state 0-A (Switched Off) as defined in TS 38.508-1 [4], subclause 4.4A.2.

11.5.2.3.2 Test procedure sequence

Table 11.5.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS configures:  - NR Cell 1 as "Serving cell"  - E-UTRA Cell 1 as "Non-suitable "off" cell". | - | - | - | - |
| 2 | The UE is switched on. | - | - | - | - |
| 3 | Wait for 60s for the UE to enter 5GMM-DEREGISTERED.eCALL-INACTIVE state | - | - | - | - |
| 4 | An eCall to URI for test service is initiated by dialling the eCall Test Number in the EFFDNURI field of the USIM (tel:123456). (Note 1) | - | - | - | - |
| 4A | Check: Does UE transmits a *RRCSetupRequest* message with ' establishmentCause' set to 'mo-Signalling'? | --> | NR RRC: *RRCSetupRequest* | 1 | P |
| 4B | SS transmits an *RRCSetup* message. | <-- | NR RRC: *RRCSetup* | - | - |
| 5 | Check: Does the UE send REGISTRATION REQUEST message with 5GS registration type set to 'initial registration'? | --> | NR RRC: *RRCSetupComplete*  5GMM: REGISTRATION REQUEST | 1 | P |
| 6-14 | Steps 5-13 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 15 | The SS transmits a REGISTRATION ACCEPT message and assigns value of 7 hours for the timer T3512. | <-- | 5GMM: REGISTRATION ACCEPT | - | - |
| 16 | The UE transmits an *ULInformationTransfer* message and a REGISTRATION COMPLETE message. | --> | 5GMM: REGISTRATION COMPLETE | - | - |
| 17 | Check: Does the UE transmit an *ULInformationTransfer* message with Request type set to "initial request" and a PDU SESSION ESTABLISHMENT REQUEST message? | --> | NR RRC: ULInformationTransfer  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION  ESTABLISHMENT REQUEST | 2 | P |
| - | EXCEPTION: In parallel to the events described in steps 17A-17B below the behaviour in table 11.5.2.3.2-2 occurs. | - | - | - | - |
| 17A | The SS transmits an *RRCReconfiguration* message and a PDU SESSION ESTABLISHMENT ACCEPT | <-- | NR RRC: *RRCReconfiguration*  5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |
| 17B | The UE transmits an *RRCReconfigurationComplete* message. | --> | NR RRC:  *RRCReconfigurationComplete* | - | - |
| 18-31 | Void | - | - | - | - |
| - | EXCEPTION: In parallel to the events described in steps 32 to 34 below steps 2 – 3 of eCall Setup and MSD Update / 5GS as defined in TS 34.229-5 [41] annex A.23 take place | - | - | - | - |
| 32-34 | Steps 11 to 13 of Table 4.9.11.2.2-1 of the test procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 35 | Release eCall for test service using the generic procedure described in TS 38.508-1 [4] subclause 4.9.18. |  |  |  |  |
| 36 | Void | - | - | - | - |
| 37 | The SS releases the RRC connection. (Note 2) | <-- | NR RRC: RRCRelease | - | - |
| 38 | The SS waits 1 minute. | - | - | - | - |
| 39-51 | Steps 1 to 13 of the generic test procedure for IMS MT speech call establishment in 5GC specified in TS 38.508-1 [4] subclause 4.9.16 are performed. | - | - | 3 | P |
| 52 | Generic test procedure for MT release of Voice call in 5GS described in TS 38.508-1 [4] subclause 4.9.18 takes place. | - | - | - | - |
| 53 | Void | - | - | - | - |
| 54 | The SS releases the RRC connection. (Note 3) | <-- | NR RRC: RRCRelease | - | - |
| 55 | Check: Does the UE transmit a REGISTRATION REQUEST message at the expiry of T3512? | --> | 5GMM: REGISTRATION REQUEST | 4 | P |
| 56 | The SS transmits a REGISTRATION ACCEPT message including T3512 value IE. | <-- | 5GMM: REGISTRATION ACCEPT | - | - |
| 57 | The UE transmits a REGISTRATION COMPLETE message | --> | 5GMM: REGISTRATION COMPLETE |  |  |
| 58 | The SS releases the RRC connection. | <-- | NR RRC: RRCRelease | - | - |
| 59 | The SS configures:  - NR Cell 1 as " Non-suitable "off" cell"  - E-UTRA Cell 1 as "Serving cell". | - | - | - | - |
| 60 | Check: Does the UE perform on the E-UTRA Cell 1 the TAU procedure for Inter-system change from N1 mode to S1 mode as described in TS 38.508-1 [4], Table 4.9.7.2.2-1? | - | - | 5 | P |
| 61 | The SS configures:  - NR Cell 1 as "Serving cell"  - E-UTRA Cell 1 as "Non-suitable "off" cell". | - | - | - | - |
| 62 | Check: Does the UE perform on the NR Cell 1 the Test procedure for UE Tracking area updating for Inter-system change from S1 mode to N1 mode as described in TS 38.508-1 [4], Table 4.9.9.2.2-1? | - | - | 6 | P |
| 63 | Check: Does the UE transmit a DEREGISTRATION REQUEST message at expiry of T3445? | --> | 5GMM: DEREGISTRATION REQUEST | 7 | P |
| Note 1: The request to originate a manual eCall may be performed by MMI or AT command.  Note 2: Timer T3445 of 12hours starts.  Note 3: Timer T3512 of 7hours starts. | | | | | |

Table 11.5.2.3.2-2: Parallel behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| - | EXCEPTION: Step 1a1 describes behaviour  depending on UE implementation; the "lower case letter" identifies a step sequence that take place if the UE performs a specific action. | - | - | - | - |
| 1a1 | Step 5a1 of the procedure of "PDU session establishment " described in TS 38.508-1 [4] Table 4.5A.2.2.2-1 is performed. | - | - | - | - |
| 2-5 | Steps 1-4 of the generic procedure for IMS registration / 5GS as defined in TS 34.229-5 [41] Annex A.2 take place. | - | - | - | - |
| - | EXCEPTION: In parallel to the event described in steps 6-10 below the behaviour in table 11.5.2.3.2-3 occurs. | - | - | - | - |
| 6-10 | Steps 5-8 of the generic procedure for IMS registration as defined in TS 34.229-5 [41] Annex A.2 take place. | - | - | - | - |

Table 11.5.2.3.2-3: Parallel behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Step 1 of expected sequence from A.23 as defined in TS 34.229-5 [41] is performed. | --> | INVITE | - | - |

11.5.2.3.3 Specific message contents

Table 11.5.2.3.3-1: SIB1 for NR Cell 1 (All steps, Table 11.5.2.3.2-1)

|  |
| --- |
| Derivation path: TS 38.508-1 [4] table 4.6.1-28 Condition eCalloverIMSforNR |

Table 11.5.2.3.3-2: REGISTRATION ACCEPT (step 15, 56, 62 Table 11.5.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-7 | | | |
| Information Element | Value/Remark | Comment | Condition |
| T3512 value |  |  |  |
| Unit | '001'B | value is incremented in multiples of 1 hour |  |
| Timer value | '0 0111'B | 7 hours |  |

Table 11.5.2.3.3-3A: INVITE (Step 1 Table 11.5.2.3.2-3)

|  |  |
| --- | --- |
| Derivation path: TS 34.229-1 [35] table in annex A.2.1 Condition A25 | |
|  |  |
| Header/param | Value/remark |
| Call-Info  url  purpose | Any URL  *EmergencyCallData.eCall.MSD* |
| Message-body | The following SDP types and values.  Session description:  -  - *v=0*  - *o=*(username) (sess-id) (sess-version) IN (addrtype) (unicast-address for UE)  - *s=*(session name)  - c=IN (addrtype) (connection-address for UE) [Note 1]  Time description:  - t= (start-time) (stop-time)  Media description:  - *m=audio* (transport port) [Note 2]  - *c=IN* (addrtype) (connection-address for UE) [Note 1]  - *b=AS:* (bandwidth-value)  Note 1: At least one "c=" field shall be present.  Note 2: AMR codec (AMR/8000 and/or AMR-WB/16000) shall be present in the media attributes, optionally including channel number "/1".  -boundary value (as provided in SIP hdr Content-Type) *Content-Type: application/EmergencyCallData.eCall.MSD Content-ID:* same URL as in Call-Info header *Content-Disposition: by-reference;handling=optional* MSD in ASN.1 PER encoding  -boundary value (as provided in SIP hdr Content-Type) |

Table 11.5.2.3.3-3B: 200 OK for INVITE (Step 2 TS 34.229-5 [41] annex A.23, in parallel to steps 32-34 Table 11.5.2.3.2-1)

|  |  |
| --- | --- |
| Derivation path: TS 34.229-1 [35] table in annex A.3.1 Condition A12 | |
|  |  |
| Header/param | Value/remark |
| Message-body | --*boundary1 Content-Type: application/EmergencyCallData.eCall.Control+xml Content-ID:* <*psap@3gpp.org*> *Content-Disposition: by-reference <?xml version="1.0" encoding="UTF-8"?> <EmergencyCallData.control xmlns="urn:ietf:params:xml:ns:EmergencyCallData:control"> <ack received="true" ref="* addr-spec of the Content-ID *of MIME body part containing the MSD sent by the UE in INVITE"/> </EmergencyCallData.control>* *--boundary1*  The following SDP types and values.  Session description:  - *v=0*  - *o=- 1111111111 1111111111 IN* (addrtype) (unicast-address for SS)  - *s=-*  - *c=IN* (addrtype) (connection-address for SS)  - *b=AS:37*  Time description:  - *t=0* 0  Media description:  - *m=audio* (transport port) RTP/AVP (fmt) [Note 1]  - *b=AS:37*  - *b=RS:0*  - *b=RR:0*  Attributes for media:  - *a=rtpmap*: (payload type) *AMR/8000/1 or AMR-WB/16000/1* [Note 1] [Note2]  - *a=fmtp*: (format) *mode-change-capability=2; max-red=220*  - *a=ptime:20*  - *a=maxptime:240*  Note 1: The value for fmt, payload type and format is copied from step 1.  Note 2: If UE included AMR-WB/16000 in step 1, SS uses AMR-WB/16000/1. Otherwise SS uses AMR/8000/1. |

Table 11.5.2.3.3-3:UL NAS TRANSPORT (step 17, Table 11.5.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] table 4.7.1-10, condition INITIAL\_PDU\_REQUEST. | | | |
| Information Element | Value/remark | Comment | Condition |
| Request type | ‘001’B | initial request |  |
| S-NSSAI | Not Present |  |  |

Table 11.5.2.3.3-4: REGISTRATION REQUEST (step 55, Table 11.5.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] table 4.7.1-6 | | | |
| Information Element | Value/remark | Comment | Condition |
| 5GS registration type |  |  |  |
| 5GS registration type value | ‘011’B |  | PERIODIC |

Table 11.5.2.3.3-5: TRACKING AREA UPDATE REQUEST (Step 60, Table 11.5.2.3.2-1; step 3, TS 38.508-1 [4] Table 4.9.7.2.2-1)

|  |
| --- |
| Derivation Path: TS 38.508-1 [4] table 4.9.7.2.3-1 with condition First-N1-to-S1 = TRUE |

Table 11.5.2.3.3-6: DEREGISTRATION REQUEST (step 63, Table 11.5.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.1-12 | | | |
| Information Element | Value/remark | Comment | Condition |
| De-registration type |  |  |  |
| Switch off | ‘0’B | Normal de-registration |  |

### 11.5.3 eCall Only mode / 5GS supports IMS voice over PS session / 5GS does not support emergency service / eCall over EPS / eCall failure if EPS and CS domain are not available

11.5.3.1 Test Purpose (TP)

(1)

**with** { UE is switched ON with eCall only enabled USIM }

**ensure that** {

**when** { 5GS supports IMS voice over PS session but ims-EmergencySupport on 5GS is not indicated, eCallOverIMS-Support-r14 and ims-EmergencySupport on EPS is indicated and UE is requested to make an automatic eCall }

**then** { UE establishes the eCall over EPS }

}

(2)

**with** { UE is switched ON with eCall only enabled USIM }

**ensure that** {

**when** { 5GS supports IMS voice over PS session but ims-EmergencySupport on 5GS is not indicated and other RATs are not available and UE is requested to make an automatic eCall }

**then** { UE does not establish a normal emergency call, eCall over IMS or eCall over CS domain }

}

11.5.3.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 23.122, clause 4.4.3.1.1 and TS 23.167, Annex H.6.

[TS 23.122 clause 4.4.3.1.1]

The MS selects and attempts registration on other PLMN/access technology combinations, if available and, for bullets i, ii, iii, iv, v, allowable, in the following order:

i) either the HPLMN (if the EHPLMN list is not present or is empty) or the highest priority EHPLMN that is available (if the EHPLMN list is present) ;

ii) each PLMN/access technology combination in the "User Controlled PLMN Selector with Access Technology" data file in the SIM (in priority order);

iii) each PLMN/access technology combination in the "Operator Controlled PLMN Selector with Access Technology" data file in the SIM (in priority order) or stored in the ME (in priority order);

iv) other PLMN/access technology combinations with received high quality signal in random order;

NOTE 1: High quality signal is defined in the appropriate AS specification.

v) other PLMN/access technology combinations in order of decreasing signal quality.

…

l) In i to vii, if the MS is in eCall only mode, the MS shall not consider PLMNs which do not advertise support for eCall over IMS, unless such PLMNs are available in GERAN or UTRAN.

NOTE 6: As an implementation option, an MS in eCall only mode that was not able to select any PLMN according to l) can perform a second iteration of i to v with no restriction.

[TS 23.167 clause H.6]

Table H.2: Domain Selection Rules for eCall over IMS session attempts for E-UTRAN or NG-RAN radio access networks

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | PS Available | VoIMS | EMS | ECL | First eCall Attempt | Second eCall Attempt |
| A | Y | Y | Y | Y | PS | PS on another PS RAT if available with EMS=Y and ECL=Y  or CS if available |
| B | Y | Y | Y | N | CS if available | PS (UE establishes IMS emergency session) |
| C | Y | Y or N | N | N | CS if available | PS on another PS RAT if available with EMS=Y or EMS unknown |
| D | Y | N | Y | Y | PS or CS if available | CS if first attempt in PS  PS if first attempt in CS |
| E | Y | N | Y | N | CS if available | PS (UE establishes IMS emergency session) |
| F | N |  | - | - | CS if available |  |
| VoIMS = Voice over IMS over PS sessions support as indicated by IMS Voice over PS session supported indication as defined in TS 23.401 [28] and TS 23.502 [49].  EMS = IMS Emergency Services supported as indicated by Emergency Service Support indicator as defined in TS 23.401 [28] and TS 23.501 [48] and TS 23.502 [49].  ECL = eCall Over IMS support as indicated by the eCall support indicator defined in TS 23.401 [28] and TS 23.501 [48].  NOTE 1: As an implementation option, when the first attempt uses PS and fails for reasons other than related to IMS, the second attempt may use PS with a different 3GPP RAT. In this case the UE, can make a third attempt using CS. | | | | | | |

11.5.3.3 Test description

11.5.3.3.1 Pre-test conditions

System Simulator:

- 2 cells

- NR Cell 1 as defined in TS 38.508-1 [4] Table 4.4.2-3. System information combination NR-6 as defined in TS 38.508-1 [4], sub-clause 4.4.3.1.2 with eCallOverIMS-Support and ims-EmergencySupport not present.

- E-UTRA Cell 1 as defined in TS 36.508 [7] Table 4.4.2-2. System information combination 31 as defined in TS 36.508 [7], sub-clause 4.4.3.1.1.

UE:

- the eCall capable UE is equipped with ‘eCall only’ enabled USIM configured as per TS 38.508-1 [4] Table 6.4.1-24.

Preamble:

- The UE is in test state 0-A (Switched Off) as defined in TS 38.508-1 [4], subclause 4.4A.2.

11.5.3.3.2 Test procedure sequence

Tables 11.5.3.3.2-1A and 11.5.3.3.2-1B illustrate the downlink power levels and other changing parameters to be applied for the cells in conducted and OTA test environment respectively, at various time instants of the test execution. Row marked "T0" denotes the initial conditions after preamble, while columns marked "T1" is to be applied subsequently. The exact instants on which these values shall be applied are described in the texts in this clause.

Table 11.5.3.3.2-1A: Time instances of cell power level and parameter changes for conducted test environment

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter | Unit | E-UTRA Cell 1 | NR Cell 1 | Remark |
| T0 | Cell-specific RS EPRE | dBm/15kHz | -91 | - |  |
| SS/PBCH SSS EPRE | dBm/SCS | - | -88 |
| T1 | Cell-specific RS EPRE | dBm/15kHz | Off | - | The cell power level “Off” corresponds to “Non-suitable "Off" cell” as defined in TS 38.508-1[4], Table 6.2.2.1-3 |
| SS/PBCH SSS EPRE | dBm/SCS | - | -88 |

Table 11.5.3.3.2-1B: Time instances of cell power level and parameter changes for OTA test environment

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter | Unit | E-UTRA Cell 1 | NR Cell 1 | Remark |
| T0 | Cell-specific RS EPRE | dBm/15kHz | -96 | - |  |
| SS/PBCH SSS EPRE | dBm/SCS | - | -82 |
| T1 | Cell-specific RS EPRE | dBm/15kHz | Off | - | The cell power level “Off” corresponds to “Non-suitable "Off" cell” as defined in TS 38.508-1[4], Table 6.2.2.2.2-2 |
| SS/PBCH SSS EPRE | dBm/SCS | - | -82 |

Table 11.5.3.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **St** | **Procedure** | **Message Sequence** | | **TP** | **Verdict** |
|  |  | **U - S** | **Message** |  |  |
| 1 | SS configure the cell-specific reference signal level according to row "T0". | - | - | - | - |
| 2 | The UE is switched on. | - | - | - | - |
| 3 | Wait 60s for the UE to enter eCALL-INACTIVE state. | - | - | - | - |
| 4 | An automatic eCall is initiated. (Note 1) | - | - | - | - |
| - | The following messages are to be observed on E-UTRA Cell 1 unless explicitly stated otherwise | - | - | - | - |
| 5 | Check: Does the UE sends an ATTACH  REQUEST message with a PDN  CONNECTIVITY REQUEST message to  request PDN connectivity to the default PDN.  EPS attach type = "combined EPS/IMSI  attach"? | --> | ATTACH REQUEST | 1 | P |
| 6-24 | Steps 7 to 25 of Generic Test Procedure for eCall over IMS establishment in EUTRA: eCall Only Support specified in clause 4.5A.27 of TS 36.508 [6] take place. | - | *-* | - | - |
| 25 | Release eCall over IMS using the generic procedure described in TS 34.229-1 [35] subclause C.33 | - | - | - | - |
| 26 | The SS releases the RRC connection. | <-- | *RRCConnectionRelease* | - | - |
| 27 | The UE is Switched Off. | - | - | - | - |
| 28 | SS adjusts the cell-specific reference signal level according to row "T1". | - | - | - | - |
| 29 | The UE is switched on. | - | - | - | - |
| 30 | Wait for 60s. | - | - | - | - |
| 31 | An automatic eCall is initiated. (Note 1) | - | - | - | - |
| - | The following messages are to be observed on NR Cell 1 unless explicitly stated otherwise | - | - | - | - |
| 32 | Check: Does the UE transmit an *RRCSetupRequest* message in the next 30 sec? | --> | RRCSetupRequest | 2 | F |
| Note 1: The request to originate an automatic eCall may be performed by MMI or AT command | | | | | |

11.5.3.3.3 Specific message contents

Table 11.5.3.3.3-1: SIB1 for NR Cell 1 (All steps, Table 11.5.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] table 4.6.1-28 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| ims-EmergencySupport | Not present | Not support eCall  over IMS services |  |
| eCallOverIMS-Support | Not present | Not support IMS  emergency call |  |
| } |  |  |  |

Table 11.5.3.3.3-2: SIB1 for E-UTRA Cell 1 (All steps, Table 11.5.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [6] table 4.4.3.2-3 | | | |
| Information Element | Value/remark | Comment | Condition |
| SystemInformationBlockType1 ::= SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| ims-EmergencySupport-r9 | true | Support IMS emergency call |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| eCallOverIMS-Support-r14 | true | Support eCall over IMS services |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

### 11.5.4 eCall Only mode / 5GS supports IMS voice over PS session / 5GS supports emergency service / eCall over IMS is supported on 5GS / RACH failure in NR cell / eCall over EPS

11.5.4.1 Test Purpose (TP)

(1)

**with** { UE is in the state 5GMM-DEREGISTERED.eCALL-INACTIVE }

**ensure that** {

**when** { UE is requested to make an automatic eCall and RACH failure is observed in NR cell }

**then** { UE establishes eCall over EPS }

}

11.5.4.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 36.331, clauses 5.2.2.7, 6.2.2 , TS 38.331, clause 6.2.2 and TS 23.167, Annex H.6.

[TS 36.331 clause 5.2.2.7]

Upon receiving the *SystemInformationBlockType1* or *SystemInformationBlockType1-BR* either via broadcast or via dedicated signalling, the UE shall:

…

1> else:

2> if the frequency band indicated in the *freqBandIndicator* is part of the frequency bands supported by the UE and it is not a downlink only band; or

…

3> forward the *ims-EmergencySupport* to upper layers, if present;

[TS 23.167 clause H.6]

Table H.2: Domain Selection Rules for eCall over IMS session attempts for E-UTRAN or NG-RAN radio access networks

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | PS Available | VoIMS | EMS | ECL | First eCall Attempt | Second eCall Attempt |
| A | Y | Y | Y | Y | PS | PS on another PS RAT if available with EMS=Y and ECL=Y  or CS if available |
| B | Y | Y | Y | N | CS if available | PS (UE establishes IMS emergency session) |
| C | Y | Y or N | N | N | CS if available | PS on another PS RAT if available with EMS=Y or EMS unknown |
| D | Y | N | Y | Y | PS or CS if available | CS if first attempt in PS  PS if first attempt in CS |
| E | Y | N | Y | N | CS if available | PS (UE establishes IMS emergency session) |
| F | N |  | - | - | CS if available |  |
| VoIMS = Voice over IMS over PS sessions support as indicated by IMS Voice over PS session supported indication as defined in TS 23.401 [28] and TS 23.502 [49].  EMS = IMS Emergency Services supported as indicated by Emergency Service Support indicator as defined in TS 23.401 [28] and TS 23.501 [48] and TS 23.502 [49].  ECL = eCall Over IMS support as indicated by the eCall support indicator defined in TS 23.401 [28] and TS 23.501 [48].  NOTE 1: As an implementation option, when the first attempt uses PS and fails for reasons other than related to IMS, the second attempt may use PS with a different 3GPP RAT. In this case the UE, can make a third attempt using CS. | | | | | | |

NOTE: If the E-UTRAN and NG-RAN cells available to the UE have different settings, the UE assumes "PS Available" and "ECL" apply to whichever cell is indicated (as defined in TS 23.401 [28] and TS 23.501 [48]) as providing eCall over IMS support. When support by more than one cell is indicated, a UE may select any cell to attempt eCall over IMS according to the UE implementation.

[TS 38.331, clause 6.2.2]

eCallOverIMS-Support

Indicates whether the cell supports eCall over IMS services as defined in TS 23.501 [32]. If absent, eCall over IMS is not supported by the network in the cell.

[TS 36.331, clause 6.2.2]

eCallOverIMS-Support

Indicates whether the cell supports eCall over IMS services via EPC for UEs as defined in TS 23.401 [41]. If absent, eCall over IMS via EPC is not supported by the network in the cell.NOTE 2.

11.5.4.3 Test description

11.5.4.3.1 Pre-test conditions

System Simulator:

- 2 cells

- NR Cell 1 as defined in TS 38.508-1 [4] Table 4.4.2-3. System information combination NR-6 as defined in TS 38.508-1 [4], sub-clause 4.4.3.1.2.

- E-UTRA Cell 1 as defined in TS 36.508 [7] Table 4.4.2-2. System information combination 31 as defined in TS 36.508 [7], sub-clause 4.4.3.1.1.

UE:

- the eCall capable UE is equipped with ‘eCall only’ enabled USIM configured as per TS 38.508-1 [4] Table 6.4.1-24.

Preamble:

- The UE is in test state 0-A (Switched Off) as defined in TS 38.508-1 [4], subclause 4.4A.2.

11.5.4.3.2 Test procedure sequence

Table 11.5.4.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The SS configures:  - NR Cell 1 as "Serving cell"  - E-UTRA Cell 1 as "Non-suitable "off" cell". | - | - | - | - |
| 2 | The UE is switched on. | - | - | - | - |
| 3 | Wait for 60s for the UE to enter 5GMM-DEREGISTERED.eCALL-INACTIVE state. | - | - | - | - |
| 4 | An automatic eCall is initiated. (Note 1) | - | - | - | - |
| - | EXCEPTION: In parallel to the events described in step 4 the steps specified in Table 11.5.4.3.2-2 should take place. | - | - | - | - |
| 5 | The UE transmits preamble on PRACH. | --> | PRACH Preamble | - | - |
| 6 | The SS configures:  - E-UTRA Cell 1 as "Suitable cell". | - | - | - | - |
| - | The following messages are to be observed on E-UTRA Cell 1 unless explicitly stated otherwise | - | - | - | - |
| 7 | Check: Does the UE sends an ATTACH  REQUEST message with a PDN  CONNECTIVITY REQUEST message to  request PDN connectivity to the default PDN.  EPS attach type = "combined EPS/IMSI  attach"? | --> | ATTACH REQUEST | 1 | P |
| 8-26 | Steps 7 to 25 of Generic Test Procedure for eCall over IMS establishment in EUTRA: eCall Only Support specified in TS 36.508 subclause 4.5A.27 take place. | - | - | - | - |
| 27 | Release eCall over IMS using the generic procedure described in TS 34.229-1 [35] subclause C.33. | - | - | - | - |
| 28 | The SS releases the RRC connection. | <-- | RRCConnectionRelease | - | - |
| Note 1: The request to originate an automatic eCall may be performed by MMI or AT command. | | | | | |

Table 11.5.4.3.2-2: Parallel behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| - | EXCEPTION: The steps 1 and 2 below are repeated for the duration of T300. | - | - | - | - |
| 1 | The UE attempts to perform RACH procedure on NR Cell 1. | --> | PRACH Preamble | - | - |
| 2 | The SS does not respond. | - | *-* | - | - |

11.5.4.3.3 Specific message contents

Table 11.5.4.3.3-1: Message *SystemInformationBlockType1* for NR Cell(All steps, Table 11.5.4.3.2-1)

|  |
| --- |
| Derivation path: TS 38.508-1 [4] table 4.6.1-28 Condition eCalloverIMSforNR |

Table 11.5.4.3.3-2: Message *SystemInformationBlockType1* for E-UTRACell 1(All Steps, Table 11.5.4.3.2-1)

|  |
| --- |
| Derivation path: TS 36.508 [7] table 4.4.3.2-3 Condition eCalloverIMS |

Table 11.5.4.3.3-3: Message ATTACH ACCEPT (step 17, Table 11.5.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 36.508 [7] table 4.7.2-1 | | | |
| Information Element | Value/Remark | Comment | Condition |
| EPS attach result | '010'B | ''Combined EPS/IMSI attach'' |  |
| EPS network feature support | '0000 0011'B | emergency bearer services in S1 mode and IMS voice over PS session in S1 mode are supported |  |

### 11.5.5 eCall Only mode / Limited service state / Call to URI for test service should not be attempted / eCall over IMS should be attempted / 5GS

11.5.5.1 Test Purpose (TP)

(1)

**with** { UE in eCALL-INACTIVE.LIMITED-SERVICE state }

**ensure that** {

**when** { UE is requested to make an eCall to URI for test service }

**then** { UE does not transmit any RRCSetupRequest message }

}

(2)

**with** { UE in eCALL-INACTIVE.LIMITED-SERVICE state }

ensure that {

when { UE is requested to make a manual eCall }

**then** { UE transmits a REGISTRATION REQUEST message with registration type set to “emergency” }

}

11.5.5.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 23.122 [38], subclause 2

[TS 23.122 clause 2]

If the MS is in eCall only mode, it attempts to camp on a suitable cell and enters an "eCall inactive" state in which it can only attempt an eCall over IMS, or a call to a non-emergency MSISDN or URI for test or terminal reconfiguration services as specified in 3GPP TS 31.102 [40].

If the MS is in eCall only mode and is unable to find a suitable cell to camp on, it attempts to camp on an acceptable cell in limited service state, and enters an "eCall inactive" state in which it can only attempt an eCall over IMS.

11.5.5.3 Test description

11.5.5.3.1 Pre-test conditions

System Simulator:

- NR Cell 1

- The PLMN is defined in Table 11.5.5.3.1-1.

Table 11.5.5.3.1–1: PLMN identifier

|  |  |  |
| --- | --- | --- |
| NR Cell | PLMN name | MCC / MNC |
| 1 | PLMN4 | 004 / 31 |

UE:

- the eCall capable UE is equipped with ‘eCall only’ enabled USIM configured as per TS 38.508-1 [4] Table 6.4.1-26.

Preamble:

- The UE is in test state 0-A (Switched Off) as defined in TS 38.508-1 [4], subclause 4.4A.2.

11.5.5.3.2 Test procedure sequence

Table 11.5.5.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2 | Wait 60s for the UE to camp on NR Cell 1 as an acceptable cell. | - | - | - | - |
| 3 | A manual eCall is initiated. (Note 1) | - | - | - | - |
| 4A-4B | Steps 1-2 of test procedure 4.9.12 in TS 38.508-1 [4] are performed. | - | - | - | - |
| 4C | Check: Does the UE transmit an *RRCSetupComplete* message and a REGISTRATION REQUEST message with ‘Registration type' set to 'emergency’? | --> | NR RRC: *RRCSetupComplete*  5GMM: REGISTRATION REQUEST | 2 | P |
| 4D-4O | Steps 4-15 of test procedure 4.9.12 in TS 38.508-1 [4] are performed. | - | - | - | - |
| - | EXCEPTION: In parallel to the events described in steps 4P-4R below the events specified Table 11.5.5.3.2-2 take place. | - | - | - | - |
| 4P-4R | Steps 16-18 of test procedure 4.9.12 in TS 38.508-1 [4] are performed. | - | - | - | - |
| 5 | Test procedure for IMS MT Emergency call release is performed as specified in TS 38.508-1 [4], subclause 4.9.12B on NR Cell 1. | - | - | - | - |
| 6 | Void | - | - | - | - |
| 7 | The SS releases the RRC connection. | <-- | RRC: RRCRelease | - | - |
| 8 | Wait for 5 seconds | - | - | - | - |
| 9 | An eCall to URI for test service is initiated. (Note 2) | - | - | - | - |
| 10 | Check: Does UE send an *RRCConnectionRequest* on NR Cell 1 within 120 seconds? | --> | RRC: RRCSetupRequest | 1 | F |
| Note 1: The request to originate a manual eCall may be performed by MMI or AT command.  Note 2: The request to originate an eCall to URI for test service may be performed by MMI or AT command. | | | | | |

Table 11.5.5.3.2-2: Parallel behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message/PDU/SDU |  |  |
| 1-3 | Steps 1-3 of generic test procedure for setting up eCall as defined in TS 34.229-5 [47] annex A.23 are performed. | - | - | - | - |

11.5.5.3.3 Specific message contents

Table 11.5.5.3.3-1: SIB1 for NR Cell 1 (All steps, Table 11.5.5.3.2-1)

|  |
| --- |
| Derivation path: TS 38.508-1 [4] table 4.6.1-28 Condition eCalloverIMSforNR |

Table 11.5.5.3.3-2:REGISTRATION REQUEST (step 4C, Table 11.5.5.3.2-1)

|  |
| --- |
| Derivation Path: Table 4.7.1-6, condition EMERGENCY. |

Table 11.5.5.3.3-3:INVITE (step 1, Table 11.5.5.3.2-2)

|  |
| --- |
| Derivation Path: Step 1 in Annex A.23 TS 34.229-5 [47], Condition A6 |

### 11.5.6 eCall capable / 5GS supports IMS voice over PS session / 5GS supports emergency service / eCall over IMS is not supported / eCall using the CS domain / emergency call over IMS if eCall using the CS domain is not available / UTRA

11.5.6.1 Test Purpose (TP)

(1)

**with** { UE in 5GMM-REGISTERED.NORMAL-SERVICE state and 5GMM-IDLE mode }

**ensure that** {

**when** { *eCallOverIMS-Support* is not indicated in SIB1 and UE is requested to make an automatic eCall and UTRA Cell is available }

**then** { UE establishes the eCall using the CS domain (UTRA) }

}

(2)

**with** { UE in 5GMM-REGISTERED.NORMAL-SERVICE state and 5GMM-IDLE mode }

ensure that {

**when** { *eCallOverIMS-Support* is not indicated in SIB1 and UE is requested to make an automatic eCall }

**then** { UE establishes an RRC connection for normal emergency call with the RRC *establishmentCause* set to "emergency", **and**, sends a SERVICE REQUEST message with Service type IE set to "emergency services" }

}

11.5.6.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 38.331, clauses 5.2.2.4.2, 6.2.2 and TS 23.167, Annex H.6.

[TS 38.331, clause 5.2.2.4.2]

Upon receiving the *SIB1* the UE shall:

1> store the acquired *SIB1*;

…

4> forward the *eCallOverIMS-Support* to upper layers, if present;

[TS 38.331, clause 6.2.2]

eCallOverIMS-Support

Indicates whether the cell supports eCall over IMS services as defined in TS 23.501 [32]. If absent, eCall over IMS is not supported by the network in the cell.

[TS 23.167, clause H.6]

This clause details the domain priority and selection (see clause 7.3) for a UE that attempts to make an eCall over IMS session using E-UTRAN or NG-RAN radio access networks based on the availability of the CS or PS domains and the network support for IMS emergency, eCall over IMS and IMS voice over PS.

The following table (Table H.2) defines these rules based on the UE (last 2 columns) for different initial conditions (first 4 columns) when an eCall over IMS session is initiated and when the UE is not in limited service state.

Table H.2: Domain Selection Rules for eCall over IMS session attempts for E-UTRAN or NG-RAN radio access networks

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | PS Available | VoIMS | EMS | ECL | First eCall Attempt | Second eCall Attempt |
| A | Y | Y | Y | Y | PS | PS on another PS RAT if available with EMS=Y and ECL=Y  or CS if available |
| B | Y | Y | Y | N | CS if available | PS (UE establishes IMS emergency session) |
| C | Y | Y or N | N | N | CS if available | PS on another PS RAT if available with EMS=Y or EMS unknown |
| D | Y | N | Y | Y | PS or CS if available | CS if first attempt in PS  PS if first attempt in CS |
| E | Y | N | Y | N | CS if available | PS (UE establishes IMS emergency session) |
| F | N |  | - | - | CS if available |  |
| VoIMS = Voice over IMS over PS sessions support as indicated by IMS Voice over PS session supported indication as defined in TS 23.401 [28] and TS 23.502 [49].  EMS = IMS Emergency Services supported as indicated by Emergency Service Support indicator as defined in TS 23.401 [28] and TS 23.501 [48] and TS 23.502 [49].  ECL = eCall Over IMS support as indicated by the eCall support indicator defined in TS 23.401 [28] and TS 23.501 [48].  NOTE 1: As an implementation option, when the first attempt uses PS and fails for reasons other than related to IMS, the second attempt may use PS with a different 3GPP RAT. In this case the UE, can make a third attempt using CS. | | | | | | |

NOTE: If the E-UTRAN and NG-RAN cells available to the UE have different settings, the UE assumes "PS Available" and "ECL" apply to whichever cell is indicated (as defined in TS 23.401 [28] and TS 23.501 [48]) as providing eCall over IMS support. When support by more than one cell is indicated, a UE may select any cell to attempt eCall over IMS according to the UE implementation.

11.5.6.3 Test description

11.5.6.3.1 Pre-test conditions

System Simulator:

- NR Cell 1 as defined in TS 38.508-1 [4] Table 4.4.2-3. System information combination NR-1 as defined in TS 38.508-1 [4], subclause 4.4.3.1.2.

- UTRA Cell 5 is configured as Non-suitable "Off" cell as defined in TS 36.508 [7].

UE:

- the eCall capable UE is equipped with USIM configured as per TS 38.508-1 [4] Table 6.4.1-23.

Preamble:

- The UE is in test state 1N-A as defined in TS 38.508-1 [4], subclause 4.4A.2 on NR Cell 1.

11.5.6.3.2 Test procedure sequence

Table 11.5.6.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| - | EXCEPTION: Steps 1a1 to 1a27 describes behaviour that depends on the UE capability pc\_UTRA = TRUE; the "lower case letter" identifies a step sequence that takes place if a capability is supported. | - | - | - | - |
| 1a1 | The SS configures UTRA Cell 5 as ''Suitable Neighbour cell''. | - | - | - | - |
| 1a2 | Cause the UE to originate an automatic eCall. (Note 1) | - | - | - | - |
| 1a3 | Check: Does the UE transmit an RRC CONNECTION REQUEST message on Cell 5 with establishment cause set to Emergency Call? | --> | RRC CONNECTION REQUEST | 1 | P |
| 1a4 | The SS transmits an RRC CONNECTION SETUP message. | <-- | RRC CONNECTION SETUP | - | - |
| 1a5 | The UE transmits an RRC CONNECTION SETUP COMPLETE message. | --> | RRC CONNECTION SETUP COMPLETE | - | - |
| - | EXCEPTION: In parallel to the event described in steps 1a6 to 1a17, if initiated by the UE the steps 5 to 13 of the generic procedure for Registration on PS specified in TS 34.108 subclause 7.2.2.2.3 take place. | - | - | - | - |
| 1a6 | Check: Does the UE transmit a CM SERVICE REQUEST with CM service type IE indicating “Emergency call establishment”? | --> | CM SERVICE REQUEST | 1 | P |
| 1a7 | The SS transmits an AUTHENTICATION REQUEST. | <-- | AUTHENTICATION REQUEST | - | - |
| 1a8 | The UE transmits AUTHENTICATION RESPONSE. | --> | AUTHENTICATION RESPONSE | - | - |
| 1a9 | The SS transmits a SECURITY MODE COMMAND message for the CS domain. | <-- | SECURITY MODE COMMAND | - | - |
| 1a10 | The UE transmits a SECURITY MODE COMPLETE message. | --> | SECURITY MODE COMPLETE | - | - |
| 1a11 | Check: Does the UE transmit an EMERGENCY SETUP message with Emergency Service Category IE bit 7 set to 1 and all other bits are set to 0? | --> | EMERGENCY SETUP | 1 | P |
| 1a12-1a17 | Steps 11 to 16 of the generic test procedure in TS 34.108 subclause 7.2.3.2.3 are performed on Cell 5.  NOTE: the CS call setup is completed. | - | - | - | - |
| 1a18 | Traffic channel is kept active for at least 5 seconds. | - | - | - | - |
| 1a19 | The SS transmits DISCONNECT. | <-- | DISCONNECT | - | - |
| 1a20 | The UE transmits RELEASE. | --> | RELEASE | - | - |
| 1a21 | The SS transmits RELEASE COMPLETE. | <-- | RELEASE COMPLETE | - | - |
| 1a22 | The SS transmits an RRC CONNECTION RELEASE message. | <-- | RRC CONNECTION RELEASE | - | - |
| 1a23 | The UE transmits RRC CONNECTION RELEASE COMPLETE. |  | RRC CONNECTION RELEASE COMPLETE |  |  |
| 1a24 | if possible (see ICS) switch off is performed or the USIM is removed.  Otherwise the power is removed. | - | - | - | - |
| - | EXCEPTION: Step1a24Aa1 describes behaviour that depends on the UE capability. | - | - | - | - |
| 1a24Aa1 | If pc\_SwitchOnOff or pc\_USIM\_Removal then UE sends DETACH REQUEST message | --> | DETACH REQUEST | - | - |
| 1a25 | Set the power level of Cell 5 to Non-suitable" Off" level. | - | - | - | - |
| 1a26 | The UE is brought back to operation or the USIM configured as per TS 38.508-1 [4] Table 6.4.1-23 is inserted. | - | - | - | - |
| 1a27 | The Generic test procedure for NR RRC\_IDLE described in TS 38.508-1 [4], Table 4.5.2.2-2 is performed. The UE performs registration and the RRC connection is released. | - | - | - | - |
| 2-17a1 | Void | - | - | - | - |
| 18 | Cause the UE to originate Automatic eCall. (see Note 1) | - | - | - | - |
| 19 | Check: Does the UE perform Generic Test Procedure for IMS Emergency call establishment with IMS Emergency registration as specified in TS 38.508-1 [4], subclause 4.9.11? (see Note 2) | - | - | 2 | - |
| 20 | Test procedure for IMS MT Emergency call release is performed as specified in TS 38.508-1 [4], subclause 4.9.12B. | - | - | - | - |
| 21 | The SS releases the RRC connection. | - | - | - | - |
| Note 1: The request to originate an automatic eCall may be performed by MMI or AT command.  Note 2: The UE shall set the “Request URI and To header” to "urn:service:sos.ecall.automatic" and shall not include the initial MSD in the SIP INVITE message. | | | | | |

11.5.6.3.3 Specific message contents

able 11.5.6.3.3-0: *SIB1* of NR Cell 1 (All steps, Table 11.5.6.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-28 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| eCallOverIMS-Support | Not present |  |  |
| } |  |  |  |

Table 11.5.6.3.3-1: RRC CONNECTION REQUEST (Step 1a3, Table 11.5.6.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 34.108 clause 9.1.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Establishment cause | Emergency Call |  |  |

Table 11.5.6.3.3-2: CM SERVICE REQUEST (Step 1a6, Table 11.5.6.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 24.008 Table 9.2.11 | | | |
| Information Element | Value/remark | Comment | Condition |
| CM service type | 0010 | Emergency call establishment |  |

### 11.5.7 eCall Only mode / SRVCC Handover to CS domain / UTRAN / MSD Update / Success / 5GS

11.5.7.1 Test Purpose (TP)

(1)

**with** { UE in eCall Only Mode and an IMS eCall is ongoing }

**ensure that** {

**when** { UE receives a *MobilityFromNRCommand* message and an UTRA Speech RAB combination is configured for an UTRA cell }

**then** { UE transmits a HANDOVER TO UTRAN COMPLETE message on the utra cell }

}

11.5.7.2 Conformance requirements

References: The conformance requirements covered in the present testcase are specified in TS 38.331, clause 5.4.3.3, TS 23.237, clauses 5.3.3, 6c.2.1, TS 26.267, clause 4.3, and TS 24.008, clause 5.2.4.2.

[TS 38.331, clause 5.4.3.3]

Reception of the MobilityFromNRCommand by the UE

The UE shall:

1> stop timer T310, if running;

1> stop timer T312, if running;

1> if T316 is running:

2> stop timer T316;

2> clear the information included in *VarRLF-Report*, if any;

1> if T390 is running:

2> stop timer T390 for all access categories;

2> perform the actions as specified in 5.3.14.4;

1> if the *targetRAT-Type* is set to *eutra*:

2> consider inter-RAT mobility as initiated towards E-UTRA;

2> forward the *nas-SecurityParamFromNR* to the upper layers, if included;

1> else if the *targetRAT-Type* is set to *utra-fdd*:

2> consider inter-RAT mobility as initiated towards UTRA-FDD;

2> forward the *nas-SecurityParamFromNR* to the upper layers, if included;

1> access the target cell indicated in the inter-RAT message in accordance with the specifications of the target RAT.

[TS 23.237, clause 5.3.3]

The Emergency Access Transfer Function (EATF) provides IMS-based mechanisms for enabling service continuity of IMS emergency sessions and eCall over IMS. It is a function in the serving (visited if roaming) IMS network, providing the procedures for IMS emergency session anchoring and PS to CS Access Transfer. The EATF acts as a routing B2BUA which invokes third party call control (3pcc) for enablement of Access Transfer.

When supporting PS to CS DRVCC for IMS emergency, the EATF provides the following functions:

- Generates and sends an E-STN-DR to UE for session continuity procedure toward the CS domain. The E-STN-DR is used by the EATF to correlate two access legs, and is unique for each access transfer function within an EATF.

The EATF performs the session continuity when the Access Transfer request indicated by the E-STN-SR is received.

[TS 23.237, clause 6c.2.1]

Figure 6c.2.1-1 provides flow for SRVCC for IMS emergency session, when the IMS emergency session is active session. This applies when a single EATF instance is deployed (see clause 6c.2.3 for multiple EATF instances).



Figure 6c.2.1-1: IMS level Call flow for SRVCC for IMS emergency session with E-STN-SR with a single EATF instance

1. MSC Server initiates the session transfer with the E-STN-SR and it includes the equipment identifier.

2. The I-CSCF routes the INVITE directly to the EATF via I5 by using similar procedures to that defined in TS 23.228 [4] for PSI based Application Server termination.

NOTE 1: The use of indirect routeing for PSI based Application Server Termination as described in TS 23.228 [4] in clause 5.7.6 cannot be used for routing the INVITE to the EATF.

3 - 4. The EATF uses the E-STN-SR to determine that Access Transfer is requested. The EATF proceeds with the Access Transfer of the active session with bi-directional speech for the UE by updating the Remote Leg with the media description and other information using the Remote Leg Update procedure as specified in clause 6.3.1.5. For SRVCC session transfer of an eCall over IMS, the EATF indicates in the reINVITE that the EATF shall exclude INFO requests for any Info Packages related to eCall over IMS as defined in RFC 6086 [34] clause 5.2.2.

NOTE: Indicating an unwillingness to receive INFO requests will prevent an emergency centre/PSAP from sending an INFO message to request an updated MSD from the UE.

5. The E-CSCF forwards the Re-INVITE to the MGCF associated with the PSAP if the PSAP is located in the PSTN or CS Domain (the u-plane path is switched between the UE and the MGW) or the Re-INVITE is sent directly to an IP-capable PSAP (the u-plane path between the UE and the PSAP is switched end-to-end).

6. When session modification procedures complete, the source access leg (i.e. the access leg previously established over IMS) is released as specified in clause 6.3.1.6.

NOTE 2: If non-voice media was part of the original Multimedia emergency call session, the non-voice media will be released.

[TS 26.267, clause 4.3]

After an emergency voice call has been (automatically or manually) established, the IVS modem receiver constantly monitors the incoming signal from the speech decoder output. When prompted by a request from the PSAP operator for MSD, the IVS connects the IVS data modem transmitter to the input of the speech coder and mutes any speech from the motorist for the duration of MSD transmission to prevent it from interfering with the eCall data transmission. Alternatively, it can be the IVS that may trigger the MSD transmission. In this case, the IVS asks the PSAP to request an MSD transmission.

The first operation mode shall be referred to as the *pull* mode whereas the latter one is the *push* mode. Essentially, push mode is realized by a request from the IVS to the PSAP to *pull* the MSD.

The requirement about the modem to be configured in either *push* or *pull* mode is beyond the scope of this specification. Refer to clause 4.2 for a reproduction of eCall service requirements.

[TS 24.008, clause 5.2.4.2]

If the MS supports single radio PS to CS access transfer for calls in alerting state as specified in 3GPP TS 24.237 [136] subclause 12.2.3B, and the MS has a single voice media stream over the PS domain that is handed over to the CS domain via SRVCC, and the call control entity of the MS in the "null" state receives an indication "MM connection establishment due to SRVCC handover" then:

- the call control entity shall indicate to the upper layers that call establishment is due to SRVCC handover;

- if the upper layers indicate that the media stream(s) is/are associated with a mobile originated session in the "early" state (defined in IETF RFC 3261 [137]) according to the conditions specified in 3GPP TS 24.237 [136] subclause 12.2.3B.3.2, the call control entity of the MS shall enter the "call delivered" state for this transaction. The MS and the network shall locally set the TI value of the call to "000" and the TI flag value as in mobile terminated call; and

...

If the MS has additional voice media streams carried over the PS domain that are handed over to the CS domain via SRVCC, the call states for the transactions and the setting of the TI value and TI flag for these additional media streams are described in 3GPP TS 24.237 [136].

11.5.7.3 Test Description

11.5.7.3.1 Pre-test conditions

System Simulator:

- NR Cell 1 with system information combination NR-1 as defined in TS 38.508-1 [4].

- UTRA Cell 5 as defined in TS 36.508 [7].

UE:

- the eCall capable UE is equipped with ‘eCall only’ enabled USIM configured as per TS 38.508-1 [4] Table 6.4.1-24.

Preamble:

- The UE is in test state 0-A (Switched Off) as defined in TS 38.508-1 [4], subclause 4.4A.2.

11.5.7.3.2 Test procedure sequence

Table 11.5.7.3.2-1/2 illustrate the downlink power levels and other changing parameters to be applied for the cell at various time instants of the test execution. The exact instants on which these values shall be applied are described in the texts in this clause. The configuration T0 indicates the initial conditions for preamble. Configurations marked "T1" and “T2” are applied at the points indicated in the Main behaviour description in Table 11.5.7.3.2-3.

Table 11.5.7.3.2-1: Time instances of cell power level and parameter changes for FR1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter | Unit | NR Cell 1 | UTRA Cell 5 | Remark |
| T0 | SS/PBCH  SSS EPRE | dBm/  SCS | -88 | - |  |
| CPICH\_Ec (UTRA FDD) | dBm/3.84 MHz | - | Off |  |
| T1 | SS/PBCH  SSS EPRE | dBm/  SCS | -88 | - |  |
| CPICH\_Ec (UTRA FDD) | dBm/3.84 MHz |  | -60 |  |
| T2 | SS/PBCH  SSS EPRE | dBm/  SCS | Off | - |  |
| CPICH\_Ec (UTRA FDD) | dBm/3.84 MHz |  | -60 |  |

Table 11.5.7.3.2-2: Time instances of cell power level and parameter changes for FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter | Unit | NR Cell 1 | UTRA Cell 5 | Remark |
| T0 | SS/PBCH  SSS EPRE | dBm/  SCS | -82 | - |  |
| CPICH\_Ec (UTRA FDD) | dBm/3.84 MHz | - | Off |  |
| T1 | SS/PBCH  SSS EPRE | dBm/  SCS | -82 | - |  |
| CPICH\_Ec (UTRA FDD) | dBm/3.84 MHz |  | -60 |  |
| T2 | SS/PBCH  SSS EPRE | dBm/  SCS | Off | - |  |
| CPICH\_Ec (UTRA FDD) | dBm/3.84 MHz |  | -60 |  |

Table 11.5.7.3.2-3: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U – S | Message |  |  |
| 1-12 | A manual eCall is established by following the test procedure as defined in steps 1 to 12 of TS 38.508-1 [4], subclause 4.9.29. | - | - | - | - |
| 13 | The SS transmits a *UECapabilityEnquiry* message to request UE radio access capability information for NR and UTRA. | <-- | NR RRC: UECapabilityEnquiry | - | - |
| 14 | The UE transmits a *UECapabilityInformation* message.  NOTE: The start-CS values received, should be used to configure ciphering on cell 5. | --> | NR RRC: UECapabilityInformation | - | - |
| 15-26 | Steps 15-26 of generic procedure specified in Table 4.9.29.2.2-1 of TS 38.508-1 [4] are performed. | - | - | - | - |
| 27 | Set the power levels according to “T1” as per Table 11.5.7.3.2-1/2. | - | - | - | - |
| 28 | The SS transmits a *MobilityFromNRCommand* message*.* | <-- | NR RRC: MobilityFromNRCommand | - | - |
| - | The following messages are to be observed on UTRA Cell 5 unless explicitly stated otherwise. | - | - | - | - |
| 29 | Check: Does the UE transmit a HANDOVER TO UTRAN COMPLETE messageon cell 5? | - | HANDOVER TO UTRAN COMPLETE | 1 | P |
| - | EXCEPTION: In parallel to the events described in steps 30 to 35, the steps specified in table 11.5.7.3.2-4 take place. | - | - | - | - |
| 30 | The SS transmits a SECURITY MODE COMMAND message for the CS domain. | <-- | SECURITY MODE COMMAND | - | - |
| 31 | The UE transmits a SECURITY MODE COMPLETE message. | --> | SECURITY MODE COMPLETE | - | - |
| 32 | The SS transmits an UTRAN MOBILITY INFORMATION message to notify CN information. | <-- | UTRAN MOBILITY INFORMATION | - | - |
| 33 | The UE transmits an UTRAN MOBILITY INFORMATION CONFIRM message. | --> | UTRAN MOBILITY INFORMATION CONFIRM | - | - |
| 34 | The SS transmits a TMSI REALLOCATION COMMAND message. | <-- | TMSI REALLOCATION COMMAND | - | - |
| 35 | The UE transmits a TMSI REALLOCATION COMPLETE message. | --> | TMSI REALLOCATION COMPLETE | - | - |
| 36 | The CS traffic channel is kept alive by UE for at-least 5 seconds for in-band MSD transfer. | - | - | - | - |
| 37 | Set the power levels according to “T2” as per Table 11.5.7.3.2-1/2. | - | - | - | - |
| 38 | The SS transmits DISCONNECT. | <-- | DISCONNECT | - | - |
| 39 | The UE transmits RELEASE. | --> | RELEASE | - | - |
| 40 | The SS transmits RELEASE COMPLETE. | <-- | RELEASE COMPLETE | - | - |
| 41 | The SS transmits an RRC CONNECTION RELEASE message. | <-- | RRC CONNECTION RELEASE | - | - |
| 42 | The UE transmits RRC CONNECTION RELEASE COMPLETE. | --> | RRC CONNECTION RELEASE COMPLETE | - | - |
| Note 1: The request to originate a manual eCall may be performed by MMI or AT command. | | | | | |

Table 11.5.7.3.2-4: Parallel behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Check: Does the UE transmit an ATTACH REQUEST message? | --> | ATTACH REQUEST | - | - |
| 2 | The SS transmits an AUTHENTICATION AND CIPHERING REQUEST message. | <-- | AUTHENTICATION AND CIPHERING REQUEST | - | - |
| 3 | The UE transmits an AUTHENTICATION AND CIPHERING RESPONSE message. | --> | AUTHENTICATION AND CIPHERING RESPONSE | - | - |
| 4 | The SS transmits a SECURITY MODE COMMAND message for the PS domain. | <-- | SECURITY MODE COMMAND | - | - |
| 5 | The UE transmits a SECURITY MODE COMPLETE message. | --> | SECURITY MODE COMPLETE | - | - |
| 6 | The SS transmits an ATTACH ACCEPT message. | <-- | ATTACH ACCEPT | - | - |
| 7 | The UE transmits an ATTACH COMPLETE message. | --> | ATTACH COMPLETE | - | - |

11.5.7.3.3 Specific message contents

Table 11.5.7.3.3-1: SIB1 for NR Cell 1 (All steps, Table 11.5.7.3.2-3)

|  |
| --- |
| Derivation path: TS 38.508-1 [4] table 4.6.1-28 Condition eCalloverIMSforNR |

Table 11.5.7.3.3-2: Message REGISTRATION REQUEST (step 5, Table 11.5.7.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| 5GMM capability | '???? ???? ???? ???? ???? ???? ???? ???1 \*'B | 5G-SRVCC from NG-RAN to UTRAN supported |  |

Table 11.5.7.3.3-3: *UECapabilityEnquiry* (step 13, Table 11.5.7.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 38.508-1 [4], Table 4.6.1-31 | | | |
| Information Element | Value/remark | Comment | Condition |
| UECapabilityEnquiry ::= SEQUENCE { |  |  |  |
| rrc-TransactionIdentifier | RRC-TransactionIdentifier |  |  |
| criticalExtensions CHOICE { |  |  |  |
| ueCapabilityEnquiry SEQUENCE { |  |  |  |
| ue-CapabilityRAT-RequestList SEQUENCE (SIZE (1.. maxRAT-CapabilityContainers)) OF CapabilityRAT-Request { | 2 entries |  |  |
| UE-CapabilityRAT-Request[1] SEQUENCE { |  | entry 1 |  |
| rat-Type | nr |  |  |
| } |  |  |  |
| UE-CapabilityRAT-Request[2] SEQUENCE { |  | entry 2 |  |
| rat-Type | utra-fdd-v1610 |  |  |
| } |  |  |  |
| } |  |  |  |
| lateNonCriticalExtension | Not present |  |  |
| nonCriticalExtension | Not present |  |  |
| } |  |  |  |
| criticalExtensionsFuture |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.5.7.3.3-4: *UECapabilityInformation* (step 14, Table 11.5.7.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 38.508-1 [4], Table 4.6.1-32 | | | |
| Information Element | Value/remark | Comment | Condition |
| UECapabilityInformation ::= SEQUENCE { |  |  |  |
| rrc-TransactionIdentifier | RRC-TransactionIdentifier |  |  |
| criticalExtensions CHOICE { |  |  |  |
| ueCapabilityInformation SEQUENCE { |  |  |  |
| ue-CapabilityRAT-ContainerList SEQUENCE (SIZE (0..maxRAT-CapabilityContainers)) OF CapabilityRAT-Request { | 2 entries |  |  |
| UE-CapabilityRAT-Request[1] SEQUENCE { |  | entry 1 |  |
| rat-Type | nr |  |  |
| ueCapabilityRAT-Container | Not checked |  |  |
| } |  |  |  |
| UE-CapabilityRAT-Request[2] SEQUENCE { |  | entry 2 |  |
| rat-Type | utra-fdd-v1610 |  |  |
| ueCapabilityRAT-Container | Octet string | INTER RAT HANDOVER INFO |  |
| } |  |  |  |
| } |  |  |  |
| lateNonCriticalExtension | Not checked |  |  |
| nonCriticalExtension | Not checked |  |  |
| } |  |  |  |
| criticalExtensionsFuture | Not checked |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.5.7.3.3-5: MobilityFromNRCommand (step 28, Table 11.5.7.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 38.508-1 [4] Table 4.6.1-8 | | | |
| Information Element | Value/remark | Comment | Condition |
| MobilityFromNRCommand::= SEQUENCE { |  |  |  |
| rrc-TransactionIdentifier | RRC-TransactionIdentifier |  |  |
| criticalExtensions CHOICE { |  |  |  |
| mobilityFromNRCommand ::= SEQUENCE { |  |  |  |
| targetRAT-Type | utra-fdd-v1610 |  |  |
| targetRAT-MessageContainer | HANDOVER TO UTRAN COMMAND(UTRA RRC message) |  |  |
| nas-SecurityParamFromNR | 4 LSB of the downlink NAS COUNT |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.5.7.3.3-6: HANDOVER TO UTRAN COMMAND(Table 11.5.7.3.3-5)

|  |
| --- |
| Derivation Path: 36.508 [7], Table 4.7B.1-1, condition UTRA Speech |

Table 11.5.7.3.3-7: SECURITY MODE COMMAND(step 30, Table 11.5.7.3.2-3)

| Derivation Path: 36.508 [7], Table 4.7B.1-n | | |
| --- | --- | --- |
| Information Element | Condition | Value/remark |
| Ciphering mode info |  | Not Present |

Table 11.5.7.3.3-8: SECURITY MODE COMMAND(step 4, Table 11.5.7.3.2-4)

| Derivation Path: TS 36.508 [7], Table 4.7B.1-n | | |
| --- | --- | --- |
| Information Element | Condition | Value/remark |
| Ciphering mode info |  | StartRestart |
| Integrity protection mode info |  | modify |
| CN Domain Identity |  | ps-domain |

### 11.5.8 eCall Only mode / 5GS supports IMS voice over PS session / 5GS supports emergency service / eCall over IMS is supported / RACH failure in NR cell / eCall using the CS domain

11.5.8.1 Test Purpose (TP)

(1)

**with** { UE is in state 5GMM-DEREGISTERED.eCALL-INACTIVE }

**ensure that** {

**when** { UE is requested to make an automatic eCall over IMS and RACH failure is observed in NR cell }

**then** { UE establishes the eCall using CS domain (UTRA or GERAN) }

}

11.5.8.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 23.167, Annex H.6.

[TS 23.167 Annex H.6]

This clause details the domain priority and selection (see clause 7.3) for a UE that attempts to make an eCall over IMS session using E-UTRAN or NG-RAN radio access networks based on the availability of the CS or PS domains and the network support for IMS emergency, eCall over IMS and IMS voice over PS.

The following table (Table H.2) defines these rules based on the UE (last 2 columns) for different initial conditions (first 4 columns) when an eCall over IMS session is initiated and when the UE is not in limited service state.

Table H.2: Domain Selection Rules for eCall over IMS session attempts for E-UTRAN or NG-RAN radio access networks

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | PS Available | VoIMS | EMS | ECL | First eCall Attempt | Second eCall Attempt |
| A | Y | Y | Y | Y | PS | PS on another PS RAT if available with EMS=Y and ECL=Y  or CS if available |
| B | Y | Y | Y | N | CS if available | PS (UE establishes IMS emergency session) |
| C | Y | Y or N | N | N | CS if available | PS on another PS RAT if available with EMS=Y or EMS unknown |
| D | Y | N | Y | Y | PS or CS if available | CS if first attempt in PS  PS if first attempt in CS |
| E | Y | N | Y | N | CS if available | PS (UE establishes IMS emergency session) |
| F | N |  | - | - | CS if available |  |
| VoIMS = Voice over IMS over PS sessions support as indicated by IMS Voice over PS session supported indication as defined in TS 23.401 [28] and TS 23.502 [49].  EMS = IMS Emergency Services supported as indicated by Emergency Service Support indicator as defined in TS 23.401 [28] and TS 23.501 [48] and TS 23.502 [49].  ECL = eCall Over IMS support as indicated by the eCall support indicator defined in TS 23.401 [28] and TS 23.501 [48].  NOTE 1: As an implementation option, when the first attempt uses PS and fails for reasons other than related to IMS, the second attempt may use PS with a different 3GPP RAT. In this case the UE, can make a third attempt using CS. | | | | | | |

11.5.8.3 Test description

11.5.8.3.1 Pre-test conditions

System Simulator:

- 2 cells

- NR Cell 1 as defined in TS 38.508-1 [4] Table 4.4.2-3. System information combination NR-1 as defined in TS 38.508-1 [4], subclause 4.4.3.1.2. SIB1 indicates ims-EmergencySupport and eCallOverIMS-Support.

- if px\_NR\_RATComb\_Tested = NR\_UTRA, UTRA Cell 5 as defined in TS 36.508 [7].

- cell 5 is configured as ''Suitable Neighbour cell''.

- if px\_NR\_RATComb\_Tested = NR\_GERAN, GERAN cell 24 as defined in TS 36.508 [7].

- cell 24 is configured as ''Suitable Neighbour cell''.

UE:

- the eCall capable UE is equipped with ‘eCall only’ enabled USIM configured as per TS 38.508-1 [4] Table 6.4.1-24.

Preamble:

- The UE is in state 0-A(Switched Off) as defined in TS 38.508-1 [4], subclause 4.4A.2.

11.5.8.3.2 Test procedure sequence

Table 11.5.8.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **St** | **Procedure** | **Message Sequence** | | **TP** | **Verdict** |
|  |  | **U - S** | **Message** |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2 | Wait 60s for the UE to enter 5GMM-DEREGISTERED.eCALL-INACTIVE state | - | *-* | - | - |
| 3 | An automatic eCall is initiated. (NOTE 1) | - | - | - | - |
| 4 | UE transmits preamble on PRACH | --> | PRACH Preamble | - | - |
| - | EXCEPTION: In parallel to the events described in step 4, the steps specified in Table 11.5.8.3.2-2 should take place. | - | - | - | - |
| - | EXCEPTION: Steps 5a1 to 5b20 describe behaviour that depends on the UE capability; the "lower case letter" identifies a step sequence that takes place if a capability is supported. | - | - | - | - |
| 5a1 | IF (px\_NR\_RATComb\_Tested = NR\_UTRA), Check: Does the UE transmit an RRC CONNECTION REQUEST message on Cell 5 with establishment cause set to Emergency Call? | --> | RRC CONNECTION REQUEST | 1 | P |
| 5a2 | The SS transmits an RRC CONNECTION SETUP message. | <-- | RRC CONNECTION SETUP | - | - |
| 5a3 | The UE transmits an RRC CONNECTION SETUP COMPLETE message. | --> | RRC CONNECTION SETUP COMPLETE | - | - |
| 5a4 | Check: Does the UE transmit a CM SERVICE REQUEST with CM service type IE indicating “Emergency call establishment”? | --> | CM SERVICE REQUEST | 1 | P |
| 5a5 | The SS transmits an AUTHENTICATION REQUEST. | <-- | AUTHENTICATION REQUEST | - | - |
| 5a6 | The UE transmits AUTHENTICATION RESPONSE. | --> | AUTHENTICATION RESPONSE | - | - |
| 5a7 | The SS transmits a SECURITY MODE COMMAND message for the CS domain. | <-- | SECURITY MODE COMMAND | - | - |
| 5a8 | The UE transmits a SECURITY MODE COMPLETE message. | --> | SECURITY MODE COMPLETE | - | - |
| 5a9 | Check: Does the UE transmit an EMERGENCY SETUP message with Emergency Service Category IE bit 7 set to 1 and all other bits are set to 0? | --> | EMERGENCY SETUP | 1 | P |
| 5a10-5a15 | Steps 11 to 16 of the generic test procedure in TS 34.108 subclause 7.2.3.2.3 are performed on Cell 5.  NOTE: the CS call setup is completed. | - | - | - | - |
| 5a16 | Traffic channel is kept active for at least 5 seconds. | - | - | - | - |
| 5a17 | The SS transmits DISCONNECT. | <-- | DISCONNECT | - | - |
| 5a18 | The UE transmits RELEASE. | --> | RELEASE | - | - |
| 5a19 | The SS transmits RELEASE COMPLETE. | <-- | RELEASE COMPLETE | - | - |
| 5a20 | The SS transmits an RRC CONNECTION RELEASE message. | <-- | RRC CONNECTION RELEASE | - | - |
| 5a21 | The UE transmits RRC CONNECTION RELEASE COMPLETE. | --> | RRC CONNECTION RELEASE COMPLETE | - | - |
| 5b1 | IF (px\_NR\_RATComb\_Tested = NR\_GERAN), Check: Does the UE transmit a CHANNEL REQUEST message on Cell 24 with Establishment cause: Emergency call? | --> | CHANNEL REQUEST | 1 | P |
| 5b2 | The SS transmits an IMMEDIATE ASSIGNMENT message. | <-- | IMMEDIATE ASSIGNMENT | - | - |
| 5b3 | Check: Does the UE transmit a CM SERVICE REQUEST with CM service type IE indicating “Emergency call establishment”? | --> | CM SERVICE REQUEST | 1 | P |
| 5b4 | The SS transmits an AUTHENTICATION REQUEST message. | <-- | AUTHENTICATION REQUEST | - | - |
| 5b5 | The UE transmits an AUTHENTICATION RESPONSE message. | --> | AUTHENTICATION RESPONSE | - | - |
| 5b6 | The SS transmits a CIPHERING MODE COMMAND. | <-- | CIPHERING MODE COMMAND | - | - |
| 5b7 | The UE transmits a CIPHERING MODE COMPLETE. | --> | CIPHERING MODE COMPLETE | - | - |
| 5b8 | Check: Does the UE transmit an EMERGENCY SETUP message with Emergency Service Category IE bit 7 set to 1 and all other bits are set to 0? | --> | EMERGENCY SETUP | 1 | P |
| 5b9-5b15 | Steps 11 to 17 of the generic test procedure in TS 51.010-1 subclause 10.2.3 are performed on Cell 24.  NOTE: the CS call setup is completed. | - | - | - | - |
| 5b16 | Traffic channel is kept active for at least 5 seconds. | - | - | - | - |
| 5b17 | The SS transmits DISCONNECT. | <-- | DISCONNECT | - | - |
| 5b18 | The UE transmits RELEASE. | --> | RELEASE | - | - |
| 5b19 | The SS transmits RELEASE COMPLETE. | <-- | RELEASE COMPLETE | - | - |
| 5b20 | The SS transmits CHANNEL RELEASE | <-- | CHANNEL RELEASE | - | - |
| NOTE 1: The request to originate an automatic eCall may be performed by MMI or AT command. | | | | | |

Table 11.5.8.3.2-2: Parallel behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **St** | **Procedure** | **Message Sequence** | | **TP** | **Verdict** |
|  |  | **U - S** | **Message** |  |  |
| - | EXCEPTION: Steps 1 and 2 are repeated for the duration of T300. | - | - | - | - |
| 1 | The UE attempts to perform RACH procedure on NR Cell 1. | - | *-* | - | - |
| 2 | The SS does not respond | - | - | - | - |

11.5.8.3.3 Specific message contents

Table 11.5.8.3.3-1: SIB1 for NR Cell 1 (All steps, Table 11.5.8.3.2-1)

|  |
| --- |
| Derivation path: TS 38.508-1 [4] table 4.6.1-28 Condition eCalloverIMSforNR |

Table 11.5.8.3.3-2: RRC CONNECTION REQUEST (Step 5a1, Table 11.5.8.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 34.108 clause 9.1.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Establishment cause | Emergency Call |  |  |

Table 11.5.8.3.3-3: CM SERVICE REQUEST (Steps 5a4 and 5b3, Table 11.5.8.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 24.008[43] Table 9.2.11 | | | |
| Information Element | Value/remark | Comment | Condition |
| CM service type | 0010 | Emergency call establishment |  |

Table 11.5.8.3-4: CHANNEL REQUEST (Step 5b1, Table 11.5.8.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 44.018 Table 9.1.8.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Establishment cause | 101 | Emergency call |  |

### 11.5.9 eCall Only mode / Manual initiation / Emergency registration / Abnormal case / IMS CN sends 486 (Busy Here) / UE performs eCall in CS domain / UTRAN or GERAN / 5GS

11.5.9.1 Test Purpose (TP)

(1)

**with** { UE is in state 5GMM-DEREGISTERED.eCALL-INACTIVE and requested to make a manual eCall over IMS }

**ensure that** {

**when** { UE receives 486 Busy Here in response to INVITE }

**then** { UE establishes the eCall using CS domain (UTRA or GERAN) }

}

11.5.9.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.229 [44], clauses 5.1.6.11.1, 5.1.6.11.2 and TS 23.167, Annex H.6.

[TS 24.229 clause 5.1.6.11.1]

If the upper layers request establishment of an IMS emergency call of the manually initiated eCall type of emergency service, the service URN shall be "urn:service:sos.ecall.manual" as specified in RFC 8147 [244].

If the upper layers request establishment of an IMS emergency call of the automatically initiated eCall type of emergency service, the service URN shall be "urn:service:sos.ecall.automatic" as specified in RFC 8147 [244].

NOTE 1: The manually initiated eCall type of emergency service is used when the eCall IMS emergency session is invoked with user input. The automatically initiated eCall type of emergency service is used if the eCall IMS emergency session is invoked without user input.

[TS 24.229 clause 5.1.6.11.2]

If the upper layers request establishment of an IMS emergency call of the automatically initiated eCall type of emergency service or of the manually initiated eCall type of emergency service and if allowed by IP-CAN specific annex, the UE shall send an INVITE request as specified in the procedures in subclause 5.1.6.8 with the following additions:

1) the UE shall set the Request-URI to "urn:service:sos.ecall.automatic" or "urn:service:sos.ecall.manual"; and

2) if the IP-CAN indicates the eCall support indication, the UE shall:

a) insert a multipart/mixed body containing an "application/EmergencyCallData.eCall.MSD" MIME body part as defined in RFC 8147 [244], containing the MSD not exceeding 140 bytes and encoded in binary ASN.1 PER as specified in CEN EN 15722:2015 [245] and include a Content-Disposition header field with a "handling" header field parameter with an "optional" value, as described in RFC 3261 [26];

b) insert an Accept header field indicating the UE is willing to accept an "application/EmergencyCallData.Control+xml" MIME type as defined in RFC 8147 [244]; and

c) insert a Recv-Info header field set to "EmergencyCallData.eCall.MSD" as defined in RFC 8147 [244].

NOTE: Further content for the INVITE is as defined in RFC 8147 [244].

Then the UE shall proceed as follows:

…

3) if the UE receives a 486 (Busy Here), 600 (Busy Everywhere) or 603 (Decline) response to the INVITE request containing:

a) a multipart/mixed body containing an "application/EmergencyCallData.Control+xml" MIME body part as defined in RFC 8147 [244] with an "ack" element containing:

i) a "received" attribute set to "true"; and

ii) a "ref" attribute set to the Content-ID of the MIME body part containing the MSD sent by the UE;

then the UE shall consider the initial MSD transmission as successful and shall perform domain selection to re-attempt the eCall as specified in 3GPP TS 23.167 [4B]; and

4) in all other cases, the UE shall perform domain selection to re-attempt the eCall as specified in 3GPP TS 23.167 [4B].

[TS 23.167 clause H.6]

Table H.2: Domain Selection Rules for eCall over IMS session attempts for E-UTRAN or NG-RAN radio access networks

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | PS Available | VoIMS | EMS | ECL | First eCall Attempt | Second eCall Attempt |
| A | Y | Y | Y | Y | PS | PS on another PS RAT if available with EMS=Y and ECL=Y  or CS if available |
| B | Y | Y | Y | N | CS if available | PS (UE establishes IMS emergency session) |
| C | Y | Y or N | N | N | CS if available | PS on another PS RAT if available with EMS=Y or EMS unknown |
| D | Y | N | Y | Y | PS or CS if available | CS if first attempt in PS  PS if first attempt in CS |
| E | Y | N | Y | N | CS if available | PS (UE establishes IMS emergency session) |
| F | N |  | - | - | CS if available |  |
| VoIMS = Voice over IMS over PS sessions support as indicated by IMS Voice over PS session supported indication as defined in TS 23.401 [28] and TS 23.502 [49].  EMS = IMS Emergency Services supported as indicated by Emergency Service Support indicator as defined in TS 23.401 [28] and TS 23.501 [48] and TS 23.502 [49].  ECL = eCall Over IMS support as indicated by the eCall support indicator defined in TS 23.401 [28] and TS 23.501 [48].  NOTE 1: As an implementation option, when the first attempt uses PS and fails for reasons other than related to IMS, the second attempt may use PS with a different 3GPP RAT. In this case the UE, can make a third attempt using CS. | | | | | | |

11.5.9.3 Test description

11.5.9.3.1 Pre-test conditions

System Simulator:

- 2 cells

- NR Cell 1 as defined in TS 38.508-1 [4] Table 4.4.2-3.

- if px\_NR\_RATComb\_Tested = NR\_UTRA, UTRA Cell 5 as defined in TS 36.508 [7].

- cell 5 is configured as ''Suitable Neighbour cell''.

- if px\_NR\_RATComb\_Tested = NR\_GERAN, GERAN cell 24 as defined in TS 36.508 [7].

- cell 24 is configured as ''Suitable Neighbour cell''.

UE:

- the eCall capable UE is equipped with ‘eCall only’ enabled USIM configured as per TS 38.508-1 [4] Table 6.4.1-24.

Preamble:

- The UE is in test state 0-A (Switched Off) as defined in TS 38.508-1 [4], subclause 4.4A.2.

11.5.9.3.2 Test procedure sequence

Table 11.5.9.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2 | Wait 60s for the UE to enter 5GMM-DEREGISTERED.eCALL-INACTIVE state. | - | - | - | - |
| 3 | A manual eCall is initiated. (Note 1) | - | - | - | - |
| 4-21 | Steps 2 to 19 of generic procedure specified in Table 4.5.2.2-2 of 38.508-1 [4] takes place. | - | - | - | - |
| 22-24 | Steps 8-10 of generic procedure specified in Table 4.9.11.2.2-1 of TS 38.508-1 [4] with condition ‘eCall’ are performed. | - | - | - | - |
| 25 | Step 1 of Annex A.23 of TS 34.229-5 [41] happens | --> | INVITE | - | - |
| 26 | SS sends 486 Busy Here response | <-- | 486 Busy Here | - | - |
| - | EXCEPTION: Steps 27a1 to 27b20 describe behaviour that depends on the UE capability; the "lower case letter" identifies a step sequence that takes place if a capability is supported. | - | - | - | - |
| 27a1 | IF (px\_NR\_RATComb\_Tested = NR\_UTRA), Check: Does the UE transmit an RRC CONNECTION REQUEST message on Cell 5 with establishment cause set to Emergency Call? | --> | RRC CONNECTION REQUEST | 1 | P |
| 27a2 | The SS transmits an RRC CONNECTION SETUP message. | <-- | RRC CONNECTION SETUP | - | - |
| 27a3 | The UE transmits an RRC CONNECTION SETUP COMPLETE message. | --> | RRC CONNECTION SETUP COMPLETE | - | - |
| 27a4 | Check: Does the UE transmit a CM SERVICE REQUEST with CM service type IE indicating “Emergency call establishment”? | --> | CM SERVICE REQUEST | 1 | P |
| 27a5 | The SS transmits an AUTHENTICATION REQUEST. | <-- | AUTHENTICATION REQUEST | - | - |
| 27a6 | The UE transmits AUTHENTICATION RESPONSE. | --> | AUTHENTICATION RESPONSE | - | - |
| 27a7 | The SS transmits a SECURITY MODE COMMAND message for the CS domain. | <-- | SECURITY MODE COMMAND | - | - |
| 27a8 | The UE transmits a SECURITY MODE COMPLETE message. | --> | SECURITY MODE COMPLETE | - | - |
| 27a9 | Check: Does the UE transmit an EMERGENCY SETUP message with Emergency Service Category IE bit 6 set to 1 and all other bits are set to 0? | --> | EMERGENCY SETUP | 1 | P |
| 27a10-27a15 | Steps 11 to 16 of the generic test procedure in TS 34.108 subclause 7.2.3.2.3 are performed on Cell 5.  NOTE: the CS call setup is completed. | - | - | - | - |
| 27a16 | Traffic channel is kept active for at least 5 seconds. | - | - | - | - |
| 27a17 | The SS transmits DISCONNECT. | <-- | DISCONNECT | - | - |
| 27a18 | The UE transmits RELEASE. | --> | RELEASE | - | - |
| 27a19 | The SS transmits RELEASE COMPLETE. | <-- | RELEASE COMPLETE | - | - |
| 27a20 | The SS transmits an RRC CONNECTION RELEASE message. | <-- | RRC CONNECTION RELEASE | - | - |
| 27a21 | The UE transmits RRC CONNECTION RELEASE COMPLETE. | --> | RRC CONNECTION RELEASE COMPLETE | - | - |
| 27b1 | IF (px\_NR\_RATComb\_Tested = NR\_GERAN), Check: Does the UE transmit a CHANNEL REQUEST message on Cell 24 with Establishment cause: Emergency call? | --> | CHANNEL REQUEST | 1 | P |
| 27b2 | The SS transmits an IMMEDIATE ASSIGNMENT message. | <-- | IMMEDIATE ASSIGNMENT | - | - |
| 27b3 | Check: Does the UE transmit a CM SERVICE REQUEST with CM service type IE indicating “Emergency call establishment”? | --> | CM SERVICE REQUEST | 1 | P |
| 27b4 | The SS transmits an AUTHENTICATION REQUEST message. | <-- | AUTHENTICATION REQUEST | - | - |
| 27b5 | The UE transmits an AUTHENTICATION RESPONSE message. | --> | AUTHENTICATION RESPONSE | - | - |
| 27b6 | The SS transmits a CIPHERING MODE COMMAND. | <-- | CIPHERING MODE COMMAND | - | - |
| 27b7 | The UE transmits a CIPHERING MODE COMPLETE. | --> | CIPHERING MODE COMPLETE | - | - |
| 27b8 | Check: Does the UE transmit an EMERGENCY SETUP message with Emergency Service Category IE bit 6 set to 1 and all other bits are set to 0? | --> | EMERGENCY SETUP | 1 | P |
| 27b9-27b15 | Steps 11 to 17 of the generic test procedure in TS 51.010-1 subclause 10.2.3 are performed on Cell 24.  NOTE: the CS call setup is completed. | - | - | - | - |
| 27b16 | Traffic channel is kept active for at least 5 seconds. | - | - | - | - |
| 27b17 | The SS transmits DISCONNECT. | <-- | DISCONNECT | - | - |
| 27b18 | The UE transmits RELEASE. | --> | RELEASE | - | - |
| 27b19 | The SS transmits RELEASE COMPLETE. | <-- | RELEASE COMPLETE | - | - |
| 26b20 | The SS transmits CHANNEL RELEASE | <-- | CHANNEL RELEASE | - | - |
| Note 1: The request to originate a manual eCall may be performed by MMI or AT command. | | | | | |

11.5.9.3.3 Specific message contents

Table 11.5.9.3.3-1: SIB1 for NR Cell 1 (All steps, Table 11.5.9.3.2-1)

|  |
| --- |
| Derivation path: TS 38.508-1 [4] table 4.6.1-28 Condition eCalloverIMSforNR |

Table 11.5.9.3.3-2: INVITE (step 25, Table 11.5.9.3.2-1)

| Derivation path: TS 34.299-5 [41] Step 1 in Annex A.23 Condition A20 |
| --- |

Table 11.5.9.3.3-3: 486 Busy Here (step 26, Table 11.5.9.3.2-1)

| Derivation path: TS 34.229-1 [35] Annex A.2.21 Condition A1 |
| --- |

Table 11.5.9.3.3-4: RRC CONNECTION REQUEST (Step 27a1, Table 11.5.9.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 34.108 clause 9.1.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Establishment cause | Emergency Call |  |  |

Table 11.5.9.3.3-5: CM SERVICE REQUEST (Steps 27a4 and 27b3, Table 11.5.9.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 24.008[43] Table 9.2.11 | | | |
| Information Element | Value/remark | Comment | Condition |
| CM service type | 0010 | Emergency call establishment |  |

Table 11.5.9.3.3-6: CHANNEL REQUEST (Step 27b1, Table 11.5.9.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 44.018 Table 9.1.8.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Establishment cause | 101 | Emergency call |  |

### 11.5.10 eCall Only mode / Automatic initiation / Emergency registration / Abnormal case / IMS CN sends 600 (Busy Everywhere) / UE performs eCall in CS domain / UTRAN or GERAN / 5GS

11.5.10.1 Test Purpose (TP)

(1)

**with** { UE is in state 5GMM-DEREGISTERED.eCALL-INACTIVE and requested to make an automatic eCall over IMS }

**ensure that** {

**when** { UE receives 600 Busy Everywhere in response to INVITE }

**then** { UE establishes the eCall using CS domain (UTRA or GERAN) }

}

11.5.10.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.229 [44], clauses 5.1.6.11.1, 5.1.6.11.2 and TS 23.167, Annex H.6.

[TS 24.229 clause 5.1.6.11.1]

If the upper layers request establishment of an IMS emergency call of the manually initiated eCall type of emergency service, the service URN shall be "urn:service:sos.ecall.manual" as specified in RFC 8147 [244].

If the upper layers request establishment of an IMS emergency call of the automatically initiated eCall type of emergency service, the service URN shall be "urn:service:sos.ecall.automatic" as specified in RFC 8147 [244].

NOTE 1: The manually initiated eCall type of emergency service is used when the eCall IMS emergency session is invoked with user input. The automatically initiated eCall type of emergency service is used if the eCall IMS emergency session is invoked without user input.

[TS 24.229 clause 5.1.6.11.2]

If the upper layers request establishment of an IMS emergency call of the automatically initiated eCall type of emergency service or of the manually initiated eCall type of emergency service and if allowed by IP-CAN specific annex, the UE shall send an INVITE request as specified in the procedures in subclause 5.1.6.8 with the following additions:

1) the UE shall set the Request-URI to "urn:service:sos.ecall.automatic" or "urn:service:sos.ecall.manual"; and

2) if the IP-CAN indicates the eCall support indication, the UE shall:

a) insert a multipart/mixed body containing an "application/EmergencyCallData.eCall.MSD" MIME body part as defined in RFC 8147 [244], containing the MSD not exceeding 140 bytes and encoded in binary ASN.1 PER as specified in CEN EN 15722:2015 [245] and include a Content-Disposition header field with a "handling" header field parameter with an "optional" value, as described in RFC 3261 [26];

b) insert an Accept header field indicating the UE is willing to accept an "application/EmergencyCallData.Control+xml" MIME type as defined in RFC 8147 [244]; and

c) insert a Recv-Info header field set to "EmergencyCallData.eCall.MSD" as defined in RFC 8147 [244].

NOTE: Further content for the INVITE is as defined in RFC 8147 [244].

Then the UE shall proceed as follows:

…

3) if the UE receives a 486 (Busy Here), 600 (Busy Everywhere) or 603 (Decline) response to the INVITE request containing:

a) a multipart/mixed body containing an "application/EmergencyCallData.Control+xml" MIME body part as defined in RFC 8147 [244] with an "ack" element containing:

i) a "received" attribute set to "true"; and

ii) a "ref" attribute set to the Content-ID of the MIME body part containing the MSD sent by the UE;

then the UE shall consider the initial MSD transmission as successful and shall perform domain selection to re-attempt the eCall as specified in 3GPP TS 23.167 [4B]; and

4) in all other cases, the UE shall perform domain selection to re-attempt the eCall as specified in 3GPP TS 23.167 [4B].

[TS 23.167 clause H.6]

Table H.2: Domain Selection Rules for eCall over IMS session attempts for E-UTRAN or NG-RAN radio access networks

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | PS Available | VoIMS | EMS | ECL | First eCall Attempt | Second eCall Attempt |
| A | Y | Y | Y | Y | PS | PS on another PS RAT if available with EMS=Y and ECL=Y  or CS if available |
| B | Y | Y | Y | N | CS if available | PS (UE establishes IMS emergency session) |
| C | Y | Y or N | N | N | CS if available | PS on another PS RAT if available with EMS=Y or EMS unknown |
| D | Y | N | Y | Y | PS or CS if available | CS if first attempt in PS  PS if first attempt in CS |
| E | Y | N | Y | N | CS if available | PS (UE establishes IMS emergency session) |
| F | N |  | - | - | CS if available |  |
| VoIMS = Voice over IMS over PS sessions support as indicated by IMS Voice over PS session supported indication as defined in TS 23.401 [28] and TS 23.502 [49].  EMS = IMS Emergency Services supported as indicated by Emergency Service Support indicator as defined in TS 23.401 [28] and TS 23.501 [48] and TS 23.502 [49].  ECL = eCall Over IMS support as indicated by the eCall support indicator defined in TS 23.401 [28] and TS 23.501 [48].  NOTE 1: As an implementation option, when the first attempt uses PS and fails for reasons other than related to IMS, the second attempt may use PS with a different 3GPP RAT. In this case the UE, can make a third attempt using CS. | | | | | | |

11.5.10.3 Test description

11.5.10.3.1 Pre-test conditions

System Simulator:

- 2 cells

- NR Cell 1 as defined in TS 38.508-1 [4] Table 4.4.2-3.

- if px\_NR\_RATComb\_Tested = NR\_UTRA, UTRA Cell 5 as defined in TS 36.508 [7].

- cell 5 is configured as ''Suitable Neighbour cell''.

- if px\_NR\_RATComb\_Tested = NR\_GERAN, GERAN cell 24 as defined in TS 36.508 [7].

- cell 24 is configured as ''Suitable Neighbour cell''.

UE:

- the eCall capable UE is equipped with ‘eCall only’ enabled USIM configured as per TS 38.508-1 [4] Table 6.4.1-24.

Preamble:

- The UE is in test state 0-A (Switched Off) as defined in TS 38.508-1 [4], subclause 4.4A.2.

11.5.10.3.2 Test procedure sequence

Table 11.5.10.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2 | Wait 60s for the UE to enter 5GMM-DEREGISTERED.eCALL-INACTIVE state. | - | - | - | - |
| 3 | An automatic eCall is initiated. (Note 1) | - | - | - | - |
| 4-21 | Steps 2 to 19 of generic procedure specified in Table 4.5.2.2-2 of 38.508-1 [4] takes place. | - | - | - | - |
| 22-24 | Steps 8-10 of generic procedure specified in Table 4.9.11.2.2-1 of TS 38.508-1 [4] with condition ‘eCall’ are performed. | - | - | - | - |
| 25 | Step 1 of Annex A.23 of TS 34.229-5 [41] happens | --> | INVITE | - | - |
| 26 | SS sends 600 Busy Everywhere response | <-- | 600 Busy Everywhere | - | - |
| - | EXCEPTION: Steps 27a1 to 27b20 describe behaviour that depends on the UE capability; the "lower case letter" identifies a step sequence that takes place if a capability is supported. | - | - | - | - |
| 27a1 | IF (px\_NR\_RATComb\_Tested = NR\_UTRA), Check: Does the UE transmit an RRC CONNECTION REQUEST message on Cell 5 with establishment cause set to Emergency Call? | --> | RRC CONNECTION REQUEST | 1 | P |
| 27a2 | The SS transmits an RRC CONNECTION SETUP message. | <-- | RRC CONNECTION SETUP | - | - |
| 27a3 | The UE transmits an RRC CONNECTION SETUP COMPLETE message. | --> | RRC CONNECTION SETUP COMPLETE | - | - |
| 27a4 | Check: Does the UE transmit a CM SERVICE REQUEST with CM service type IE indicating “Emergency call establishment”? | --> | CM SERVICE REQUEST | 1 | P |
| 27a5 | The SS transmits an AUTHENTICATION REQUEST. | <-- | AUTHENTICATION REQUEST | - | - |
| 27a6 | The UE transmits AUTHENTICATION RESPONSE. | --> | AUTHENTICATION RESPONSE | - | - |
| 27a7 | The SS transmits a SECURITY MODE COMMAND message for the CS domain. | <-- | SECURITY MODE COMMAND | - | - |
| 27a8 | The UE transmits a SECURITY MODE COMPLETE message. | --> | SECURITY MODE COMPLETE | - | - |
| 27a9 | Check: Does the UE transmit an EMERGENCY SETUP message with Emergency Service Category IE bit 7 set to 1 and all other bits are set to 0? | --> | EMERGENCY SETUP | 1 | P |
| 27a10-27a15 | Steps 11 to 16 of the generic test procedure in TS 34.108 subclause 7.2.3.2.3 are performed on Cell 5.  NOTE: the CS call setup is completed. | - | - | - | - |
| 27a16 | Traffic channel is kept active for at least 5 seconds. | - | - | - | - |
| 27a17 | The SS transmits DISCONNECT. | <-- | DISCONNECT | - | - |
| 27a18 | The UE transmits RELEASE. | --> | RELEASE | - | - |
| 27a19 | The SS transmits RELEASE COMPLETE. | <-- | RELEASE COMPLETE | - | - |
| 27a20 | The SS transmits an RRC CONNECTION RELEASE message. | <-- | RRC CONNECTION RELEASE | - | - |
| 27a21 | The UE transmits RRC CONNECTION RELEASE COMPLETE. | --> | RRC CONNECTION RELEASE COMPLETE | - | - |
| 27b1 | IF (px\_NR\_RATComb\_Tested = NR\_GERAN), Check: Does the UE transmit a CHANNEL REQUEST message on Cell 24 with Establishment cause: Emergency call? | --> | CHANNEL REQUEST | 1 | P |
| 27b2 | The SS transmits an IMMEDIATE ASSIGNMENT message. | <-- | IMMEDIATE ASSIGNMENT | - | - |
| 27b3 | Check: Does the UE transmit a CM SERVICE REQUEST with CM service type IE indicating “Emergency call establishment”? | --> | CM SERVICE REQUEST | 1 | P |
| 27b4 | The SS transmits an AUTHENTICATION REQUEST message. | <-- | AUTHENTICATION REQUEST | - | - |
| 27b5 | The UE transmits an AUTHENTICATION RESPONSE message. | --> | AUTHENTICATION RESPONSE | - | - |
| 27b6 | The SS transmits a CIPHERING MODE COMMAND. | <-- | CIPHERING MODE COMMAND | - | - |
| 27b7 | The UE transmits a CIPHERING MODE COMPLETE. | --> | CIPHERING MODE COMPLETE | - | - |
| 27b8 | Check: Does the UE transmit an EMERGENCY SETUP message with Emergency Service Category IE bit 7 set to 1 and all other bits are set to 0? | --> | EMERGENCY SETUP | 1 | P |
| 27b9-27b15 | Steps 11 to 17 of the generic test procedure in TS 51.010-1 subclause 10.2.3 are performed on Cell 24.  NOTE: the CS call setup is completed. | - | - | - | - |
| 27b16 | Traffic channel is kept active for at least 5 seconds. | - | - | - | - |
| 27b17 | The SS transmits DISCONNECT. | <-- | DISCONNECT | - | - |
| 27b18 | The UE transmits RELEASE. | --> | RELEASE | - | - |
| 27b19 | The SS transmits RELEASE COMPLETE. | <-- | RELEASE COMPLETE | - | - |
| 26b20 | The SS transmits CHANNEL RELEASE | <-- | CHANNEL RELEASE | - | - |
| Note 1: The request to originate an automatic eCall may be performed by MMI or AT command. | | | | | |

11.5.10.3.3 Specific message contents

Table 11.5.10.3.3-1: SIB1 for NR Cell 1 (All steps, Table 11.5.10.3.2-1)

|  |
| --- |
| Derivation path: TS 38.508-1 [4] table 4.6.1-28 Condition eCalloverIMSforNR |

Table 11.5.10.3.3-2: INVITE (step 25, Table 11.5.10.3.2-1)

| Derivation path: TS 34.299-5 [41] Step 1 in Annex A.23 Condition A21 |
| --- |

Table 11.5.10.3.3-3: 600 Busy Everywhere (step 26, Table 11.5.10.3.2-1)

| Derivation path: TS 34.229-1 [35] Annex A.2.22 Condition A1 |
| --- |

Table 11.5.10.3.3-4: RRC CONNECTION REQUEST (Step 27a1, Table 11.5.10.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 34.108 clause 9.1.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Establishment cause | Emergency Call |  |  |

Table 11.5.10.3.3-5: CM SERVICE REQUEST (Steps 27a4 and 27b3, Table 11.5.10.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 24.008[43] Table 9.2.11 | | | |
| Information Element | Value/remark | Comment | Condition |
| CM service type | 0010 | Emergency call establishment |  |

Table 11.5.10.3.3-6: CHANNEL REQUEST (Step 27b1, Table 11.5.10.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 44.018 Table 9.1.8.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Establishment cause | 101 | Emergency call |  |

### 11.5.11 eCall Only mode / Automatic initiation / Emergency registration / Abnormal case / IMS CN sends 603 (Decline) / UE performs eCall in CS domain / UTRAN or GERAN / 5GS

11.5.11.1 Test Purpose (TP)

(1)

**with** { UE is in state 5GMM-DEREGISTERED.eCALL-INACTIVE and requested to make an automatic eCall over IMS }

**ensure that** {

**when** { UE receives 603 Decline in response to INVITE }

**then** { UE establishes the eCall using CS domain (UTRA or GERAN) }

}

11.5.11.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.229 [44], clauses 5.1.6.11.1, 5.1.6.11.2 and TS 23.167, Annex H.6.

[TS 24.229 clause 5.1.6.11.1]

If the upper layers request establishment of an IMS emergency call of the manually initiated eCall type of emergency service, the service URN shall be "urn:service:sos.ecall.manual" as specified in RFC 8147 [244].

If the upper layers request establishment of an IMS emergency call of the automatically initiated eCall type of emergency service, the service URN shall be "urn:service:sos.ecall.automatic" as specified in RFC 8147 [244].

NOTE 1: The manually initiated eCall type of emergency service is used when the eCall IMS emergency session is invoked with user input. The automatically initiated eCall type of emergency service is used if the eCall IMS emergency session is invoked without user input.

[TS 24.229 clause 5.1.6.11.2]

If the upper layers request establishment of an IMS emergency call of the automatically initiated eCall type of emergency service or of the manually initiated eCall type of emergency service and if allowed by IP-CAN specific annex, the UE shall send an INVITE request as specified in the procedures in subclause 5.1.6.8 with the following additions:

1) the UE shall set the Request-URI to "urn:service:sos.ecall.automatic" or "urn:service:sos.ecall.manual"; and

2) if the IP-CAN indicates the eCall support indication, the UE shall:

a) insert a multipart/mixed body containing an "application/EmergencyCallData.eCall.MSD" MIME body part as defined in RFC 8147 [244], containing the MSD not exceeding 140 bytes and encoded in binary ASN.1 PER as specified in CEN EN 15722:2015 [245] and include a Content-Disposition header field with a "handling" header field parameter with an "optional" value, as described in RFC 3261 [26];

b) insert an Accept header field indicating the UE is willing to accept an "application/EmergencyCallData.Control+xml" MIME type as defined in RFC 8147 [244]; and

c) insert a Recv-Info header field set to "EmergencyCallData.eCall.MSD" as defined in RFC 8147 [244].

NOTE: Further content for the INVITE is as defined in RFC 8147 [244].

Then the UE shall proceed as follows:

…

3) if the UE receives a 486 (Busy Here), 600 (Busy Everywhere) or 603 (Decline) response to the INVITE request containing:

a) a multipart/mixed body containing an "application/EmergencyCallData.Control+xml" MIME body part as defined in RFC 8147 [244] with an "ack" element containing:

i) a "received" attribute set to "true"; and

ii) a "ref" attribute set to the Content-ID of the MIME body part containing the MSD sent by the UE;

then the UE shall consider the initial MSD transmission as successful and shall perform domain selection to re-attempt the eCall as specified in 3GPP TS 23.167 [4B]; and

4) in all other cases, the UE shall perform domain selection to re-attempt the eCall as specified in 3GPP TS 23.167 [4B].

[TS 23.167 clause H.6]

Table H.2: Domain Selection Rules for eCall over IMS session attempts for E-UTRAN or NG-RAN radio access networks

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | PS Available | VoIMS | EMS | ECL | First eCall Attempt | Second eCall Attempt |
| A | Y | Y | Y | Y | PS | PS on another PS RAT if available with EMS=Y and ECL=Y  or CS if available |
| B | Y | Y | Y | N | CS if available | PS (UE establishes IMS emergency session) |
| C | Y | Y or N | N | N | CS if available | PS on another PS RAT if available with EMS=Y or EMS unknown |
| D | Y | N | Y | Y | PS or CS if available | CS if first attempt in PS  PS if first attempt in CS |
| E | Y | N | Y | N | CS if available | PS (UE establishes IMS emergency session) |
| F | N |  | - | - | CS if available |  |
| VoIMS = Voice over IMS over PS sessions support as indicated by IMS Voice over PS session supported indication as defined in TS 23.401 [28] and TS 23.502 [49].  EMS = IMS Emergency Services supported as indicated by Emergency Service Support indicator as defined in TS 23.401 [28] and TS 23.501 [48] and TS 23.502 [49].  ECL = eCall Over IMS support as indicated by the eCall support indicator defined in TS 23.401 [28] and TS 23.501 [48].  NOTE 1: As an implementation option, when the first attempt uses PS and fails for reasons other than related to IMS, the second attempt may use PS with a different 3GPP RAT. In this case the UE, can make a third attempt using CS. | | | | | | |

11.5.11.3 Test description

11.5.11.3.1 Pre-test conditions

System Simulator:

- 2 cells

- NR Cell 1 as defined in TS 38.508-1 [4] Table 4.4.2-3.

- if px\_NR\_RATComb\_Tested = NR\_UTRA, UTRA Cell 5 as defined in TS 36.508 [7].

- cell 5 is configured as ''Suitable Neighbour cell''.

- if px\_NR\_RATComb\_Tested = NR\_GERAN, GERAN cell 24 as defined in TS 36.508 [7].

- cell 24 is configured as ''Suitable Neighbour cell''.

UE:

- the eCall capable UE is equipped with ‘eCall only’ enabled USIM configured as per TS 38.508-1 [4] Table 6.4.1-24.

Preamble:

- The UE is in test state 0-A (Switched Off) as defined in TS 38.508-1 [4], subclause 4.4A.2.

11.5.11.3.2 Test procedure sequence

Table 11.5.11.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2 | Wait 60s for the UE to enter 5GMM-DEREGISTERED.eCALL-INACTIVE state. | - | - | - | - |
| 3 | An automatic eCall is initiated. (Note 1) | - | - | - | - |
| 4-21 | Steps 2 to 19 of generic procedure specified in Table 4.5.2.2-2 of 38.508-1 [4] takes place. | - | - | - | - |
| 22-24 | Steps 8-10 of generic procedure specified in Table 4.9.11.2.2-1 of TS 38.508-1 [4] with condition ‘eCall’ are performed. | - | - | - | - |
| 25 | Step 1 of Annex A.23 of TS 34.229-5 [41] happens | --> | INVITE | - | - |
| 26 | SS sends 603 Decline response | <-- | 603 Decline | - | - |
| - | EXCEPTION: Steps 27a1 to 27b20 describe behaviour that depends on the UE capability; the "lower case letter" identifies a step sequence that takes place if a capability is supported. | - | - | - | - |
| 27a1 | IF (px\_NR\_RATComb\_Tested = NR\_UTRA), Check: Does the UE transmit an RRC CONNECTION REQUEST message on Cell 5 with establishment cause set to Emergency Call? | --> | RRC CONNECTION REQUEST | 1 | P |
| 27a2 | The SS transmits an RRC CONNECTION SETUP message. | <-- | RRC CONNECTION SETUP | - | - |
| 27a3 | The UE transmits an RRC CONNECTION SETUP COMPLETE message. | --> | RRC CONNECTION SETUP COMPLETE | - | - |
| 27a4 | Check: Does the UE transmit a CM SERVICE REQUEST with CM service type IE indicating “Emergency call establishment”? | --> | CM SERVICE REQUEST | 1 | P |
| 27a5 | The SS transmits an AUTHENTICATION REQUEST. | <-- | AUTHENTICATION REQUEST | - | - |
| 27a6 | The UE transmits AUTHENTICATION RESPONSE. | --> | AUTHENTICATION RESPONSE | - | - |
| 27a7 | The SS transmits a SECURITY MODE COMMAND message for the CS domain. | <-- | SECURITY MODE COMMAND | - | - |
| 27a8 | The UE transmits a SECURITY MODE COMPLETE message. | --> | SECURITY MODE COMPLETE | - | - |
| 27a9 | Check: Does the UE transmit an EMERGENCY SETUP message with Emergency Service Category IE bit 7 set to 1 and all other bits are set to 0? | --> | EMERGENCY SETUP | 1 | P |
| 27a10-27a15 | Steps 11 to 16 of the generic test procedure in TS 34.108 subclause 7.2.3.2.3 are performed on Cell 5.  NOTE: the CS call setup is completed. | - | - | - | - |
| 27a16 | Traffic channel is kept active for at least 5 seconds. | - | - | - | - |
| 27a17 | The SS transmits DISCONNECT. | <-- | DISCONNECT | - | - |
| 27a18 | The UE transmits RELEASE. | --> | RELEASE | - | - |
| 27a19 | The SS transmits RELEASE COMPLETE. | <-- | RELEASE COMPLETE | - | - |
| 27a20 | The SS transmits an RRC CONNECTION RELEASE message. | <-- | RRC CONNECTION RELEASE | - | - |
| 27a21 | The UE transmits RRC CONNECTION RELEASE COMPLETE. | --> | RRC CONNECTION RELEASE COMPLETE | - | - |
| 27b1 | IF (px\_NR\_RATComb\_Tested = NR\_GERAN), Check: Does the UE transmit a CHANNEL REQUEST message on Cell 24 with Establishment cause: Emergency call? | --> | CHANNEL REQUEST | 1 | P |
| 27b2 | The SS transmits an IMMEDIATE ASSIGNMENT message. | <-- | IMMEDIATE ASSIGNMENT | - | - |
| 27b3 | Check: Does the UE transmit a CM SERVICE REQUEST with CM service type IE indicating “Emergency call establishment”? | --> | CM SERVICE REQUEST | 1 | P |
| 27b4 | The SS transmits an AUTHENTICATION REQUEST message. | <-- | AUTHENTICATION REQUEST | - | - |
| 27b5 | The UE transmits an AUTHENTICATION RESPONSE message. | --> | AUTHENTICATION RESPONSE | - | - |
| 27b6 | The SS transmits a CIPHERING MODE COMMAND. | <-- | CIPHERING MODE COMMAND | - | - |
| 27b7 | The UE transmits a CIPHERING MODE COMPLETE. | --> | CIPHERING MODE COMPLETE | - | - |
| 27b8 | Check: Does the UE transmit an EMERGENCY SETUP message with Emergency Service Category IE bit 7 set to 1 and all other bits are set to 0? | --> | EMERGENCY SETUP | 1 | P |
| 27b9-27b15 | Steps 11 to 17 of the generic test procedure in TS 51.010-1 subclause 10.2.3 are performed on Cell 24.  NOTE: the CS call setup is completed. | - | - | - | - |
| 27b16 | Traffic channel is kept active for at least 5 seconds. | - | - | - | - |
| 27b17 | The SS transmits DISCONNECT. | <-- | DISCONNECT | - | - |
| 27b18 | The UE transmits RELEASE. | --> | RELEASE | - | - |
| 27b19 | The SS transmits RELEASE COMPLETE. | <-- | RELEASE COMPLETE | - | - |
| 26b20 | The SS transmits CHANNEL RELEASE | <-- | CHANNEL RELEASE | - | - |
| Note 1: The request to originate an automatic eCall may be performed by MMI or AT command. | | | | | |

11.5.11.3.3 Specific message contents

Table 11.5.11.3.3-1: SIB1 for NR Cell 1 (All steps, Table 11.5.11.3.2-1)

|  |
| --- |
| Derivation path: TS 38.508-1 [4] table 4.6.1-28 Condition eCalloverIMSforNR |

Table 11.5.11.3.3-2: INVITE (step 25, Table 11.5.11.3.2-1)

| Derivation path: TS 34.299-5 [41] Step 1 in Annex A.23 Condition A21 |
| --- |

Table 11.5.11.3.3-3: 603 Decline (step 26, Table 11.5.11.3.2-1)

| Derivation path: TS 34.229-1 [35] Annex A.2.23 Condition A1 |
| --- |

Table 11.5.11.3.3-4: RRC CONNECTION REQUEST (Step 27a1, Table 11.5.11.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 34.108 clause 9.1.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Establishment cause | Emergency Call |  |  |

Table 11.5.11.3.3-5: CM SERVICE REQUEST (Steps 27a4 and 27b3, Table 11.5.11.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 24.008[43] Table 9.2.11 | | | |
| Information Element | Value/remark | Comment | Condition |
| CM service type | 0010 | Emergency call establishment |  |

Table 11.5.11.3.3-6: CHANNEL REQUEST (Step 27b1, Table 11.5.11.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 44.018 Table 9.1.8.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Establishment cause | 101 | Emergency call |  |

### 11.5.12 eCall Only mode / 5GS supports IMS voice over PS session / 5GS supports emergency service / eCall over IMS is not supported on 5GS / eCall over EPS

11.5.12.1 Test Purpose (TP)

(1)

**with** { UE is switched ON with eCall only enabled USIM }

**ensure that** {

**when** { *eCallOverIMS-Support* on 5GS is not indicated, eCallOverIMS-Support-r14 on EPS is indicated and UE is requested to make an automatic eCall }

**then** { UE establishes eCall over EPS }

}

11.5.12.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 36.331, clauses 5.2.2.7, 6.2.2 , TS 38.331, clause 6.2.2 and TS 23.167, Annex H.6.

[TS 36.331 clause 5.2.2.7]

Upon receiving the *SystemInformationBlockType1* or *SystemInformationBlockType1-BR* either via broadcast or via dedicated signalling, the UE shall:

…

1> else:

2> if the frequency band indicated in the *freqBandIndicator* is part of the frequency bands supported by the UE and it is not a downlink only band; or

…

3> forward the *ims-EmergencySupport* to upper layers, if present;

[TS 23.167 clause H.6]

Table H.2: Domain Selection Rules for eCall over IMS session attempts for E-UTRAN or NG-RAN radio access networks

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | PS Available | VoIMS | EMS | ECL | First eCall Attempt | Second eCall Attempt |
| A | Y | Y | Y | Y | PS | PS on another PS RAT if available with EMS=Y and ECL=Y  or CS if available |
| B | Y | Y | Y | N | CS if available | PS (UE establishes IMS emergency session) |
| C | Y | Y or N | N | N | CS if available | PS on another PS RAT if available with EMS=Y or EMS unknown |
| D | Y | N | Y | Y | PS or CS if available | CS if first attempt in PS  PS if first attempt in CS |
| E | Y | N | Y | N | CS if available | PS (UE establishes IMS emergency session) |
| F | N |  | - | - | CS if available |  |
| VoIMS = Voice over IMS over PS sessions support as indicated by IMS Voice over PS session supported indication as defined in TS 23.401 [28] and TS 23.502 [49].  EMS = IMS Emergency Services supported as indicated by Emergency Service Support indicator as defined in TS 23.401 [28] and TS 23.501 [48] and TS 23.502 [49].  ECL = eCall Over IMS support as indicated by the eCall support indicator defined in TS 23.401 [28] and TS 23.501 [48].  NOTE 1: As an implementation option, when the first attempt uses PS and fails for reasons other than related to IMS, the second attempt may use PS with a different 3GPP RAT. In this case the UE, can make a third attempt using CS. | | | | | | |

NOTE: If the E-UTRAN and NG-RAN cells available to the UE have different settings, the UE assumes "PS Available" and "ECL" apply to whichever cell is indicated (as defined in TS 23.401 [28] and TS 23.501 [48]) as providing eCall over IMS support. When support by more than one cell is indicated, a UE may select any cell to attempt eCall over IMS according to the UE implementation.

[TS 38.331, clause 6.2.2]

eCallOverIMS-Support

Indicates whether the cell supports eCall over IMS services as defined in TS 23.501 [32]. If absent, eCall over IMS is not supported by the network in the cell.

[TS 36.331, clause 6.2.2]

eCallOverIMS-Support

Indicates whether the cell supports eCall over IMS services via EPC for UEs as defined in TS 23.401 [41]. If absent, eCall over IMS via EPC is not supported by the network in the cell.NOTE 2.

11.5.12.3 Test description

11.5.12.3.1 Pre-test conditions

System Simulator:

- 2 cells

- NR Cell 1 as defined in TS 38.508-1 [4] Table 4.4.2-3. System information combination NR-6 as defined in TS 38.508-1 [4], sub-clause 4.4.3.1.2.

- E-UTRA Cell 1 as defined in TS 36.508 [7] Table 4.4.2-2. System information combination 31 as defined in TS 36.508 [7], sub-clause 4.4.3.1.1.

UE:

- the eCall capable UE is equipped with ‘eCall only’ enabled USIM configured as per TS 38.508-1 [4] Table 6.4.1-24.

Preamble:

- The UE is in test state 0-A (Switched Off) as defined in TS 38.508-1 [4], subclause 4.4A.2.

11.5.12.3.2 Test procedure sequence

Table 11.5.12.3.2-1/2 illustrate the downlink power levels to be applied for NR Cell 1, and E-UTRA Cell 1 at various time instants of the test execution. Row marked "T0" denotes the conditions after the preamble.

Table 11.5.12.3.2-1: Power levels in FR1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter | Unit | NR Cell 1 | E-UTRA  Cell 1 | Remark |
| T0 | SS/PBCH  SSS EPRE | dBm/  SCS | -85 | - |  |
| Cell-specific RS EPRE | dBm/15kHz |  | -93 |

Table 11.5.12.3.2-2: Power levels in FR2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Parameter | Unit | NR Cell 1 | E-UTRA  Cell 1 | Remark |
| T0 | SS/PBCH  SSS EPRE | dBm/  SCS | -82 | - |  |
| Cell-specific RS EPRE | dBm/15kHz |  | -96 |

Table 11.5.12.3.2-3: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **St** | **Procedure** | **Message Sequence** | | **TP** | **Verdict** |
|  |  | **U - S** | **Message** |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2 | Wait 60s for the UE to enter eCALL-INACTIVE state. | - | - | - | - |
| 3 | An automatic eCall is initiated. (Note 1) | - | - | - | - |
| - | The following messages are to be observed on E-UTRA Cell 1 unless explicitly stated otherwise | - | - | - | - |
| 4 | Check: Does the UE sends an ATTACH  REQUEST message with a PDN  CONNECTIVITY REQUEST message to  request PDN connectivity to the default PDN.  EPS attach type = "combined EPS/IMSI  attach"? | --> | ATTACH REQUEST | 1 | P |
| 5-23 | Steps 7 to 25 of Generic Test Procedure for eCall over IMS establishment in EUTRA: eCall Only Support specified in clause 4.5A.27 of TS 36.508 [7] take place. | - | - | - | - |
| 24 | Release eCall over IMS using the generic procedure described in TS 34.229-1 [35] subclause C.33 | - | *-* | - | - |
| 25 | The SS releases the RRC connection. | <-- | RRCConnectionRelease | - | - |
| Note 1: The request to originate an automatic eCall may be performed by MMI or AT command. | | | | | |

11.5.12.3.3 Void

11.5.12.3.4 Specific message contents

Table 11.5.12.3.4-1: Message *SystemInformationBlockType1* for E-UTRA Cell 1(All Steps)

|  |
| --- |
| Derivation path: TS 36.508 [7] table 4.4.3.2-3 Condition eCalloverIMS |

Table 11.5.12.3.4-2: *SIB1* of NR Cell 1 (All steps)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-28 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| eCallOverIMS-Support | Not present |  |  |
| } |  |  |  |

Table 11.5.12.3.4-3: Message ATTACH ACCEPT (step 14, Table 11.5.12.3.2-3)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 36.508 [7] table 4.7.2-1 | | | |
| Information Element | Value/Remark | Comment | Condition |
| EPS attach result | '010'B | ''Combined EPS/IMSI attach'' |  |
| EPS network feature support | '0000 0011'B | emergency bearer services in S1 mode and IMS voice over PS session in S1 mode are supported |  |

### 11.5.13 eCall capable / Manual initiation / MSD Transfer failure / UE performs eCall in CS domain after Timer expiry / UTRAN or GERAN / 5GS

11.5.13.1 Test Purpose (TP)

(1)

**with** { UE in state 5GMM-REGISTERED.NORMAL-SERVICE state and 5GMM-IDLE mode and requested to make a manual eCall over IMS }

**ensure that** {

**when** { UE does not receive any response to INVITE }

**then** { UE establishes the eCall using CS domain (UTRA or GERAN) after emerg-request timer expiry }

}

11.5.13.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.229 [44], clauses 5.1.6.11.2, 5.1.6.8.1, Table 7.8.1 and TS 23.167, Annex H.6.

[TS 24.229 clause 5.1.6.11.2]

If the upper layers request establishment of an IMS emergency call of the automatically initiated eCall type of emergency service or of the manually initiated eCall type of emergency service and if allowed by IP-CAN specific annex, the UE shall send an INVITE request as specified in the procedures in subclause 5.1.6.8 with the following additions:

1) the UE shall set the Request-URI to "urn:service:sos.ecall.automatic" or "urn:service:sos.ecall.manual"; and

2) if the IP-CAN indicates the eCall support indication, the UE shall:

a) insert a multipart/mixed body containing an "application/EmergencyCallData.eCall.MSD" MIME body part as defined in RFC 8147 [244], containing the MSD not exceeding 140 bytes and encoded in binary ASN.1 PER as specified in CEN EN 15722:2015 [245] and include a Content-Disposition header field with a "handling" header field parameter with an "optional" value, as described in RFC 3261 [26];

b) insert an Accept header field indicating the UE is willing to accept an "application/EmergencyCallData.Control+xml" MIME type as defined in RFC 8147 [244]; and

c) insert a Recv-Info header field set to "EmergencyCallData.eCall.MSD" as defined in RFC 8147 [244].

NOTE: Further content for the INVITE is as defined in RFC 8147 [244].

Then the UE shall proceed as follows:

1) if the UE receives a 200 (OK) response to the INVITE request not containing:

a) a multipart/mixed body containing an "application/EmergencyCallData.Control+xml" MIME body part as defined in RFC 8147 [244] with an "ack" element containing:

i) a "received" attribute set to "true"; and

ii) a "ref" attribute set to the Content-ID of the MIME body part containing the MSD sent by the UE;

then the UE shall send the MSD using audio media stream encoded as described in 3GPP TS 26.267 [9C];

2) if the UE receives a 200 (OK) response to the INVITE request containing:

a) a multipart/mixed body containing an "application/EmergencyCallData.Control+xml" MIME body part as defined in RFC 8147 [244] with an "ack" element containing:

i) a "received" attribute set to "true"; and

ii) a "ref" attribute set to the Content-ID of the MIME body part containing the MSD sent by the UE;

then the UE shall consider the initial MSD transmission as successful;

3) if the UE receives a 486 (Busy Here), 600 (Busy Everywhere) or 603 (Decline) response to the INVITE request containing:

a) a multipart/mixed body containing an "application/EmergencyCallData.Control+xml" MIME body part as defined in RFC 8147 [244] with an "ack" element containing:

i) a "received" attribute set to "true"; and

ii) a "ref" attribute set to the Content-ID of the MIME body part containing the MSD sent by the UE;

then the UE shall consider the initial MSD transmission as successful and shall perform domain selection to re-attempt the eCall as specified in 3GPP TS 23.167 [4B]; and

4) in all other cases, the UE shall perform domain selection to re-attempt the eCall as specified in 3GPP TS 23.167 [4B].

[TS 24.229 Table 7.8.1]

Table 7.8.1: IM CN subsystem

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Timer | Value to be applied at the UE | Value to be applied at the P-CSCF | Value to be applied at the S-CSCF | Meaning |
| emerg-request | Configurable value between 5 seconds and 15 seconds | not applicable | not applicable | The timer is used by the UE during initial request for emergency service. For detailed usage of the timer see subclause 5.1.6.8.1. |

[TS 24.229 clause 5.1.6.8.1]

If the UE supports the emerg-request timer defined in Table 7.8.1, the UE shall start the emerg-request timer when sending the initial INVITE request for emergency service. The UE shall stop the timer upon receipt of any 18x provisional SIP response. When the emerg-request timer expires, the UE shall consider that the emergency service request has failed and apply the procedures related to emergency service request failure that are defined in 3GPP TS 23.167 [4B] subclause 7.3 with clarifications in clause H.5. The UE may support being configured for the emerg-request timer using one or more of the following methods:

a) the Timer\_Emerg-request leaf of the EFIMSConfigData file described in 3GPP TS 31.102 [15C];

b) the Timer\_Emerg-request leaf of the EFIMSConfigData file described in 3GPP TS 31.103 [15B]; and

c) the Timer\_Emerg-request leaf of 3GPP TS 24.167 [8G].

If the UE is configured with both the Timer\_Emerg-request leaf of 3GPP TS 24.167 [8G] and the Timer\_Emerg-request leaf of the EFIMSConfigData file described in 3GPP TS 31.102 [15C] or 3GPP TS 31.103 [15B], then the Timer\_Emerg-request leaf of the EFIMSConfigData file shall take precedence.

[TS 23.167 clause H.6]

Table H.2: Domain Selection Rules for eCall over IMS session attempts for E-UTRAN or NG-RAN radio access networks

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | PS Available | VoIMS | EMS | ECL | First eCall Attempt | Second eCall Attempt |
| A | Y | Y | Y | Y | PS | PS on another PS RAT if available with EMS=Y and ECL=Y  or CS if available |
| B | Y | Y | Y | N | CS if available | PS (UE establishes IMS emergency session) |
| C | Y | Y or N | N | N | CS if available | PS on another PS RAT if available with EMS=Y or EMS unknown |
| D | Y | N | Y | Y | PS or CS if available | CS if first attempt in PS  PS if first attempt in CS |
| E | Y | N | Y | N | CS if available | PS (UE establishes IMS emergency session) |
| F | N |  | - | - | CS if available |  |
| VoIMS = Voice over IMS over PS sessions support as indicated by IMS Voice over PS session supported indication as defined in TS 23.401 [28] and TS 23.502 [49].  EMS = IMS Emergency Services supported as indicated by Emergency Service Support indicator as defined in TS 23.401 [28] and TS 23.501 [48] and TS 23.502 [49].  ECL = eCall Over IMS support as indicated by the eCall support indicator defined in TS 23.401 [28] and TS 23.501 [48].  NOTE 1: As an implementation option, when the first attempt uses PS and fails for reasons other than related to IMS, the second attempt may use PS with a different 3GPP RAT. In this case the UE, can make a third attempt using CS. | | | | | | |

11.5.13.3 Test description

11.5.13.3.1 Pre-test conditions

System Simulator:

- 2 cells

- NR Cell 1 as defined in TS 38.508-1 [4] Table 4.4.2-3.

- if px\_NR\_RATComb\_Tested = NR\_UTRA, UTRA Cell 5 as defined in TS 36.508 [7].

- cell 5 is configured as ''Suitable Neighbour cell''.

- if px\_NR\_RATComb\_Tested = NR\_GERAN, GERAN cell 24 as defined in TS 36.508 [7].

- cell 24 is configured as ''Suitable Neighbour cell''.

UE:

- the eCall capable UE is equipped with ecall enabled USIM configured as per TS 38.508-1 [4] Table 6.4.1-23.

Preamble:

- The UE is in test state 1N-A as defined in TS 38.508-1 [4], subclause 4.4A.2 on NR Cell 1.

11.5.13.3.2 Test procedure sequence

Table 11.5.13.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | A manual eCall is initiated. (Note 1) | - | - | - | - |
| 2-11 | Steps 1-10 of generic procedure specified in Table 4.9.11.2.2-1 of TS 38.508-1 [4] with condition ‘eCall’ are performed. | - | - | - | - |
| 12 | Step 1 of Annex A.23 of TS 34.229-5 [41] happens | --> | INVITE | - | - |
| 13 | SS waits 15s for emerg-request timer to expire so that MSD transfer fails. | - | - | - | - |
| - | EXCEPTION: Steps 14a1 to 14b20 describe behaviour that depends on the UE capability; the "lower case letter" identifies a step sequence that takes place if a capability is supported. | - | - | - | - |
| 14a1 | IF (px\_NR\_RATComb\_Tested = NR\_UTRA), Check: Does the UE transmit an RRC CONNECTION REQUEST message on Cell 5 with establishment cause set to Emergency Call? | --> | RRC CONNECTION REQUEST | 1 | P |
| 14a2 | The SS transmits an RRC CONNECTION SETUP message. | <-- | RRC CONNECTION SETUP | - | - |
| 14a3 | The UE transmits an RRC CONNECTION SETUP COMPLETE message. | --> | RRC CONNECTION SETUP COMPLETE | - | - |
| - | EXCEPTION: In parallel to the event described in steps 1a6 to 1a17, if initiated by the UE the steps 5 to 13 of the generic procedure for Registration on PS specified in TS 34.108 subclause 7.2.2.2.3 take place. | - | - | - | - |
| 14a4 | Check: Does the UE transmit a CM SERVICE REQUEST with CM service type IE indicating “Emergency call establishment”? | --> | CM SERVICE REQUEST | 1 | P |
| 14a5 | The SS transmits an AUTHENTICATION REQUEST. | <-- | AUTHENTICATION REQUEST | - | - |
| 14a6 | The UE transmits AUTHENTICATION RESPONSE. | --> | AUTHENTICATION RESPONSE | - | - |
| 14a7 | The SS transmits a SECURITY MODE COMMAND message for the CS domain. | <-- | SECURITY MODE COMMAND | - | - |
| 14a8 | The UE transmits a SECURITY MODE COMPLETE message. | --> | SECURITY MODE COMPLETE | - | - |
| 14a9 | Check: Does the UE transmit an EMERGENCY SETUP message with Emergency Service Category IE bit 6 set to 1 and all other bits are set to 0? | --> | EMERGENCY SETUP | 1 | P |
| 14a10-14a15 | Steps 11 to 16 of the generic test procedure in TS 34.108 subclause 7.2.3.2.3 are performed on Cell 5.  NOTE: the CS call setup is completed. | - | - | - | - |
| 14a16 | Traffic channel is kept active for at least 5 seconds. | - | - | - | - |
| 14a17 | The SS transmits DISCONNECT. | <-- | DISCONNECT | - | - |
| 14a18 | The UE transmits RELEASE. | --> | RELEASE | - | - |
| 14a19 | The SS transmits RELEASE COMPLETE. | <-- | RELEASE COMPLETE | - | - |
| 14a20 | The SS transmits an RRC CONNECTION RELEASE message. | <-- | RRC CONNECTION RELEASE | - | - |
| 14a21 | The UE transmits RRC CONNECTION RELEASE COMPLETE. | --> | RRC CONNECTION RELEASE COMPLETE | - | - |
| 14b1 | IF (px\_NR\_RATComb\_Tested = NR\_GERAN), Check: Does the UE transmit a CHANNEL REQUEST message on Cell 24 with Establishment cause: Emergency call? | --> | CHANNEL REQUEST | 1 | P |
| 14b2 | The SS transmits an IMMEDIATE ASSIGNMENT message. | <-- | IMMEDIATE ASSIGNMENT | - | - |
| 14b3 | Check: Does the UE transmit a CM SERVICE REQUEST with CM service type IE indicating “Emergency call establishment”? | --> | CM SERVICE REQUEST | 1 | P |
| 14b4 | The SS transmits an AUTHENTICATION REQUEST message. | <-- | AUTHENTICATION REQUEST | - | - |
| 14b5 | The UE transmits an AUTHENTICATION RESPONSE message. | --> | AUTHENTICATION RESPONSE | - | - |
| 14b6 | The SS transmits a CIPHERING MODE COMMAND. | <-- | CIPHERING MODE COMMAND | - | - |
| 14b7 | The UE transmits a CIPHERING MODE COMPLETE. | --> | CIPHERING MODE COMPLETE | - | - |
| 14b8 | Check: Does the UE transmit an EMERGENCY SETUP message with Emergency Service Category IE bit 6 set to 1 and all other bits are set to 0? | --> | EMERGENCY SETUP | 1 | P |
| 14b9-14b15 | Steps 11 to 17 of the generic test procedure in TS 51.010-1 subclause 10.2.3 are performed on Cell 24.  NOTE: the CS call setup is completed. | - | - | - | - |
| 14b16 | Traffic channel is kept active for at least 5 seconds. | - | - | - | - |
| 14b17 | The SS transmits DISCONNECT. | <-- | DISCONNECT | - | - |
| 14b18 | The UE transmits RELEASE. | --> | RELEASE | - | - |
| 14b19 | The SS transmits RELEASE COMPLETE. | <-- | RELEASE COMPLETE | - | - |
| 14b20 | The SS transmits CHANNEL RELEASE | <-- | CHANNEL RELEASE | - | - |
| Note 1: The request to originate a manual eCall may be performed by MMI or AT command. | | | | | |

11.5.13.3.3 Specific message contents

Table 11.5.13.3.3-1: SIB1 for NR Cell 1 (All steps, Table 11.5.13.3.2-1)

|  |
| --- |
| Derivation path: TS 38.508-1 [4] table 4.6.1-28 Condition eCalloverIMSforNR |

Table 11.5.13.3.3-2: INVITE (step 12, Table 11.5.13.3.2-1)

| Derivation path: TS 34.229-5 [41] Step 1 in Annex A.23 Condition A20 |
| --- |

Table 11.5.13.3.3-3: RRC CONNECTION REQUEST (Step 14a1, Table 11.5.13.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 34.108 clause 9.1.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Establishment cause | Emergency Call |  |  |

Table 11.5.13.3.3-4: CM SERVICE REQUEST (Steps 14a4 and 14b3, Table 11.5.13.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 24.008[43] Table 9.2.11 | | | |
| Information Element | Value/remark | Comment | Condition |
| CM service type | 0010 | Emergency call establishment |  |

Table 11.5.13.3.3-5: CHANNEL REQUEST (Step 14b1, Table 11.5.13.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 44.018 Table 9.1.8.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Establishment cause | 101 | Emergency call |  |

### 11.5.14 eCall Only mode / 5GS supports IMS voice over PS session / 5GS does not support emergency service / eCall using CS domain

11.5.14.1 Test Purpose (TP)

(1)

**with** { UE is switched ON with eCall only enabled USIM }

**ensure that** {

**when** { 5GS supports IMS voice over PS session but ims-EmergencySupport on 5GS is not indicated and UE is requested to make an automatic eCall }

**then** { UE establishes the eCall using the CS domain(UTRA or GERAN) }

}

11.5.14.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 23.122, clause 4.4.3.1.1 and TS 23.167, Annex H.6.

[TS 23.122 clause 4.4.3.1.1]

The MS selects and attempts registration on other PLMN/access technology combinations, if available and, for bullets i, ii, iii, iv, v, allowable, in the following order:

i) either the HPLMN (if the EHPLMN list is not present or is empty) or the highest priority EHPLMN that is available (if the EHPLMN list is present) ;

ii) each PLMN/access technology combination in the "User Controlled PLMN Selector with Access Technology" data file in the SIM (in priority order);

iii) each PLMN/access technology combination in the "Operator Controlled PLMN Selector with Access Technology" data file in the SIM (in priority order) or stored in the ME (in priority order);

iv) other PLMN/access technology combinations with received high quality signal in random order;

NOTE 1: High quality signal is defined in the appropriate AS specification.

v) other PLMN/access technology combinations in order of decreasing signal quality.

…

l) In i to vii, if the MS is in eCall only mode, the MS shall not consider PLMNs which do not advertise support for eCall over IMS, unless such PLMNs are available in GERAN or UTRAN.

NOTE 6: As an implementation option, an MS in eCall only mode that was not able to select any PLMN according to l) can perform a second iteration of i to v with no restriction.

[TS 23.167 clause H.6]

Table H.2: Domain Selection Rules for eCall over IMS session attempts for E-UTRAN or NG-RAN radio access networks

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | PS Available | VoIMS | EMS | ECL | First eCall Attempt | Second eCall Attempt |
| A | Y | Y | Y | Y | PS | PS on another PS RAT if available with EMS=Y and ECL=Y  or CS if available |
| B | Y | Y | Y | N | CS if available | PS (UE establishes IMS emergency session) |
| C | Y | Y or N | N | N | CS if available | PS on another PS RAT if available with EMS=Y or EMS unknown |
| D | Y | N | Y | Y | PS or CS if available | CS if first attempt in PS  PS if first attempt in CS |
| E | Y | N | Y | N | CS if available | PS (UE establishes IMS emergency session) |
| F | N |  | - | - | CS if available |  |
| VoIMS = Voice over IMS over PS sessions support as indicated by IMS Voice over PS session supported indication as defined in TS 23.401 [28] and TS 23.502 [49].  EMS = IMS Emergency Services supported as indicated by Emergency Service Support indicator as defined in TS 23.401 [28] and TS 23.501 [48] and TS 23.502 [49].  ECL = eCall Over IMS support as indicated by the eCall support indicator defined in TS 23.401 [28] and TS 23.501 [48].  NOTE 1: As an implementation option, when the first attempt uses PS and fails for reasons other than related to IMS, the second attempt may use PS with a different 3GPP RAT. In this case the UE, can make a third attempt using CS. | | | | | | |

11.5.14.3 Test description

11.5.14.3.1 Pre-test conditions

System Simulator:

- 3 cells

- NR Cell 1 as defined in TS 38.508-1 [4] Table 4.4.2-3. System information combination NR-6 as defined in TS 38.508-1 [4], sub-clause 4.4.3.1.2 with eCallOverIMS-Support and ims-EmergencySupport not present.

- if px\_NR\_RATComb\_Tested = NR\_UTRA, UTRA Cell 5 as defined in TS 36.508 [7].

- cell 5 is configured as ''Suitable Neighbour cell''.

- if px\_NR\_RATComb\_Tested = NR\_GERAN, GERAN cell 24 as defined in TS 36.508 [7].

- cell 24 is configured as ''Suitable Neighbour cell''.

UE:

- the eCall capable UE is equipped with ‘eCall only’ enabled USIM configured as per TS 38.508-1 [4] Table 6.4.1-24.

Preamble:

- The UE is in test state 0-A (Switched Off) as defined in TS 38.508-1 [4], subclause 4.4A.2.

11.5.14.3.2 Test procedure sequence

Table 11.5.14.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **St** | **Procedure** | **Message Sequence** | | **TP** | **Verdict** |
|  |  | **U - S** | **Message** |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2 | Wait for 60s. | - | - | - | - |
| 3 | An automatic eCall is initiated. (Note 1) | - | - | - | - |
| - | EXCEPTION: Steps 4a1 to 4b27 describe behaviour that depends on the UE capability; the "lower case letter" identifies a step sequence that takes place if a capability is supported. | - | - | - | - |
| 4a1 | IF (px\_NR\_RATComb\_Tested = NR\_UTRA), UE transmits an RRC CONNECTION REQUEST message on Cell 5 with establishment cause set to registration | --> | RRC CONNECTION REQUEST | - | - |
| 4a2 | The SS transmits an RRC CONNECTION SETUP message. | <-- | RRC CONNECTION SETUP | - | - |
| 4a3 | The UE transmits an RRC CONNECTION SETUP COMPLETE message. | --> | RRC CONNECTION SETUP COMPLETE | - | - |
| 4a4 | The UE transmits LOCATION AREA UPDATE REQUEST message. | --> | LOCATION UPDATE REQUEST | - | - |
| 4a5 | The SS transmits an AUTHENTICATION REQUEST. | <-- | AUTHENTICATION REQUEST | - | - |
| 4a6 | The UE transmits AUTHENTICATION RESPONSE. | --> | AUTHENTICATION RESPONSE | - | - |
| 4a7 | The SS transmits a SECURITY MODE COMMAND message for the CS domain. | <-- | SECURITY MODE COMMAND | - | - |
| 4a8 | The UE transmits a SECURITY MODE COMPLETE message. | --> | SECURITY MODE COMPLETE | - | - |
| 4a9 | The SS transmits a LOCATION UPDATE ACCEPT message | <-- | LOCATION UPDATE ACCEPT | - | - |
| 4a10 | The UE transmits a TMSI REALLOCATION COMPLETE message | --> | TMSI REALLOCATION COMPLETE | - | - |
| 4a11 | SS releases the RRC Connection | - | - | - | - |
| 4a12 | Check: Does the UE transmit an RRC CONNECTION REQUEST message on Cell 5 with establishment cause set to Emergency Call? | --> | RRC CONNECTION REQUEST | 1 | P |
| 4a13 | The SS transmits an RRC CONNECTION SETUP message. | <-- | RRC CONNECTION SETUP | - | - |
| 4a14 | The UE transmits an RRC CONNECTION SETUP COMPLETE message. | --> | RRC CONNECTION SETUP COMPLETE | - | - |
| 4a15 | Check: Does the UE transmit a CM SERVICE REQUEST with CM service type IE indicating “Emergency call establishment”? | --> | CM SERVICE REQUEST | 1 | P |
| 4a16 | The SS transmits an AUTHENTICATION REQUEST. | <-- | AUTHENTICATION REQUEST | - | - |
| 4a17 | The UE transmits AUTHENTICATION RESPONSE. | --> | AUTHENTICATION RESPONSE | - | - |
| 4a18 | The SS transmits a SECURITY MODE COMMAND message for the CS domain. | <-- | SECURITY MODE COMMAND | - | - |
| 4a19 | The UE transmits a SECURITY MODE COMPLETE message. | --> | SECURITY MODE COMPLETE | - | - |
| 4a20 | Check: Does the UE transmit an EMERGENCY SETUP message with Emergency Service Category IE bit 7 set to 1 and all other bits are set to 0? | --> | EMERGENCY SETUP | 1 | P |
| 4a21-4a26 | Steps 11 to 16 of the generic test procedure in TS 34.108 subclause 7.2.3.2.3 are performed on Cell 5.  NOTE: the CS call setup is completed. | - | - | - | - |
| 4a27 | Traffic channel is kept active for at least 5 seconds. | - | - | - | - |
| 4a28 | The SS transmits DISCONNECT. | <-- | DISCONNECT | - | - |
| 4a29 | The UE transmits RELEASE. | --> | RELEASE | - | - |
| 4a30 | The SS transmits RELEASE COMPLETE. | <-- | RELEASE COMPLETE | - | - |
| 4a31 | The SS transmits an RRC CONNECTION RELEASE message. | <-- | RRC CONNECTION RELEASE | - | - |
| 4a32 | The UE transmits RRC CONNECTION RELEASE COMPLETE. | --> | RRC CONNECTION RELEASE COMPLETE | - | - |
| 4b1 | IF (px\_NR\_RATComb\_Tested = NR\_GERAN), UE transmit RACH request with establishment cause set to Location updating on Cell 24 | - | - | - | - |
| 4b2 | UE sends a CHANNEL REQUEST | --> | CHANNEL REQUEST | - | - |
| 4b3 | The SS transmits an IMMEDIATE ASSIGNMENT message. | <-- | IMMEDIATE ASSIGNMENT | - | - |
| 4b4 | The UE sends LOCATION UPDATING REQUEST | --> | LOCATION UPDATING REQUEST | - | - |
| 4b5 | The SS transmits LOCATION UPDATING ACCEPT | <-- | LOCATION UPDATING ACCEPT | - | - |
| 4b6 | The UE transmits TMSI REALLOCATION COMPLETE | --> | TMSI REALLOCATION COMPLETE | - | - |
| 4b7 | RRC Connection is released | <-- | CHANNEL RELEASE | - | - |
| 4b8 | Check: Does the UE transmit a CHANNEL REQUEST message on Cell 24 with Establishment cause: Emergency call? | --> | CHANNEL REQUEST | 1 | P |
| 4b9 | The SS transmits an IMMEDIATE ASSIGNMENT message. | <-- | IMMEDIATE ASSIGNMENT | - | - |
| 4b10 | Check: Does the UE transmit a CM SERVICE REQUEST with CM service type IE indicating “Emergency call establishment”? | --> | CM SERVICE REQUEST | 1 | P |
| 4b11 | The SS transmits an AUTHENTICATION REQUEST message. | <-- | AUTHENTICATION REQUEST | - | - |
| 4b12 | The UE transmits an AUTHENTICATION RESPONSE message. | --> | AUTHENTICATION RESPONSE | - | - |
| 4b13 | The SS transmits a CIPHERING MODE COMMAND. | <-- | CIPHERING MODE COMMAND | - | - |
| 4b14 | The UE transmits a CIPHERING MODE COMPLETE. | --> | CIPHERING MODE COMPLETE | - | - |
| 4b15 | Check: Does the UE transmit an EMERGENCY SETUP message with Emergency Service Category IE bit 7 set to 1 and all other bits are set to 0? | --> | EMERGENCY SETUP | 1 | P |
| 4b16-4b22 | Steps 11 to 17 of the generic test procedure in TS 51.010-1 subclause 10.2.3 are performed on Cell 24.  NOTE: the CS call setup is completed. | - | - | - | - |
| 4b23 | Traffic channel is kept active for at least 5 seconds. | - | - | - | - |
| 4b24 | The SS transmits DISCONNECT. | 🡨 | DISCONNECT | - | - |
| 4b25 | The UE transmits RELEASE. | 🡪 | RELEASE | - | - |
| 4b26 | The SS transmits RELEASE COMPLETE. | 🡨 | RELEASE COMPLETE | - | - |
| 4b27 | The SS transmits CHANNEL RELEASE | 🡨 | CHANNEL RELEASE | - | - |
| Note 1: The request to originate an automatic eCall may be performed by MMI or AT command. | | | | | |

11.5.14.3.3 Specific message contents

Table 11.5.14.3.3-1: SIB1 for NR Cell 1 (All steps, Table 11.5.14.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [4] table 4.6.1-28 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| ims-EmergencySupport | Not present | Not support eCall  over IMS services |  |
| eCallOverIMS-Support | Not present | Not support IMS  emergency call |  |
| } |  |  |  |

Table 11.5.14.3.3-2: RRC CONNECTION REQUEST (Step 4a12, Table 11.5.14.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 34.108 clause 9.1.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Establishment cause | Emergency Call |  |  |

Table 11.5.14.3.3-3: CM SERVICE REQUEST (Steps 4a15 and 4b10, Table 11.5.14.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 24.008[43] Table 9.2.11 | | | |
| Information Element | Value/remark | Comment | Condition |
| CM service type | 0010 | Emergency call establishment |  |

Table 11.5.14.3.3-4: CHANNEL REQUEST (Step 4b8, Table 11.5.14.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 44.018 Table 9.1.8.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| Establishment cause | 101 | Emergency call |  |

## 11.6 3GPP PS Data Off

### 11.6.1 Data Off / MO Voice Call

11.6.1.1 Test Purpose (TP)

(1)

**with** { UE in PDU SESSION ACTIVE state and in 5GMM-CONNECTED mode and PS Data Off configured to “inactive” }

**ensure** **that** {

**when** { UE PS Data Off status is changed to “active” }

**then** { UE performs a PDU session modification procedure providing the PS Data Off status set to “active” }

}

(2)

**with** { UE being registered to IMS and with PS Data Off configured to “inactive” }

**ensure** **that** {

**when** { UE PS Data Off status is changed to “active” }

**then** { UE sends REGISTER with PS Data Off configured to “active” }

}

(3)

**with** { UE being registered to IMS and with PS Data Off configured to “active” }

**ensure that** {

**when** { UE is being made to initiate a voice call }

**then** { UE sends INVITE for voice call }

}

11.6.1.2 Conformance Requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clause 6.2.10. TS 24.229 [44] clause 4.17, Rel-15. Unless otherwise stated these are Rel-16 requirements.

[TS 24.501, clause 6.2.10]

In case of PLMN, a UE, which supports 3GPP PS data off (see 3GPP TS 23.501 [8]), can be configured with up to two lists of 3GPP PS data off exempt services as specified in 3GPP TS 24.368 [17] or in the EF3GPPPSDATAOFF USIM file as specified in 3GPP TS 31.102 [22]:

a) a list of 3GPP PS data off exempt services to be used in the HPLMN or EHPLMN; and

b) a list of 3GPP PS data off exempt services to be used in the VPLMN.

If only the list of 3GPP PS data off exempt services to be used in the HPLMN or EHPLMN is configured at the UE, this list shall be also used in the VPLMN.

In case of SNPN, a UE, which supports 3GPP PS data off (see 3GPP TS 23.501 [8]), can be configured with a list of 3GPP PS data off exempt services as specified in 3GPP TS 24.368 [17] for each SNPN whose entry exists in the "list of subscriber data":

a) a list of 3GPP PS data off exempt services to be used in the SNPN.

If the UE supports 3GPP PS data off, the UE shall provide the 3GPP PS data off UE status in the Extended protocol configuration options IE during UE-requested PDU session establishment procedure except for the transfer of a PDU session from non-3GPP access to 3GPP access and except for the establishment of user plane resources on the other access for the MA PDU session(see subclause 6.4.1), and during UE-requested PDU session modification procedure (see subclause 6.4.2), regardless of associated access type of the PDU session. If the UE requests a PDU session establishment procedure in order to transfer a PDU session from non-3GPP access to 3GPP access, or in order to establish user plane resources on the other access for the MA PDU session over 3GPP access or non-3GPP access, and:

a) if the 3GPP PS data off UE status has changed since the last providing to the network, the UE shall provide the 3GPP PS data off UE status in the Extended protocol configuration options IE; or

b) if the 3GPP PS data off UE status has not changed since the last providing to the network, the UE need not provide the 3GPP PS data off UE status.

The network shall support of 3GPP PS data off.

The UE shall indicate change of the 3GPP PS data off UE status for the PDU session by using the UE-requested PDU session modification procedure as specified in subclause 6.4.2.

When the 3GPP PS data off UE status is "activated":

a) the UE does not send uplink IP packets via 3GPP access except:

1) for those services indicated in the list of 3GPP PS data off exempt services to be used in the HPLMN or EHPLMN as specified in 3GPP TS 24.368 [17] when the UE is in its HPLMN or EHPLMN or for those services indicated in the list of 3GPP PS data off exempt services to be used in the SNPN as specified in 3GPP TS 24.368 [17] when the UE is in an SNPN;

2) for those services indicated in the list of 3GPP PS data off exempt services to be used in the HPLMN or EHPLMN when the UE is in the VPLMN, if only the list of 3GPP PS data off exempt services to be used in the HPLMN or EHPLMN is configured to the UE as specified in 3GPP TS 24.368 [17];

3) for those services indicated in the list of 3GPP PS data off exempt services to be used in the VPLMN when the UE is in the VPLMN, if the list of 3GPP PS data off exempt services to be used in the VPLMN is configured to the UE as specified in 3GPP TS 24.368 [17];

4) for those services indicated in the EF3GPPPSDATAOFF USIM file as specified in 3GPP TS 31.102 [22];

5) any uplink traffic due to procedures specified in 3GPP TS 24.229 [14]; and

6) any uplink traffic due to procedures specified in 3GPP TS 24.623 [20];

b) the UE does not send uplink Ethernet user data packets via 3GPP access; and

c) the UE does not send uplink Unstructured user data packets via 3GPP access.

Otherwise the UE sends uplink user data packets without restriction.

NOTE: If the UE supports 3GPP PS data off, uplink IP packets are filtered as specified in 3GPP TS 24.229 [14] in U.3.1.5.

3GPP PS data off does not restrict sending of uplink user data packets via non-3GPP access of a single access PDU session or an MA PDU session.

[TS 24.229, Rel-15, clause 4.17]

The UE and the network can support the 3GPP PS data off.

When 3GPP PS data off is supported and active, IP packets that are associated with services that are not a 3GPP PS data off exempt service are prevented from transport over EPS IP-CAN, GPRS IP-CAN and 5GS IP-CAN as specified in 3GPP TS 23.228 [7]. The UE may be configured by the HPLMN or the EHPLMN with up to two indications whether a 3GPP IMS service is a 3GPP PS Data Off exempt service, one indication is valid for the UE is in the HPLMN or the EHPLMN and the other indication is valid for the UE is in the VPLMN. When the UE is only configured with the indication valid for the UE camping in the HPLMN or the EHPLMN, the UE shall use this indication also when the UE is in the VPLMN.

When 3GPP PS data off is supported and active and the UE is configured, either as specified in 3GPP TS 24.167 [8G] or in 3GPP TS 31.102 [15C], with services that are 3GPP PS data off exempt, then the UE will not send uplink IP packets related to any services that are not 3GPP PS data off exempt over EPS IP-CAN, GPRS IP-CAN and 5GS IP-CAN. The UE informs the network about its 3GPP PS data off status by including a g.3gpp.ps-data-off media feature tag specified in subclause 7.9.8 in all REGISTER requests sent over GPRS IP-CAN, EPS IP-CAN or 5GS IP-CAN. The UE reregisters over EPS IP-CAN, GPRS IP-CAN and 5GS IP-CAN every time the 3GPP PS data off status is changed or the UE is provided by the network with a new list of 3GPP PS data off exempt services while the 3GPP PS data off status is "active".

An AS handling a service is configured with information whether the service is a 3GPP PS data off exempt service. If the 3GPP PS data off status is active and the service is not a 3GPP PS data off exempt service, the AS prevents downlink IP packets of the service from reaching the UE over EPS IP-CAN, GPRS IP-CAN and 5GS IP-CAN. The AS shall be configured with up to two indications whether a 3GPP IMS service is a 3GPP PS Data Off exempt service, one indication is valid for non-roaming users, and the other indication is valid for users roaming in the various VPLMNs with whom roaming agreements exist. When the AS is only configured with the indication valid for the UE camping in the HPLMN or the EHPLMN, the AS shall use this indication also when the UE is in the VPLMN.

[TS 24.229, Rel-15, clause U.3.1.0]

If the UE supports the 3GPP PS data off, then the UE shall in all REGISTER requests include the "+g.3gpp.ps-data-off" header field parameter defined in subclause 7.9.8 set to a value indicating the 3GPP PS data off status.

When the UE sends a REGISTER request, if the 3GPP PS data off status is "active", then the UE shall only include media feature tags associated with services that are 3GPP PS data off exempt services in the g.3gpp.icsi-ref media feature tag, as defined in subclause 7.9.2 and RFC 3840 [62], for the IMS communication services it intends to use.

If the UE is registered, and the 3GPP PS data off status is changed, then the UE shall perform a reregistration of the previously registered public user identity.

11.6.1.3 Test description

11.6.1.3.1 Pre-test conditions

System Simulator:

- 1 NR Cell connected to 5GC, default parameters.

UE:

- None.

Preamble:

- UE is in state 3N-A with IMS registered on NR cell 1 according to TS 38.508-1 [4] Table 4.4A.2-3.

11.6.1.3.2 Test procedure sequence

Table 11.6.1.3.2-1: Main Behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | UE is made to activate Data Off, see NOTE 1 | - | - | - | - |
| 2 | Check: Does the UE transmit a PDU SESSION MODIFICATION REQUEST message with Data Off status set to activated? | --> | 5GSM: PDU SESSION MODIFICATION REQUEST | 1 | P |
| 3 | The SS transmits an PDU SESSION MODIFICATION COMMAND message. | <-- | 5GSM: PDU SESSION MODIFICATION COMMAND | - | - |
| - | EXCEPTION: Steps 4 and 5 can occur in any order | - | - | - | - |
| 4 | the UE transmit an PDU SESSION MODIFICATION COMPLETE message. | --> | 5GSM: PDU SESSION MODIFICATION COMPLETE | - | - |
| 5 | Check: does the UE re-register with "+g.3gpp.ps-data-off" header field parameter set to “active”? | --> | IMS: REGISTER | 2 | P |
| 6 | SS responds with 200 OK | <-- | IMS: 200 OK |  |  |
| 7 | UE is made to attempt an IMS voice call. | - | - |  |  |
| 8-12 | Check: is the MTSI MO Voice call / 5GS procedure, steps 1-5, of Annex A.4.1a in TS 34.229-5 [41] performed? |  |  | 3 | P |
| 13-15 | Steps 10-12 of generic procedure specified in Table 4.9.15.2.2-1 of TS 38.508-1 [21] are performed. | - | - | - | - |
| 16-22 | Check: is the MTSI MO Voice call / 5GS procedure, steps 6-12, of Annex A.4.1a in TS 34.229-5 [41] performed? | - | - | 3 | P |
| 23-24 | SS releases the call. (Steps 1-2 of Annex A.8 in TS 34.229-5 [41]) | - | - | - | - |
| NOTE 1: This could be done by e.g. MMI or AT command. | | | | | |

11.6.1.3.3 Specific message contents

Table 11.6.1.3.3-1: PDU SESSION MODIFICATION REQUEST (step 2, Table 11.6.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| Extended protocol configuration options |  |  |  |
| Container ID n | ‘0017’H | n assigned to next available number |  |
| Length of container ID n contents |  | 1 octet |  |
| Container ID n contents | ‘02’H | 3GPP PS data off UE status activated |  |

Table 11.6.1.3.3-2: PDU SESSION MODIFICATION COMMAND (step 3, Table 11.6.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| Extended protocol configuration options |  |  |  |
| Container ID n | ‘0017’H | n assigned to next available number |  |
| Length of container ID n contents |  | 0 octets |  |
| Container ID n contents | empty | 3GPP PS data off support indication |  |

Table 11.6.1.3.3-3: REGISTER (step 5, Table 11.6.1.3.2-1)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Derivation Path: TS 34.229-1 [2], Annex A.1.1, Conditions A2, A4, A17, A32 | | | | |
| Header/param | Cond | Value/remark | Rel | Reference |
| Contact |  |  |  |  |
| feature-param |  | +g.3gpp.ps-data-off=”active” |  | TS 24.229 [44] |

### 11.6.2 Data Off / MO Video Call

11.6.2.1 Test Purpose (TP)

(1)

**with** { UE in PDU SESSION ACTIVE state and in 5GMM-CONNECTED mode and PS Data Off configured to “inactive” }

**ensure** **that** {

**when** { UE PS Data Off status is changed to “active” }

**then** { UE performs a PDU session modification procedure providing the PS Data Off status set to “active” }

}

(2)

**with** { UE being registered to IMS and with PS Data Off configured to “inactive” }

**ensure** **that** {

**when** { UE PS Data Off status is changed to “active” }

**then** { UE sends REGISTER with PS Data Off configured to “active” }

}

(3)

**with** { UE being registered to IMS and with PS Data Off configured to “active” }

**ensure that** {

**when** { UE is being made to initiate a video call }

**then** { UE does not send INVITE for video call }

}

11.6.2.2 Conformance Requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clause 6.2.10. TS 24.229 [44] clause 4.17, Rel-15. Unless otherwise stated these are Rel-16 requirements.

[TS 24.501, clause 6.2.10]

In case of PLMN, a UE, which supports 3GPP PS data off (see 3GPP TS 23.501 [8]), can be configured with up to two lists of 3GPP PS data off exempt services as specified in 3GPP TS 24.368 [17] or in the EF3GPPPSDATAOFF USIM file as specified in 3GPP TS 31.102 [22]:

a) a list of 3GPP PS data off exempt services to be used in the HPLMN or EHPLMN; and

b) a list of 3GPP PS data off exempt services to be used in the VPLMN.

If only the list of 3GPP PS data off exempt services to be used in the HPLMN or EHPLMN is configured at the UE, this list shall be also used in the VPLMN.

In case of SNPN, a UE, which supports 3GPP PS data off (see 3GPP TS 23.501 [8]), can be configured with a list of 3GPP PS data off exempt services as specified in 3GPP TS 24.368 [17] for each SNPN whose entry exists in the "list of subscriber data":

a) a list of 3GPP PS data off exempt services to be used in the SNPN.

If the UE supports 3GPP PS data off, the UE shall provide the 3GPP PS data off UE status in the Extended protocol configuration options IE during UE-requested PDU session establishment procedure except for the transfer of a PDU session from non-3GPP access to 3GPP access and except for the establishment of user plane resources on the other access for the MA PDU session(see subclause 6.4.1), and during UE-requested PDU session modification procedure (see subclause 6.4.2), regardless of associated access type of the PDU session. If the UE requests a PDU session establishment procedure in order to transfer a PDU session from non-3GPP access to 3GPP access, or in order to establish user plane resources on the other access for the MA PDU session over 3GPP access or non-3GPP access, and:

a) if the 3GPP PS data off UE status has changed since the last providing to the network, the UE shall provide the 3GPP PS data off UE status in the Extended protocol configuration options IE; or

b) if the 3GPP PS data off UE status has not changed since the last providing to the network, the UE need not provide the 3GPP PS data off UE status.

The network shall support of 3GPP PS data off.

The UE shall indicate change of the 3GPP PS data off UE status for the PDU session by using the UE-requested PDU session modification procedure as specified in subclause 6.4.2.

When the 3GPP PS data off UE status is "activated":

a) the UE does not send uplink IP packets via 3GPP access except:

1) for those services indicated in the list of 3GPP PS data off exempt services to be used in the HPLMN or EHPLMN as specified in 3GPP TS 24.368 [17] when the UE is in its HPLMN or EHPLMN or for those services indicated in the list of 3GPP PS data off exempt services to be used in the SNPN as specified in 3GPP TS 24.368 [17] when the UE is in an SNPN;

2) for those services indicated in the list of 3GPP PS data off exempt services to be used in the HPLMN or EHPLMN when the UE is in the VPLMN, if only the list of 3GPP PS data off exempt services to be used in the HPLMN or EHPLMN is configured to the UE as specified in 3GPP TS 24.368 [17];

3) for those services indicated in the list of 3GPP PS data off exempt services to be used in the VPLMN when the UE is in the VPLMN, if the list of 3GPP PS data off exempt services to be used in the VPLMN is configured to the UE as specified in 3GPP TS 24.368 [17];

4) for those services indicated in the EF3GPPPSDATAOFF USIM file as specified in 3GPP TS 31.102 [22];

5) any uplink traffic due to procedures specified in 3GPP TS 24.229 [14]; and

6) any uplink traffic due to procedures specified in 3GPP TS 24.623 [20];

b) the UE does not send uplink Ethernet user data packets via 3GPP access; and

c) the UE does not send uplink Unstructured user data packets via 3GPP access.

Otherwise the UE sends uplink user data packets without restriction.

NOTE: If the UE supports 3GPP PS data off, uplink IP packets are filtered as specified in 3GPP TS 24.229 [14] in U.3.1.5.

3GPP PS data off does not restrict sending of uplink user data packets via non-3GPP access of a single access PDU session or an MA PDU session.

[TS 24.229, Rel-15, clause 4.17]

The UE and the network can support the 3GPP PS data off.

When 3GPP PS data off is supported and active, IP packets that are associated with services that are not a 3GPP PS data off exempt service are prevented from transport over EPS IP-CAN, GPRS IP-CAN and 5GS IP-CAN as specified in 3GPP TS 23.228 [7]. The UE may be configured by the HPLMN or the EHPLMN with up to two indications whether a 3GPP IMS service is a 3GPP PS Data Off exempt service, one indication is valid for the UE is in the HPLMN or the EHPLMN and the other indication is valid for the UE is in the VPLMN. When the UE is only configured with the indication valid for the UE camping in the HPLMN or the EHPLMN, the UE shall use this indication also when the UE is in the VPLMN.

When 3GPP PS data off is supported and active and the UE is configured, either as specified in 3GPP TS 24.167 [8G] or in 3GPP TS 31.102 [15C], with services that are 3GPP PS data off exempt, then the UE will not send uplink IP packets related to any services that are not 3GPP PS data off exempt over EPS IP-CAN, GPRS IP-CAN and 5GS IP-CAN. The UE informs the network about its 3GPP PS data off status by including a g.3gpp.ps-data-off media feature tag specified in subclause 7.9.8 in all REGISTER requests sent over GPRS IP-CAN, EPS IP-CAN or 5GS IP-CAN. The UE reregisters over EPS IP-CAN, GPRS IP-CAN and 5GS IP-CAN every time the 3GPP PS data off status is changed or the UE is provided by the network with a new list of 3GPP PS data off exempt services while the 3GPP PS data off status is "active".

An AS handling a service is configured with information whether the service is a 3GPP PS data off exempt service. If the 3GPP PS data off status is active and the service is not a 3GPP PS data off exempt service, the AS prevents downlink IP packets of the service from reaching the UE over EPS IP-CAN, GPRS IP-CAN and 5GS IP-CAN. The AS shall be configured with up to two indications whether a 3GPP IMS service is a 3GPP PS Data Off exempt service, one indication is valid for non-roaming users, and the other indication is valid for users roaming in the various VPLMNs with whom roaming agreements exist. When the AS is only configured with the indication valid for the UE camping in the HPLMN or the EHPLMN, the AS shall use this indication also when the UE is in the VPLMN.

[TS 24.229, Rel-15, clause U.3.1.0]

If the UE supports the 3GPP PS data off, then the UE shall in all REGISTER requests include the "+g.3gpp.ps-data-off" header field parameter defined in subclause 7.9.8 set to a value indicating the 3GPP PS data off status.

When the UE sends a REGISTER request, if the 3GPP PS data off status is "active", then the UE shall only include media feature tags associated with services that are 3GPP PS data off exempt services in the g.3gpp.icsi-ref media feature tag, as defined in subclause 7.9.2 and RFC 3840 [62], for the IMS communication services it intends to use.

If the UE is registered, and the 3GPP PS data off status is changed, then the UE shall perform a reregistration of the previously registered public user identity.

11.6.2.3 Test description

11.6.2.3.1 Pre-test conditions

System Simulator:

- 1 NR Cell connected to 5GC, default parameters.

UE:

- None.

Preamble:

- UE is in state 3N-A with IMS registered on NR cell 1 according to TS 38.508-1 [4] Table 4.4A.2-3.

11.6.2.3.2 Test procedure sequence

Table 11.6.2.3.2-1: Main Behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | UE is made to activate Data Off, see NOTE 1. | - | - | - | - |
| 2 | Check: Does the UE transmit a PDU SESSION MODIFICATION REQUEST message with Data Off status set to activated? | --> | 5GSM: PDU SESSION MODIFICATION REQUEST | 1 | P |
| 3 | The SS transmits an PDU SESSION MODIFICATION COMMAND message. | <-- | 5GSM: PDU SESSION MODIFICATION COMMAND | - | - |
| - | EXCEPTION: Steps 4 and 5 can occur in any order | - | - | - | - |
| 4 | the UE transmit an PDU SESSION MODIFICATION COMPLETE message. | --> | 5GSM: PDU SESSION MODIFICATION COMPLETE | - | - |
| 5 | Check: does the UE re-register with "+g.3gpp.ps-data-off" header field parameter set to “active”? | --> | IMS: REGISTER | 2 | P |
| 6 | SS responds with 200 OK | <-- | IMS: 200 OK |  |  |
| 7 | UE is made to attempt an IMS video call. | - | - |  |  |
| 8 | Check: Does the UE send a SIP INVITE within 30 seconds? | - | - | 3 | F |
| NOTE 1: This could be done by e.g. MMI or AT command. | | | | | |

11.6.2.3.3 Specific message contents

Table 11.6.2.3.3-1: PDU SESSION MODIFICATION REQUEST (step 2, Table 11.6.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| Extended protocol configuration options |  |  |  |
| Container ID n | ‘0017’H | n assigned to next available number |  |
| Length of container ID n contents |  | 1 octet |  |
| Container ID n contents | ‘02’H | 3GPP PS data off UE status activated |  |

Table 11.6.2.3.3-2: PDU SESSION MODIFICATION COMMAND (step 3, Table 11.6.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| Extended protocol configuration options |  |  |  |
| Container ID n | ‘0017’H | n assigned to next available number |  |
| Length of container ID n contents |  | 0 octets |  |
| Container ID n contents | empty | 3GPP PS data off support indication |  |

Table 11.6.2.3.3-3: REGISTER (step 5, Table 11.6.2.3.2-1)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Derivation Path: TS 34.229-1 [2], Annex A.1.1, Conditions A2, A4, A17, A32 | | | | |
| Header/param | Cond | Value/remark | Rel | Reference |
| Contact |  |  |  |  |
| feature-param |  | +g.3gpp.ps-data-off=”active” |  | TS 24.229 [44] |

### 11.6.3 Data Off / SMSoIP

11.6.3.1 Test Purpose (TP)

(1)

**with** { UE in PDU SESSION ACTIVE state and in 5GMM-CONNECTED mode and PS Data Off configured to “inactive” }

**ensure** **that** {

**when** { UE PS Data Off status is changed to “active” }

**then** { UE performs a PDU session modification procedure providing the PS Data Off status set to “active” }

}

(2)

**with** { UE being registered to IMS and with PS Data Off configured to “inactive” }

**ensure** **that** {

**when** { UE PS Data Off status is changed to “active” }

**then** { UE sends REGISTER with PS Data Off configured to “active” }

}

(3)

**with** { UE being registered to IMS and with PS Data Off configured to “active” }

**ensure that** {

**when** { UE is being made to send an SMS over IP }

**then** { UE sends a SIP MESSAGE request containing a short message }

}

11.6.3.2 Conformance Requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clause 6.2.10. TS 24.341, clause 5.3.1.2, 5.3.1.3 and TS 24.229 [44] clause 4.17, Rel-15. Unless otherwise stated these are Rel-16 requirements.

[TS 24.341, clause 5.3.1.2]:

When an SM-over-IP sender wants to submit an SM over IP, the SM-over-IP sender shall send a SIP MESSAGE request with the following information:

a) the Request-URI, which shall contain the PSI of the SC of the SM-over-IP sender;

NOTE 1: The PSI of the SC can be SIP URI or tel URI based on operator policy. The PSI of the SC can be obtained using one of the following methods in the priority order listed below:

1) provided by the user;

2) if UICC is used, then:

- if present in the ISIM, then the PSI of the SC is obtained from the EFPSISMSC in DF\_TELECOM of the ISIM as per 3GPP TS 31.103 [18];

- if not present on the ISIM, then the PSI of the SC is obtained from the EFPSISMSC in DF\_TELECOM of the USIM as per 3GPP TS 31.102 [19]; or

- if neither present on the ISIM nor on the USIM, then the PSI of the SC contains the TS‑Service-Centre-Address stored in the EFSMSP in DF\_TELECOM as per 3GPP TS 31.102 [19]. If the PSI of the SC is based on the E.164 number from the TS‑Service-Centre-Address stored in the EFSMSP in DF\_TELECOM then the URI constructed can be either a tel URI or a SIP URI (using the "user=phone" SIP URI parameter format).

3) if SIM is used instead of UICC, then the PSI of the SC contains the TS‑Service Centre Address stored in the EFSMSP in DF\_TELECOM as per 3GPP TS 51.011 [20]. If the PSI of the SC is based on the E.164 number from the TS‑Service-Centre-Address stored in the EFSMSP in DF\_TELECOM then the URI constructed can be either a tel URI or a SIP URI (using the "user=phone" SIP URI parameter format); or

4) if neither the UICC nor SIM is used, then how the PSI of the SC is configured and obtained is through means outside the scope of this specification.

b) the From header, which shall contain a public user identity of the SM-over-IP sender;

NOTE 2: The IP-SM-GW will have to use an address of the SM-over-IP sender that the SC can process (i.e. an E.164 number). This address will come from a tel URI in a P-Asserted-Identity header (as defined in RFC 3325 [13]) placed in the SIP MESSAGE request by the P-CSCF or S-CSCF.

NOTE 3: The SM-over-IP sender has to store the Call-ID of the SIP MESSAGE request, so it can associate the appropriate SIP MESSAGE request including a submit report with it.

c) the To header, which shall contain the SC of the SM-over-IP sender;

d) the Content-Type header, which shall contain "application/vnd.3gpp.sms"; and

e) the body of the request shall contain an RP-DATA message as defined in 3GPP TS 24.011 [8], including the SMS headers and the SMS user information encoded as specified in 3GPP TS 23.040 [3].

NOTE 4: The address of the SC is included in the RP-DATA message content. The address of the SC included in the RP-DATA message content is stored in the EFSMSP in DF\_TELECOM of the (U)SIM of the SM-over-IP sender.

NOTE 5: The SM-over-IP sender will use content transfer encoding of type "binary" for the encoding of the SM in the body of the SIP MESSAGE request.

NOTE 6: Both the address of the SC and the PSI of the SC can be configured in the EFPSISMSC in DF\_TELECOM of the USIM and ISIM respectively using the USAT as per 3GPP TS 31.111 [21].

The SM-over-IP sender may request the SC to return the status of the submitted message. The support of status report capabilities is optional for the SC.

When a SIP MESSAGE request including a submit report in the "vnd.3gpp.sms" payload is received, the SM-over-IP sender shall:

- if SM-over-IP sender supports In-Reply-To header usage and the In-Reply-To header indicates that the request corresponds to a short message submitted by the SM-over-IP sender, generate a 200 (OK) SIP response according to RFC 3428 [14].

if SM-over-IP sender supports In-Reply-To header usage and the In-Reply-To header indicates that the request does not correspond to a short message submitted by the SM-over-IP sender, a 488 (Not Acceptable here) SIP response according to RFC 3428 [14].

- if SM-over-IP sender does not support In-Reply-To header usage, generate a 200 (OK) SIP response according to RFC 3428 [14]; and extract the payload encoded according to 3GPP TS 24.011 [8] for RP-ACK or RP-ERROR.

[TS 24.341 clause 5.3.1.3]:

When a SIP MESSAGE request including a status report in the "vnd.3gpp.sms" payload is delivered, the SM-over-IP sender shall:

- generate a SIP response according to RFC 3428 [14];

- extract the payload encoded according to 3GPP TS 24.011 [8] for RP-DATA; and

- create a delivery report for the status report as described in subclause 5.3.2.4. The content of the delivery report is defined in 3GPP TS 24.011 [8].

[TS 24.341 clause 5.3.2.4]:

When an SM-over-IP receiver wants to send an SM delivery report over IP, the SM-over-IP receiver shall send a SIP MESSAGE request with the following information:

a) the Request-URI, which shall contain the IP-SM-GW;

NOTE 1: The address of the IP-SM-GW is received in the P-Asserted-Identity header in the SIP MESSAGE request including the delivered short message.

b) the From header, which shall contain a public user identity of the SM-over-IP receiver.

c) the To header, which shall contain the IP-SM-GW;

b) the Content-Type header shall contain "application/vnd.3gpp.sms"; and

c) the body of the request shall contain the RP-ACK or RP-ERROR message for the SM delivery report, as defined in 3GPP TS 24.011 [8].

NOTE 2: The SM-over-IP sender will use content transfer encoding of type "binary" for the encoding of the SM in the body of the SIP MESSAGE request.

[TS 24.501, clause 6.2.10]

In case of PLMN, a UE, which supports 3GPP PS data off (see 3GPP TS 23.501 [8]), can be configured with up to two lists of 3GPP PS data off exempt services as specified in 3GPP TS 24.368 [17] or in the EF3GPPPSDATAOFF USIM file as specified in 3GPP TS 31.102 [22]:

a) a list of 3GPP PS data off exempt services to be used in the HPLMN or EHPLMN; and

b) a list of 3GPP PS data off exempt services to be used in the VPLMN.

If only the list of 3GPP PS data off exempt services to be used in the HPLMN or EHPLMN is configured at the UE, this list shall be also used in the VPLMN.

In case of SNPN, a UE, which supports 3GPP PS data off (see 3GPP TS 23.501 [8]), can be configured with a list of 3GPP PS data off exempt services as specified in 3GPP TS 24.368 [17] for each SNPN whose entry exists in the "list of subscriber data":

a) a list of 3GPP PS data off exempt services to be used in the SNPN.

If the UE supports 3GPP PS data off, the UE shall provide the 3GPP PS data off UE status in the Extended protocol configuration options IE during UE-requested PDU session establishment procedure except for the transfer of a PDU session from non-3GPP access to 3GPP access and except for the establishment of user plane resources on the other access for the MA PDU session(see subclause 6.4.1), and during UE-requested PDU session modification procedure (see subclause 6.4.2), regardless of associated access type of the PDU session. If the UE requests a PDU session establishment procedure in order to transfer a PDU session from non-3GPP access to 3GPP access, or in order to establish user plane resources on the other access for the MA PDU session over 3GPP access or non-3GPP access, and:

a) if the 3GPP PS data off UE status has changed since the last providing to the network, the UE shall provide the 3GPP PS data off UE status in the Extended protocol configuration options IE; or

b) if the 3GPP PS data off UE status has not changed since the last providing to the network, the UE need not provide the 3GPP PS data off UE status.

The network shall support of 3GPP PS data off.

The UE shall indicate change of the 3GPP PS data off UE status for the PDU session by using the UE-requested PDU session modification procedure as specified in subclause 6.4.2.

When the 3GPP PS data off UE status is "activated":

a) the UE does not send uplink IP packets via 3GPP access except:

1) for those services indicated in the list of 3GPP PS data off exempt services to be used in the HPLMN or EHPLMN as specified in 3GPP TS 24.368 [17] when the UE is in its HPLMN or EHPLMN or for those services indicated in the list of 3GPP PS data off exempt services to be used in the SNPN as specified in 3GPP TS 24.368 [17] when the UE is in an SNPN;

2) for those services indicated in the list of 3GPP PS data off exempt services to be used in the HPLMN or EHPLMN when the UE is in the VPLMN, if only the list of 3GPP PS data off exempt services to be used in the HPLMN or EHPLMN is configured to the UE as specified in 3GPP TS 24.368 [17];

3) for those services indicated in the list of 3GPP PS data off exempt services to be used in the VPLMN when the UE is in the VPLMN, if the list of 3GPP PS data off exempt services to be used in the VPLMN is configured to the UE as specified in 3GPP TS 24.368 [17];

4) for those services indicated in the EF3GPPPSDATAOFF USIM file as specified in 3GPP TS 31.102 [22];

5) any uplink traffic due to procedures specified in 3GPP TS 24.229 [14]; and

6) any uplink traffic due to procedures specified in 3GPP TS 24.623 [20];

b) the UE does not send uplink Ethernet user data packets via 3GPP access; and

c) the UE does not send uplink Unstructured user data packets via 3GPP access.

Otherwise the UE sends uplink user data packets without restriction.

NOTE: If the UE supports 3GPP PS data off, uplink IP packets are filtered as specified in 3GPP TS 24.229 [14] in U.3.1.5.

3GPP PS data off does not restrict sending of uplink user data packets via non-3GPP access of a single access PDU session or an MA PDU session.

[TS 24.229, Rel-15, clause 4.17]

The UE and the network can support the 3GPP PS data off.

When 3GPP PS data off is supported and active, IP packets that are associated with services that are not a 3GPP PS data off exempt service are prevented from transport over EPS IP-CAN, GPRS IP-CAN and 5GS IP-CAN as specified in 3GPP TS 23.228 [7]. The UE may be configured by the HPLMN or the EHPLMN with up to two indications whether a 3GPP IMS service is a 3GPP PS Data Off exempt service, one indication is valid for the UE is in the HPLMN or the EHPLMN and the other indication is valid for the UE is in the VPLMN. When the UE is only configured with the indication valid for the UE camping in the HPLMN or the EHPLMN, the UE shall use this indication also when the UE is in the VPLMN.

When 3GPP PS data off is supported and active and the UE is configured, either as specified in 3GPP TS 24.167 [8G] or in 3GPP TS 31.102 [15C], with services that are 3GPP PS data off exempt, then the UE will not send uplink IP packets related to any services that are not 3GPP PS data off exempt over EPS IP-CAN, GPRS IP-CAN and 5GS IP-CAN. The UE informs the network about its 3GPP PS data off status by including a g.3gpp.ps-data-off media feature tag specified in subclause 7.9.8 in all REGISTER requests sent over GPRS IP-CAN, EPS IP-CAN or 5GS IP-CAN. The UE reregisters over EPS IP-CAN, GPRS IP-CAN and 5GS IP-CAN every time the 3GPP PS data off status is changed or the UE is provided by the network with a new list of 3GPP PS data off exempt services while the 3GPP PS data off status is "active".

An AS handling a service is configured with information whether the service is a 3GPP PS data off exempt service. If the 3GPP PS data off status is active and the service is not a 3GPP PS data off exempt service, the AS prevents downlink IP packets of the service from reaching the UE over EPS IP-CAN, GPRS IP-CAN and 5GS IP-CAN. The AS shall be configured with up to two indications whether a 3GPP IMS service is a 3GPP PS Data Off exempt service, one indication is valid for non-roaming users, and the other indication is valid for users roaming in the various VPLMNs with whom roaming agreements exist. When the AS is only configured with the indication valid for the UE camping in the HPLMN or the EHPLMN, the AS shall use this indication also when the UE is in the VPLMN.

[TS 24.229, Rel-15, clause U.3.1.0]

If the UE supports the 3GPP PS data off, then the UE shall in all REGISTER requests include the "+g.3gpp.ps-data-off" header field parameter defined in subclause 7.9.8 set to a value indicating the 3GPP PS data off status.

When the UE sends a REGISTER request, if the 3GPP PS data off status is "active", then the UE shall only include media feature tags associated with services that are 3GPP PS data off exempt services in the g.3gpp.icsi-ref media feature tag, as defined in subclause 7.9.2 and RFC 3840 [62], for the IMS communication services it intends to use.

If the UE is registered, and the 3GPP PS data off status is changed, then the UE shall perform a reregistration of the previously registered public user identity.

11.6.3.3 Test description

11.6.3.3.1 Pre-test conditions

System Simulator:

- 1 NR Cell connected to 5GC, default parameters.

UE:

- None.

Preamble:

- UE is in state 3N-A with IMS registered on NR cell 1 according to TS 38.508-1 [4] Table 4.4A.2-3.

11.6.3.3.2 Test procedure sequence

Table 11.6.3.3.2-1: Main Behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | UE is made to activate Data Off, see NOTE 1. | - | - | - | - |
| 2 | Check: Does the UE transmit a PDU SESSION MODIFICATION REQUEST message with Data Off status set to activated? | --> | 5GSM: PDU SESSION MODIFICATION REQUEST | 1 | P |
| 3 | The SS transmits an PDU SESSION MODIFICATION COMMAND message. | <-- | 5GSM: PDU SESSION MODIFICATION COMMAND | - | - |
| - | EXCEPTION: Steps 4 and 5 can occur in any order | - | - | - | - |
| 4 | the UE transmit an PDU SESSION MODIFICATION COMPLETE message. | --> | 5GSM: PDU SESSION MODIFICATION COMPLETE | - | - |
| 5 | Check: does the UE re-register with "+g.3gpp.ps-data-off" header field parameter set to “active”? | --> | IMS: REGISTER | 2 | P |
| 6 | SS responds with 200 OK | <-- | IMS: 200 OK | - | - |
| 7 | UE is made to attempt to send an SMSoIP message. | - | - |  |  |
| 8 | Check: Is the IMS MO SMS / 5GS procedure performed according to steps 1-8 of annex A.13 in TS 34.229-5? | - | - | 3 | P |
| NOTE 1: This could be done by e.g. MMI or AT command. | | | | | |

11.6.3.3.3 Specific message contents

Table 11.6.3.3.3-1: PDU SESSION MODIFICATION REQUEST (step 2, Table 11.6.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-7 | | | |
| Information Element | Value/remark | Comment | Condition |
| Extended protocol configuration options |  |  |  |
| Container ID n | ‘0017’H | n assigned to next available number |  |
| Length of container ID n contents |  | 1 octet |  |
| Container ID n contents | ‘02’H | 3GPP PS data off UE status activated |  |

Table 11.6.3.3.3-2: PDU SESSION MODIFICATION COMMAND (step 3, Table 11.6.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-9 | | | |
| Information Element | Value/remark | Comment | Condition |
| Extended protocol configuration options |  |  |  |
| Container ID n | ‘0017’H | n assigned to next available number |  |
| Length of container ID n contents |  | 0 octets |  |
| Container ID n contents | empty | 3GPP PS data off support indication |  |

Table 11.6.3.3.3-3: REGISTER (step 5, Table 11.6.3.3.2-1)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Derivation Path: TS 34.229-1 [2], Annex A.1.1, Conditions A2, A4, A17, A32 | | | | |
| Header/param | Cond | Value/remark | Rel | Reference |
| Contact |  |  |  |  |
| feature-param |  | +g.3gpp.ps-data-off=”active” |  | TS 24.229 [44] |

## 11.7 eDRX

### 11.7.1 eDRX / IDLE

11.7.1.1 Test Purpose (TP)

(1)

**with** { UE having sent an REGISTRATION REQUEST message with extended DRX parameters IE }

**ensure that** {

**when** { the UE receives the extended DRX parameters in the REGISTRATION ACCEPT message }

**then** { the UE sends a REGISTRATION COMPLETE message }

}

(2)

**with** { UE in NR RRC\_IDLE state and configured eDRX (eDRX cycle > 10.24s) }

**ensure that** {

**when** { network sends Paging message within a Paging Time Window (PTW) }

**then** { UE establishes RRC connection }

}

(3)

**with** { UE in NR RRC\_IDLE state and configured eDRX (eDRX cycle <= 10.24s) }

**ensure that** {

**when** { network sends Paging message within a paging occasion }

**then** { UE establishes RRC connection }

}

(4)

**with** { UE in NR RRC\_IDLE state and configured eDRX }

**ensure** **that** {

**when** { network changes SIB1 to exclude eDRX-AllowedIdle IE }

**then** { UE applies the new system information about eDRX not allowed and stops using extended DRX for CN paging in RRC\_IDLE state }

}

11.7.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501 clauses 5.3.16, TS 38.304 clause 7.4. Unless otherwise stated these are Rel-17 requirements.

[TS 24.501, clause 5.3.16]

Extended DRX (eDRX) cycle is supported for a UE in N1 mode. When eDRX is requested by the UE and accepted by the network:

- if the UE is not in NB-N1 mode, eDRX is used when the UE is in 5GMM-IDLE mode or in 5GMM-CONNECTED mode with RRC inactive indication; or

- if the UE is in NB-N1 mode, eDRX is used when the UE is in 5GMM-IDLE mode.

The UE may request the use of eDRX cycle during a registration procedure by including the Requested extended DRX parameters IE (see 3GPP TS 23.501 [8] and 3GPP TS 23.502 [9]). The UE shall not request the use of eDRX during a registration procedure for emergency services. The UE may use the extended idle mode DRX cycle length stored in the USIM (see 3GPP TS 31.102 [22]) when requesting the use of eDRX.

The UE and the network may negotiate eDRX parameters during a registration procedure when the UE has an emergency PDU session.

The network accepts the request to use the eDRX by providing the Negotiated extended DRX parameters IE when accepting the registration procedure. The UE shall use eDRX only if it received the Negotiated extended DRX parameters IE during the last registration procedure and the UE does not have an emergency PDU session.

NOTE: If the UE wants to keep using eDRX, the UE includes the Extended DRX parameters IE in each registration procedure.

If the UE received the Negotiated extended DRX parameters IE during the last registration procedure, upon successful completion of the PDU session release procedure of the emergency PDU session, the UE shall resume eDRX.

If the network has provided the Negotiated extended DRX parameters IE during the last registration procedure, upon successful completion of the PDU session release procedure of the emergency PDU session, the network shall resume eDRX.

If the UE or the network locally releases an emergency PDU session, the UE or the network shall not use eDRX until the UE receives eDRX parameters during a registration procedure with PDU session context synchronization or upon successful completion of a service request procedure with PDU session context synchronization.

If the UE did not receive the Negotiated extended DRX parameters IE, or if the UE has an emergency PDU session, the UE shall use the stored UE specific DRX parameter, if available.

If the network did not accept the request to use eDRX, or if the UE has an emergency PDU session, the network shall use the stored UE specific DRX parameter, if available.

If the network provided the Negotiated extended DRX parameters IE and also assigned a new 5G-GUTI for the UE as described in subclause 5.5.1.3.4 during the last registration procedure, the network shall use the stored UE specific DRX parameter, if available, with the old 5G-GUTI and use the eDRX provided by the network with the new 5G-GUTI until the old 5G-GUTI can be considered as invalid by the network (see subclauses 5.4.4.4 and 5.5.1.3.4).

[TS 38.304, clause 7.4]

The UE may be configured by upper layers and/or RRC with an extended DRX (eDRX) cycle TeDRX, CN and/or TeDRX, RAN. The UE operates in eDRX for CN paging in RRC\_IDLE or RRC\_INACTIVE states if the UE is configured for eDRX by upper layers and *eDRX-AllowedIdle* is signalled in SIB1. The UE operates in eDRX for RAN paging in RRC\_INACTIVE state if the UE is configured for eDRX by RAN and *eDRX-Allowed*I*nactive* is signalled in SIB1. If the UE is configured with an extended DRX cycle no longer than 1024 radio frames, it monitors POs as defined in 7.1 with configured eDRX cycle. Otherwise, a UE configured with eDRX monitors POs as defined in 7.1 during a periodic Paging Time Window (PTW) configured for the UE. The PTW is UE-specific and is determined by a Paging Hyperframe (PH), a starting position within the PH (PTW\_start) and an ending position (PTW\_end). PH, PTW\_start and PTW\_end are given by the following formula:

The PH for CN is the H-SFN satisfying the following equations:

H-SFN mod TeDRX\_CN= (UE\_ID\_H mod TeDRX\_CN), where

- UE\_ID\_H: 13 most significant bits of the Hashed ID.

- TeDRX\_CN: UE-specific eDRX cycle in Hyper-frames, (TeDRX\_CN = 2, …, 1024 Hyper-frames) configured by upper layers.

PTW\_start denotes the first radio frame of the PH that is part of the PTW and has SFN satisfying the following equation:

SFN = 128 \* ieDRX\_CN, where

- ieDRX\_CN = floor(UE\_ID\_H /TeDRX\_CN) mod 8

PTW\_end is the last radio frame of the PTW and has SFN satisfying the following equation:

SFN = (PTW\_start + L\*100 - 1) mod 1024, where

- L = Paging Time Window (PTW) length (in seconds) configured by upper layers

Hashed ID is defined as follows:

Hashed\_ID is Frame Check Sequence (FCS) for the bits b31, b30…, b0 of 5G-S-TMSI.

5G-S-TMSI = <b47, b46, …, b0> as defined in TS 23.003 [23].

The 32-bit FCS shall be the ones complement of the sum (modulo 2) of Y1 and Y2, where

- Y1 is the remainder of xk (x31 + x30 + x29 + x28 + x27 + x26 + x25 + x24 + x23 + x22 + x21 + x20 + x19 + x18 + x17 + x16 + x15 + x14 + x13 + x12 + x11 + x10 + x9 + x8 + x7 + x6 + x5 + x4 + x3 + x2 + x1 + 1) divided (modulo 2) by the generator polynomial x32 + x26 + x23 + x22 + x16 + x12 + x11 + x10 + x8 + x7 + x5 + x4 + x2 + x + 1, where k is 32; and

- Y2 is the remainder of Y3 divided (modulo 2) by the generator polynomial x32 + x26 + x23 + x22 + x16 + x12 + x11 + x10 + x8 + x7 + x5 + x4 + x2 + x + 1, where Y3 is the product of x32 by "b31, b30…, b0 of S-TMSI or 5G-S-TMSI", i.e., Y3 is the generator polynomial x32 (b31\*x31 + b30\*x30 + … + b0\*1).

NOTE: The Y1 is 0xC704DD7B for any 5G-S-TMSI value. An example of hashed ID calculation is in Annex A.

11.7.1.3 Test description

11.7.1.3.1 Pre-test conditions

System Simulator:

- 1 NR Cell connected to 5GC, default parameters.

UE:

- UE supporting extended DRX.

Preamble:

- UE is in state 0N-B according to TS 38.508-1 [4] Table 4.4A.2-2.

11.7.1.3.2 Test procedure sequence

Table 11.7.1.3.2-1: Main Behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2-3 | Steps 2-3 of the generic procedure for NR RRC\_IDLE as specified in TS 38.508-1 [4] Table 4.5.2.2-2 are performed. | - | - | - | - |
| 4 | The UE transmits a REGISTRATION REQUEST message including the Requested extended DRX parameters IE. | --> | NR RRC: *RRCSetupComplete*  5GMM: REGISTRATION REQUEST | - | - |
| 5-13 | Steps 5-13 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 14 | The SS transmits a REGISTRATION ACCEPT message including the Negotiated extended DRX parameters IE. | <-- | NR RRC: *DLInformationTransfer*  5GMM: REGISTRATION ACCEPT | - | - |
| 15 | Check: Does the UE transmit a REGISTRATION COMPLETE message? | --> | NR RRC: *ULInformationTransfer*  5GMM: REGISTRATION COMPLETE | 1 | P |
| 16-17 | Steps 19a1-20a1 of Table 4.5.2.2-2 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 18 | The SS transmits a *Paging* message within a valid paging occasion within the PTW of the next upcoming UE’s PH as per Idle eDRX. | <-- | NR RRC: *Paging* | - | - |
| 19 | Check: Does the UE transmit an *RRCSetupRequest* message? | --> | NR RRC: *RRCSetupRequest* | 2 | P |
| 20 | The SS transmits an *RRCSetup* message. | <-- | NR RRC: *RRCSetup* | - | - |
| 21 | The UE transmits an *RRCSetupComplete* message including SERVICE REQUEST to confirm the successful completion of the connection establishment. | --> | NR RRC: *RRCSetupComplete*  5GMM: SERVICE REQUEST | - | - |
| 22-25 | Steps 5 to 8 of the NR RRC\_CONNECTED procedure in TS 38.508-1 [4] Table 4.5.4.2-3 are executed to successfully complete the service request procedure. | - | - | - | - |
| 26 | Switch off UE in RRC CONNECTED as described in TS 38.508-1 [4] subclause 4.9.6.3 | - | *-* | - | - |
| 27 | Switch on UE. | - | *-* | - | - |
| 28-46 | The generic test procedure in TS 38.508-1 [4] Table 4.5.2.2-2 indicate that the UE performs registration on NR Cell 1. | - | - | - | - |
| 47 | The SS transmits a Paging message in a valid PO. | <-- | NR RRC: *Paging* | - | - |
| 48 | Check: Does the UE transmit an *RRCSetupRequest* message? | --> | NR RRC: *RRCSetupRequest* | 3 | P |
| 49 | The SS transmits an *RRCSetup* message. | <-- | NR RRC: *RRCSetup* | - | - |
| 50 | The UE transmits an *RRCSetupComplete* message including SERVICE REQUEST to confirm the successful completion of the connection establishment. | --> | NR RRC: *RRCSetupComplete*  5GMM: SERVICE REQUEST | - | - |
| 51-54 | Steps 5 to 8 of the NR RRC\_CONNECTED procedure in TS 38.508-1 [4] Table 4.5.4.2-3 are executed to successfully complete the service request procedure. | - | - | - | - |
| 55 | The SS transmits an RRCRelease message to release RRC connection and move the UE to RRC\_IDLE. | --> | NR RRC: *RRCRelease* | - | - |
| 56 | The SIB1 is updated according to Table 11.7.1.3.3-1 and transmits a Short message on PDCCH using P-RNTI indicating a systemInfoModification. | <-- | *PDCCH (DCI 1\_0): Short Message* | - | - |
| 57 | Wait for 2.1\* modification period to allow the new system information to take effect. | - | *-* | - | - |
| 58 | The SS transmits a Paging message to the UE in a valid PO which is derived by normal DRX and not belonging to extended DRX. | <-- | *NR RRC: Paging* | - | - |
| 59 | Check: Does the UE send an RRCSetupRequest message? | --> | NR RRC: *RRCSetupRequest* | 4 | P |
| 60-65 | Steps 3-8 of Generic procedure specified in TS 38.508-1 [4] Table 4.5.4.2-3 are performed. | - | *-* | - | - |

11.7.1.3.3 Specific message contents

Table 11.7.1.3.3-1: *SIB1* (preamble and step 56, Table 11.7.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] , table 4.6.1-28 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| hyperSFN-r17 | Current H-SFN Value |  | Preamble |
|  | Not present |  | Step 56 |
| eDRX-AllowedIdle-r17 | true |  | Preamble |
|  | Not present |  | Step 56 |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.7.1.3.3-2: REGISTRATION REQUEST (Step 4 and Step 31, Table 11.7.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Requested extended DRX parameters |  |  |  |
| Paging Time Window | Present but contents not checked |  |  |
| eDRX value | Present but contents not checked |  |  |
| Extended Paging Time Window | Not Checked | Note 1 |  |
| Note 1: Extended Paging Time Window is an optional IE. If UE request eDRX cycle larger than 10,24 seconds, UE may include Extended Paging Time Window. | | | |

Table 11.7.1.3.3-3: REGISTRATION ACCEPT (Step 14, Table 11.7.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-7 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Negotiated extended DRX parameters |  |  |  |
| Paging Time Window | Any allowed value | Note 1 |  |
| eDRX value | ‘0101’B | 81,92 seconds |  |
| Extended Paging Time Window | ‘00000001’B | 2,56 seconds |  |
| Note 1: In NR connected to 5GCN, the Paging Time Window field is ignored and the PTW value is included in the Extended Paging Time Window field. | | | |

Table 11.7.1.3.3-4: REGISTRATION ACCEPT (Step 41, Table 11.7.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-7 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Negotiated extended DRX parameters |  |  |  |
| Paging Time Window | Any allowed value | Note 1 |  |
| eDRX value | ‘0001’B | 5,12 seconds |  |
| Extended Paging Time Window | ‘00000001’B | 2,56 seconds |  |
| Note 1: In NR connected to 5GCN, the Paging Time Window field is ignored and the PTW value is included in the Extended Paging Time Window field. | | | |

### 11.7.2 eDRX / Inactive / RAN-initiated paging

11.7.2.1 Test Purpose (TP)

(1)

**with** { UE having sent an REGISTRATION REQUEST message with extended DRX parameters IE }

**ensure that** {

**when** { the UE receives the extended DRX parameters in the REGISTRATION ACCEPT message}

**then** { the UE sends a REGISTRATION COMPLETE message }

}

(2)

**with** { UE in NR RRC\_Inactive state and configured eDRX and RAN Extended Paging Cycle equals to the IDLE mode eDRX cycle }

**ensure that** {

**when** { the network sends a RAN-initiated Paging message within a paging occasion }

**then** { the UE resumes RRC connection }

}

(3)

**with** { UE in NR RRC\_Inactive state and configured eDRX and RAN Extended Paging Cycle shorter than the IDLE mode eDRX cycle }

**ensure** **that** {

**when** { the network sends a RAN-initiated Paging message within a paging occasion }

**then** { the UE applies the value of ran-ExtendedPagingCycle for RAN-initiated paging and resumes RRC connection }

}

(4)

**with** { UE in NR RRC\_INACTIVE state and configured eDRX }

**ensure** **that** {

**when** { network changes SIB1 to exclude eDRX-AllowedInactive IE }

**then** { UE applies the new system information and stops using extended DRX for RAN paging in RRC\_INACTIVE state }

}

11.7.2.2 Conformance Requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clause 5.3.16 and TS 38.304, clause 7.1. Unless otherwise stated these are Rel-17 requirements.

[TS 24.501, clause 5.3.16]

Extended DRX (eDRX) cycle is supported for a UE in N1 mode. When eDRX is requested by the UE and accepted by the network:

- if the UE is not in NB-N1 mode, eDRX is used when the UE is in 5GMM-IDLE mode or in 5GMM-CONNECTED mode with RRC inactive indication; or

- if the UE is in NB-N1 mode, eDRX is used when the UE is in 5GMM-IDLE mode.

The UE may request the use of eDRX cycle during a registration procedure by including the Requested extended DRX parameters IE (see 3GPP TS 23.501 [8] and 3GPP TS 23.502 [9]). The UE shall not request the use of eDRX during a registration procedure for emergency services. The UE may use the extended idle mode DRX cycle length stored in the USIM (see 3GPP TS 31.102 [22]) when requesting the use of eDRX.

The UE and the network may negotiate eDRX parameters during a registration procedure when the UE has an emergency PDU session.

The network accepts the request to use the eDRX by providing the Negotiated extended DRX parameters IE when accepting the registration procedure. The UE shall use eDRX only if it received the Negotiated extended DRX parameters IE during the last registration procedure and the UE does not have an emergency PDU session.

NOTE: If the UE wants to keep using eDRX, the UE includes the Extended DRX parameters IE in each registration procedure.

If the UE received the Negotiated extended DRX parameters IE during the last registration procedure, upon successful completion of the PDU session release procedure of the emergency PDU session, the UE shall resume eDRX.

If the network has provided the Negotiated extended DRX parameters IE during the last registration procedure, upon successful completion of the PDU session release procedure of the emergency PDU session, the network shall resume eDRX.

If the UE or the network locally releases an emergency PDU session, the UE or the network shall not use eDRX until the UE receives eDRX parameters during a registration procedure with PDU session context synchronization or upon successful completion of a service request procedure with PDU session context synchronization.

If the UE did not receive the Negotiated extended DRX parameters IE, or if the UE has an emergency PDU session, the UE shall use the stored UE specific DRX parameter, if available.

If the network did not accept the request to use eDRX, or if the UE has an emergency PDU session, the network shall use the stored UE specific DRX parameter, if available.

If the network provided the Negotiated extended DRX parameters IE and also assigned a new 5G-GUTI for the UE as described in subclause 5.5.1.3.4 during the last registration procedure, the network shall use the stored UE specific DRX parameter, if available, with the old 5G-GUTI and use the eDRX provided by the network with the new 5G-GUTI until the old 5G-GUTI can be considered as invalid by the network (see subclauses 5.4.4.4 and 5.5.1.3.4).

[TS 38.304, clause 7.1]

In RRC\_INACTIVE state, if eDRX is configured by RRC, i.e., TeDRX, RAN , and/or upper layers, i.e., TeDRX, CN, as defined in clause 7.4:

- If both TeDRX, CN and TeDRX, RAN are no longer than 1024 radio frames, T = min{TeDRX, RAN, TeDRX, CN}.

- If TeDRX, CN is no longer than 1024 radio frames and no TeDRX, RAN is configured, T is determined by the shortest of UE specific DRX value configured by RRC and TeDRX, CN.

…

11.7.2.3 Test description

11.7.2.3.1 Pre-test conditions

System Simulator:

- 1 NR Cell connected to 5GC.

- System information combination NR-1 as defined in TS 38.508-1 [4] Table 4.4.3.1.2-1 is used in NR cell 1, with SIB 1 modified as per Table 11.7.2.3.3-0.

UE:

- UE configured to request eDRX.

Preamble:

- UE is in state 0N-B according to TS 38.508-1 [4] Table 4.4A.2-2.

11.7.2.3.2 Test procedure sequence

Table 11.7.2.3.2-1: Main Behaviour

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| St | | Procedure | | Message Sequence | | | | TP | | Verdict | |
|  | |  | | U - S | | Message | |  | |  | |
| 1 | | The UE is switched on. | | - | | - | | - | | - | |
| 2-3 | | Steps 19B-19C of the generic procedure for NR RRC\_INACTIVE as specified in TS 38.508-1 [4] Table 4.5.3.2-1 are performed. | | - | | - | | - | | - | |
| 4 | | The UE transmits a REGISTRATION REQUEST message including the Requested extended DRX parameters IE. | | --> | | NR RRC: *RRCSetupComplete*  5GMM: REGISTRATION REQUEST | | - | | - | |
| 5-13 | | Steps 19E-19M of Table 4.5.3.2-1 of the generic procedure in TS 38.508-1 [4] are performed. | | - | | - | | - | | - | |
| 14 | | The SS transmit a REGISTRATION ACCEPT message including the Negotiated extended DRX parameters IE. | | <-- | | NR RRC: *DLInformationTransfer*  5GMM: REGISTRATION ACCEPT | | - | | - | |
| 15 | | Check: Does the UE transmit a REGISTRATION COMPLETE message? | | --> | | NR RRC: *ULInformationTransfer*  5GMM: REGISTRATION COMPLETE | | 1 | | P | |
| 16-18 | | Void | | - | | - | | - | | - | |
| 19Aa1-20 | | Steps 19TAa1-20 of Table 4.5.3.2-1 of the generic procedure in TS 38.508-1 [4] are performed. | | - | | - | | - | | - | |
| 21 | | The SS transmits a *Paging* message within a paging occasion. | | <-- | | NR RRC: *Paging* | | - | | - | |
| 22 | | Check: Does the UE transmit an *RRCResumeRequest* message? | | --> | | NR RRC: *RRCResumeRequest* | | 2 | | P | |
| 23 | | The SS transmits an *RRCResume* message. | | <-- | | NR RRC: *RRCResume* | | - | | - | |
| 24 | | The UE transmits an *RRCResumeComplete* message. | | --> | | NR RRC: *RRCResumeComplete* | | - | | - | |
| 25 | | Void | | - | | *-* | | - | | - | |
| 26 | | The SS transmits an *RRCRelease* message with suspend. | | <-- | | NR RRC: NR RRC: *RRCRelease* | | - | | - | |
| 27 | | The SS transmits a Paging message to the UE in a valid PO which is derived by the value of ran-ExtendedPagingCycle IE. | | <-- | | NR RRC: *Paging* | | - | | - | |
| 28 | | Check: Does the UE transmit an *RRCResumeRequest* message? | | --> | | NR RRC: *RRCResumeRequest* | | 3 | | P | |
| 29 | | The SS transmits an *RRCResume* message. | | <-- | | NR RRC: *RRCResume* | | - | | - | |
| 30 | | The UE transmits an *RRCResumeComplete* message. | | --> | | NR RRC: *RRCResumeComplete* | | - | | - | |
| 31 | | The SS transmits an *RRCRelease* message with suspend. | | <-- | | NR RRC: *RRCRelease* | | - | | - | |
| 32 | | The SIB1 is updated according to Table 11.7.2.3.3-0 and transmits a Short message on PDCCH using P-RNTI indicating a systemInfoModification. | | <-- | | *PDCCH (DCI 1\_0): Short Message* | | - | | - | |
| 33 | | Wait for 2.1\* modification period to allow the new system information to take effect. | | - | | *-* | | - | | - | |
| 34 | | The SS transmits a Paging message to the UE in a valid PO which is derived by normal DRX and not belonging to extended DRX. | | <-- | | NR RRC: *Paging* | | - | | - | |
| 35 | | Check: Does the UE transmit an *RRCResumeRequest* message? | | --> | | NR RRC: *RRCResumeRequest* | | 4 | | P | |
| 36 | | The SS transmits an *RRCResume* message. | | <-- | | NR RRC: *RRCResume* | | - | | - | |
| 37 | | The UE transmits an *RRCResumeComplete* message. | | --> | | NR RRC: *RRCResumeComplete* | | - | | - | |

11.7.2.3.3 Specific message contents

Table 11.7.2.3.3-0: *SIB1* (preamble and step 32, Table 11.7.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] , table 4.6.1-28 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| hyperSFN-r17 | Current H-SFN Value |  | Preamble |
|  | Not present |  | Step 32 |
| eDRX-AllowedIdle-r17 | true |  | Preamble |
|  | Not present |  | Step 32 |
| eDRX-AllowedInactive-r17 | true |  | Preamble |
|  | Not present |  | Step 32 |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.7.2.3.3-1: REGISTRATION REQUEST (step 4, Table 11.7.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Requested extended DRX parameters |  |  |  |
| Paging Time Window | Present but contents not checked |  |  |
| eDRX value | Present but contents not checked |  |  |
| Extended Paging Time Window | Not Checked | Note 1 |  |
| Note 1: Extended Paging Time Window is an optional IE. If UE request eDRX cycle larger than 10,24 seconds, UE may include Extended Paging Time Window. | | | |

Table 11.7.2.3.3-2: REGISTRATION ACCEPT (step 14, Table 11.7.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-7 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Negotiated extended DRX parameters |  |  |  |
| Paging Time Window | Any allowed value | Note 1 |  |
| eDRX value | ‘0001’B | 5,12 seconds |  |
| Extended Paging Time Window | ‘00000001’B | 2,56 seconds |  |
| Note 1: In NR connected to 5GCN, the Paging Time Window field is ignored and the PTW value is included in the Extended Paging Time Window field. | | | |

Table 11.7.2.3.3-3: *RRCRelease* (step 20, step 26 and step 31, Table 11.7.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.6.1-16 with condition NR\_RRC\_INACTIVE | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCRelease ::= SEQUENCE { |  |  |  |
| rrc-TransactionIdentifier | RRC-TransactionIdentifier |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcRelease SEQUENCE { |  |  |  |
| suspendConfig SEQUENCE { |  |  |  |
| ran-ExtendedPagingCycle-r17 | rf512 | 5.12 seconds | Step 20 |
|  | rf256 | 2.56 seconds | Step 26 and Step 31 |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.7.2.3.3-4: Paging (steps 21, 27 and 34, Table 11.7.2.3.2-1)

|  |
| --- |
| Derivation Path: TS 38.508-1 [4], Table 4.6.1-9 with condition NR\_RRC\_RESUME |

### 11.7.3 eDRX / Inactive / CN-initiated paging / eDRX Allowed / Not Allowed

11.7.3.1 Test Purpose (TP)

(1)

**with** { UE in NR RRC\_INACTIVE state and configured eDRX }

**ensure that** {

**when** { the network sends a CN-initiated Paging message within a paging occasion }

**then** { UE goes to RRC\_IDLE state and establishes an RRC connection }

}

(2)

**with** { UE in NR RRC\_INACTIVE state and configured eDRX }

**ensure that** {

**when** { the network changes SIB1 to exclude eDRX-AllowedIdle and eDRX-AllowedInactive IEs }

**then** { UE applies the new system information and stops using extended DRX for CN-initiated paging in RRC\_INACTIVE state }

}

11.7.3.2 Conformance Requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clause 5.3.16 and TS 38.304, clause 7.1 and clause 7.4. Unless otherwise stated these are Rel-17 requirements.

[TS 24.501, clause 5.3.16]

Extended DRX (eDRX) cycle is supported for a UE in N1 mode. When eDRX is requested by the UE and accepted by the network:

- if the UE is not in NB-N1 mode, eDRX is used when the UE is in 5GMM-IDLE mode or in 5GMM-CONNECTED mode with RRC inactive indication; or

- if the UE is in NB-N1 mode, eDRX is used when the UE is in 5GMM-IDLE mode.

The UE may request the use of eDRX cycle during a registration procedure by including the Requested extended DRX parameters IE (see 3GPP TS 23.501 [8] and 3GPP TS 23.502 [9]). The UE shall not request the use of eDRX during a registration procedure for emergency services. The UE may use the extended idle mode DRX cycle length stored in the USIM (see 3GPP TS 31.102 [22]) when requesting the use of eDRX.

The UE and the network may negotiate eDRX parameters during a registration procedure when the UE has an emergency PDU session.

The network accepts the request to use the eDRX by providing the Negotiated extended DRX parameters IE when accepting the registration procedure. The UE shall use eDRX only if it received the Negotiated extended DRX parameters IE during the last registration procedure and the UE does not have an emergency PDU session.

NOTE: If the UE wants to keep using eDRX, the UE includes the Extended DRX parameters IE in each registration procedure.

[TS 38.304, clause 7.1]

The UE may use Discontinuous Reception (DRX) in RRC\_IDLE and RRC\_INACTIVE state in order to reduce power consumption. The UE monitors one paging occasion (PO) per DRX cycle. A PO is a set of PDCCH monitoring occasions and can consist of multiple time slots (e.g. subframe or OFDM symbol) where paging DCI can be sent (TS 38.213 [4]). One Paging Frame (PF) is one Radio Frame and may contain one or multiple PO(s) or starting point of a PO. A L2 U2N Relay UE monitors the paging occasions of its PC5-RRC connected L2 U2N Remote UEs. In this case, the DRX cycle and UE ID mentioned in this clause refer to those of the L2 U2N Remote UE.

In multi-beam operations, the UE assumes that the same paging message and the same Short Message are repeated in all transmitted beams and thus the selection of the beam(s) for the reception of the paging message and Short Message is up to UE implementation. The paging message is same for both RAN initiated paging and CN initiated paging.

The UE initiates RRC Connection Resume procedure upon receiving RAN initiated paging. If the UE receives a CN initiated paging in RRC\_INACTIVE state, the UE moves to RRC\_IDLE and informs NAS. However, if a L2 U2N Relay UE in RRC\_INACTIVE state receives a CN initiated paging for a L2 U2N Remote UE, the L2 U2N Relay UE does not move to RRC\_IDLE state.

NOTE 0a: The L2 U2N Remote UE does not need to monitor the PO in order to receive the paging message.

NOTE 0b: While the SDT procedure is ongoing in RRC\_INACTIVE state, the UE monitors the PO in order to receive only the Short Message as specified in TS 38.331 [3].

The PF and PO for paging are determined by the following formulae:

SFN for the PF is determined by:

(SFN + PF\_offset) mod T = (T div N)\*(UE\_ID mod N)

Index (i\_s), indicating the index of the PO is determined by:

i\_s = floor (UE\_ID/N) mod Ns

The PDCCH monitoring occasions for paging are determined according to *pagingSearchSpace* as specified in TS 38.213 [4] and *firstPDCCH-MonitoringOccasionOfPO* and *nrofPDCCH-MonitoringOccasionPerSSB-InPO* ifconfigured as specified in TS 38.331 [3]. When *SearchSpaceId* = 0 is configured for *pagingSearchSpace*, the PDCCH monitoring occasions for paging are same as for RMSI as defined in clause 13 in TS 38.213 [4].

When *SearchSpaceId* = 0 is configured for *pagingSearchSpace*, Ns is either 1 or 2. For Ns = 1, there is only one PO which starts from the first PDCCH monitoring occasion for paging in the PF. For Ns = 2, PO is either in the first half frame (i\_s = 0) or the second half frame (i\_s = 1) of the PF.

When *SearchSpaceId* other than 0 is configured for *pagingSearchSpace,* the UE monitors the (i\_s + 1)th PO. A PO is a set of 'S\*X ' consecutive PDCCH monitoring occasions where 'S' is the number of actual transmitted SSBs determined according to *ssb-PositionsInBurst* in *SIB1* and X is the *nrofPDCCH-MonitoringOccasionPerSSB-InPO* if configured or is equal to 1 otherwise. The [x\*S+K]th PDCCH monitoring occasion for paging in the PO corresponds to the Kth transmitted SSB, where x=0,1,…,X-1, K=1,2,…,S. The PDCCH monitoring occasions for paging which do not overlap with UL symbols (determined according to *tdd-UL-DL-ConfigurationCommon*) are sequentially numbered from zero starting from the first PDCCH monitoring occasion for paging in the PF. When *firstPDCCH-MonitoringOccasionOfPO* is present, the starting PDCCH monitoring occasion number of (i\_s + 1)th PO is the (i\_s + 1)th value of the *firstPDCCH-MonitoringOccasionOfPO* parameter; otherwise, it is equal to i\_s \* S\*X. If X > 1, when the UE detects a PDCCH transmission addressed to P-RNTI within its PO, the UE is not required to monitor the subsequent PDCCH monitoring occasions for this PO.

NOTE 1: A PO associated with a PF may start in the PF or after the PF.

NOTE 2: The PDCCH monitoring occasions for a PO can span multiple radio frames. When *SearchSpaceId* other than 0 is configured for *paging-SearchSpace* the PDCCH monitoring occasions for a PO can span multiple periods of the paging search space.

The following parameters are used for the calculation of PF and i\_s above:

T: DRX cycle of the UE.

If the UE does not operate in eDRX as defined in clause 7.4:

- T is determined by the shortest of the UE specific DRX value(s), if configured by RRC and/or upper layers or provided in PC5-RRC signalling in case of a L2 U2N Relay UE, and a default DRX value broadcast in system information. In RRC\_IDLE state, if UE specific DRX is not configured by upper layers, the default value is applied.

In RRC\_INACTIVE state, if eDRX is configured by RRC, i.e., TeDRX, RAN , and/or upper layers, i.e., TeDRX, CN, as defined in clause 7.4:

- If both TeDRX, CN and TeDRX, RAN are no longer than 1024 radio frames, T = min{TeDRX, RAN, TeDRX, CN}.

- If TeDRX, CN is no longer than 1024 radio frames and no TeDRX, RAN is configured, T is determined by the shortest of UE specific DRX value configured by RRC and TeDRX, CN.

- If TeDRX, CN is longer than 1024 radio frames:

- If TeDRX, RAN is not configured or used:

- During CN configured PTW, T is determined by the shortest of the UE specific DRX value (s), if configured by RRC and/or upper layers, and a default DRX value broadcast in system information. Outside the CN configured PTW, T is determined by the UE specific DRX value configured by RRC;

- else if used TeDRX, RAN is no longer than 1024 radio frames:

- During CN configured PTW, T is determined by the shortest of the UE specific DRX value, if configured by upper layers and TeDRX, RAN, and a default DRX value broadcast in system information. Outside the CN configured PTW, T is determined by TeDRX, RAN.

N: number of total paging frames in T

Ns: number of paging occasions for a PF

PF\_offset: offset used for PF determination

UE\_ID:

If the UE operates in eDRX as specified in clause 7.4:

- 5G-S-TMSI mod 4096

else:

- 5G-S-TMSI mod 1024

Parameters *Ns*, *nAndPagingFrameOffset*, *nrofPDCCH-MonitoringOccasionPerSSB-InPO*, and the length of default DRX Cycle are signalled in *SIB1*. The values of N and PF\_offset are derived from the parameter *nAndPagingFrameOffset* as defined in TS 38.331 [3]. The parameter *firstPDCCH-MonitoringOccasionOfPO* is signalled in *SIB1* for paging in the BWP configured by *initialDownlinkBWP*.For paging in a DL BWP other than the BWP configured by *initialDownlinkBWP*, the parameter *first-PDCCH-MonitoringOccasionOfPO* is signaled in the corresponding BWP configuration.

If the UE has no 5G-S-TMSI, for instance when the UE has not yet registered onto the network, the UE shall use as default identity UE\_ID = 0 in the PF and i\_s formulas above.

5G-S-TMSI is a 48 bit long bit string as defined in TS 23.501 [10]. 5G-S-TMSI shall in the formulae above be interpreted as a binary number where the left most bit represents the most significant bit.

In RRC\_INACTIVE state, if the UE supports *inactiveStatePO-Determination* and the network broadcasts *ranPagingInIdlePO* with value "true", the UE shall use the same i\_s as for RRC\_IDLE state. Otherwise, the UE determines the i\_s based on the parameters and formula above.

In RRC\_INACTIVE state, if used eDRX value configured by upper layers is no longer than 1024 radio frames, the UE shall use the same i\_s as for RRC\_IDLE state.

In RRC\_INACTIVE state, if used eDRX value configured by upper layers is longer than 1024 radio frames, during CN PTW, the UE shall use the same i\_s as for RRC\_IDLE state. Outside CN PTW, the UE shall use the i\_s for RRC\_INACTIVE state.

[TS 38.304, clause 7.4]

The UE may be configured by upper layers and/or RRC with an extended DRX (eDRX) cycle TeDRX, CN and/or TeDRX, RAN. The UE operates in eDRX for CN paging in RRC\_IDLE or RRC\_INACTIVE states if the UE is configured for eDRX by upper layers and *eDRX-AllowedIdle* is signalled in SIB1. The UE operates in eDRX for RAN paging in RRC\_INACTIVE state if the UE is configured for eDRX by RAN and *eDRX-Allowed*I*nactive* is signalled in SIB1. If the UE operates in eDRX with an eDRX cycle no longer than 1024 radio frames, it monitors POs as defined in 7.1 with configured eDRX cycle. Otherwise, a UE operating in eDRX monitors POs as defined in 7.1 during a periodic Paging Time Window (PTW) configured for the UE. The PTW is UE-specific and is determined by a Paging Hyperframe (PH), a starting position within the PH (PTW\_start) and an ending position (PTW\_end). PH, PTW\_start and PTW\_end are given by the following formula:

The PH for CN is the H-SFN satisfying the following equations:

H-SFN mod TeDRX\_CN= (UE\_ID\_H mod TeDRX\_CN), where

- UE\_ID\_H: 13 most significant bits of the Hashed ID.

- TeDRX\_CN: UE-specific eDRX cycle in Hyper-frames, (TeDRX\_CN = 2, …, 1024 Hyper-frames) configured by upper layers.

PTW\_start denotes the first radio frame of the PH that is part of the PTW and has SFN satisfying the following equation:

SFN = 128 \* ieDRX\_CN, where

- ieDRX\_CN = floor(UE\_ID\_H /TeDRX\_CN) mod 8

PTW\_end is the last radio frame of the PTW and has SFN satisfying the following equation:

SFN = (PTW\_start + L\*100 - 1) mod 1024, where

- L = Paging Time Window (PTW) length (in seconds) configured by upper layers

Hashed ID is defined as follows:

Hashed\_ID is Frame Check Sequence (FCS) for the bits b31, b30…, b0 of 5G-S-TMSI.

5G-S-TMSI = <b47, b46, …, b0> as defined in TS 23.003 [23].

The 32-bit FCS shall be the ones complement of the sum (modulo 2) of Y1 and Y2, where

- Y1 is the remainder of xk (x31 + x30 + x29 + x28 + x27 + x26 + x25 + x24 + x23 + x22 + x21 + x20 + x19 + x18 + x17 + x16 + x15 + x14 + x13 + x12 + x11 + x10 + x9 + x8 + x7 + x6 + x5 + x4 + x3 + x2 + x1 + 1) divided (modulo 2) by the generator polynomial x32 + x26 + x23 + x22 + x16 + x12 + x11 + x10 + x8 + x7 + x5 + x4 + x2 + x + 1, where k is 32; and

- Y2 is the remainder of Y3 divided (modulo 2) by the generator polynomial x32 + x26 + x23 + x22 + x16 + x12 + x11 + x10 + x8 + x7 + x5 + x4 + x2 + x + 1, where Y3 is the product of x32 by "b31, b30…, b0 of S-TMSI or 5G-S-TMSI", i.e., Y3 is the generator polynomial x32 (b31\*x31 + b30\*x30 + … + b0\*1).

NOTE: The Y1 is 0xC704DD7B for any 5G-S-TMSI value. An example of hashed ID calculation is in Annex A.

11.7.3.3 Test description

11.7.3.3.1 Pre-test conditions

System Simulator:

- 1 NR Cell connected to 5GC.

- System information combination NR-1 as defined in TS 38.508-1 [4] Table 4.4.3.1.2-1 is used in NR cell 1, with SIB 1 modified as per Table 11.7.3.3.3-1.

UE:

- UE configured to request eDRX.

Preamble:

- UE is in state 0N-B according to TS 38.508-1 [4] Table 4.4A.2-2.

11.7.3.3.2 Test procedure sequence

Table 11.7.3.3.2-1: Main Behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE is switched on. | - | - | - | - |
| 2-3 | Steps 19B-19C of the generic procedure for NR RRC\_INACTIVE as specified in TS 38.508-1 [4] Table 4.5.3.2-1 are performed. | - | - | - | - |
| 4 | The UE transmits a REGISTRATION REQUEST message including the Requested extended DRX parameters IE. | --> | NR RRC: RRCSetupComplete  5GMM: REGISTRATION REQUEST | - | - |
| 5-13 | Steps 19E-19M of Table 4.5.3.2-1 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 14 | The SS transmits a REGISTRATION ACCEPT message including the Negotiated extended DRX parameters IE. | <-- | NR RRC: DLInformationTransfer  5GMM: REGISTRATION ACCEPT | - | - |
| 15 | The UE transmits a REGISTRATION COMPLETE message | --> | NR RRC: ULInformationTransfer  5GMM: REGISTRATION COMPLETE | - | - |
| 16-17 | Steps 19TAa1-20 of Table 4.5.3.2-1 of the generic procedure in TS 38.508-1 [4] are performed. | - | - | - | - |
| 18 | The SS transmits a *Paging* message within a paging occasion. | <-- | NR RRC: Paging | - | - |
| 19 | Check: Does the UE transmit an *RRCSetupRequest* message indicating that UE has moved to RRC\_IDLE state? | --> | NR RRC: RRCSetupRequest | 1 | P |
| 20 | The SS transmits an *RRCSetup* message. | <-- | NR RRC: RRCSetup | - | - |
| 21 | The UE transmits an *RRCSetupComplete* message including SERVICE REQUEST to confirm the successful completion of the connection establishment. | --> | NR RRC: RRCSetupComplete  5GMM: SERVICE REQUEST | - | - |
| 22-25 | Steps 5 to 8 of the NR RRC\_CONNECTED procedure in TS 38.508-1 [4] Table 4.5.4.2-3 are executed to successfully complete the service request procedure. | - | - | - | - |
| 26 | The SS transmits an *RRCRelease* message with suspend. | <-- | NR RRC: RRCRelease | - | - |
| 27 | The SIB1 is updated according to Table 11.7.3.3.3-1 and transmits a Short message on PDCCH using P-RNTI indicating a systemInfoModification. | <-- | PDCCH (DCI 1\_0): Short Message | - | - |
| 28 | Wait for 2.1\* modification period to allow the new system information to take effect. | - | - | - | - |
| 29 | The SS transmits a Paging message to the UE in a valid PO which is derived by normal DRX and not belonging to extended DRX. | <-- | NR RRC: Paging | - | - |
| 30 | Check: Does the UE transmit an RRCSetupRequest message? | --> | NR RRC: RRCSetupRequest | 2 | P |
| 31 | The SS transmits an RRCSetup message. | <-- | NR RRC: RRCSetup | - | - |
| 32 | The UE transmits an RRCSetupComplete message including SERVICE REQUEST to confirm the successful completion of the connection establishment. | --> | NR RRC: RRCSetupComplete  5GMM: SERVICE REQUEST | - | - |
| 33-36 | Steps 5 to 8 of the NR RRC\_CONNECTED procedure in TS 38.508-1 [4] Table 4.5.4.2-3 are executed to successfully complete the service request procedure. | - | - | - | - |

11.7.3.3.3 Specific message contents

Table 11.7.3.3.3-1: *SIB1* (preamble and step 27, Table 11.7.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4] , table 4.6.1-28 | | | |
| Information Element | Value/remark | Comment | Condition |
| SIB1 ::= SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| hyperSFN-r17 | Current H-SFN Value |  | Preamble |
|  | Not present |  | Step 27 |
| eDRX-AllowedIdle-r17 | true |  | Preamble |
|  | Not present |  | Step 27 |
| eDRX-AllowedInactive-r17 | Not present |  | Step 27 |
| } | true |  | Preamble |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.7.3.3.3-2: REGISTRATION REQUEST (step 4, Table 11.7.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-6 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Requested extended DRX parameters |  |  |  |
| Paging Time Window | Present but contents not checked |  |  |
| eDRX value | Present but contents not checked |  |  |
| Extended Paging Time Window | Not checked | Note 1 |  |
| Note 1: Extended Paging Time Window is an optional IE. If UE request eDRX cycle larger than 10,24 seconds, UE may include Extended Paging Time Window. | | | |

Table 11.7.3.3.3-3: REGISTRATION ACCEPT (step 14, Table 11.7.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.7.1-7 | | | |
| Information Element | Value/Remark | Comment | Condition |
| Negotiated extended DRX parameters |  |  |  |
| Paging Time Window | Any allowed value | Note 1 |  |
| eDRX value | ‘0001’B | 5,12 seconds |  |
| Extended Paging Time Window | ‘00000001’B | 2,56 seconds |  |
| Note 1: In NR connected to 5GCN, the Paging Time Window field is ignored and the PTW value is included in the Extended Paging Time Window field. | | | |

Table 11.7.3.3.3-4: *RRCRelease* (step 26, Table 11.7.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], table 4.6.1-16 with condition NR\_RRC\_INACTIVE | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCRelease ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| rrcRelease SEQUENCE { |  |  |  |
| suspendConfig SEQUENCE { |  |  |  |
| ran-ExtendedPagingCycle-r17 | rf256 | 2.56 seconds |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 11.7.3.3.3-5: Void

## 11.8 Inter-system mobility between untrusted Non-3GPP and 3GPP system

### 11.8.1 Inter-system mobility between untrusted Non-3GPP and 3GPP system/Handover from NR to N3IWF/5GC

11.8.1.1 Test Purpose (TP)

(1)

**With** { UE supports N1 mode, the UE supports IP address preservation between NR and N3IWF/5GS, at least one PDN Connections have been established between the UE and 5GC, UE in state EMM-REGISTERED }

**ensure that** {

**when** { UE detects NR becomes not suitable and performs a handover of existing PDN connection from NR to N3IWF/5GC }

**then** { UE requested PDU Session Establishment with Existing PDU Session indication in 5GC via Untrusted non-3GPP Access via N3IWF }

}

11.8.1.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 23.502, clause 4.9.2.2

[TS 23.502, clause 4.9.2.2]

Clause 4.9.2.2 specifies how to hand over a UE from a source 3GPP access to a target Untrusted non-3GPP access and how a UE can handover a PDU Session from 3GPP access to untrusted non-3GPP access. It is based on the PDU Session Establishment procedure for non-3GPP access as specified in clause 4.12.5.



Figure 4.9.2.2-1: Handover of a PDU Session from 3GPP access to untrusted non-3GPP access (non-roaming and roaming with local breakout)

1. If the UE is not registered via untrusted non-3GPP access, the UE shall initiate Registration procedure as defined in clause 4.12.2.

2. The UE performs PDU Session Establishment procedure with the PDU Session ID of the PDU Session to be moved as specified in clause 4.12.5.

When sending the PDU Session Establishment Accept, within the N1 SM container and in the N2 SM information, the SMF shall include all QoS information (e.g. QoS Rule(s) in N1 SM container, QFI(s) and QoS Profile(s) in N2 SM information) for the QoS Flow(s) that are applicable to the PDU Session for the target access.

3. If the User Plane of the PDU Session is activated in 3GPP access, the SMF executes the release of resource in 3GPP access by performing step 3b, then steps 4 to 7a/7b specified in clause 4.3.4.2 (UE or network requested PDU Session Release for Non-Roaming and Roaming with Local Breakout) in order to release the resources over the source 3GPP access. Because the PDU Session shall not be released, the SMF shall not send the PDU Session Release Command to the UE. Hence, in steps 3b, 4, 6 and 7a of clause 4.3.4.2, messages do not include the N1 SM container but only the N2 Resource Release Request (resp. Ack). Since the PDU Session is not to be released, the SMF shall not execute step 11 of clause 4.3.4.2 and the SM context between the AMF and the SMF is maintained.

If the User Plane of the PDU Session is deactivated in 3GPP access, this step is skipped.

The steps 2 and 3 shall be repeated for all PDU Sessions to be moved from 3GPP access to untrusted non-3GPP access.

If the PDU Session is associated with Control Plane Only Indication, the AMF shall reject the PDU Session establishment request as the Control Plane CIoT Optimisation feature is not supported over non-3GPP accesses as described in clause 5.4.5.2.5 of TS 24.501 [25].

11.8.1.3 Test description

11.8.1.3.1 Pre-test conditions

- WLAN Cell 27 is configured according to TS 38.508-1 [4]

- NR Cell 1 is configured according to TS 38.508-1 [4], Table 4.4.2-3.

- NR Cell 1 and WLAN Cell 27 belong to the same PLMN and NR Cell 1 is set to '' Serving cell'', WLAN Cell 27 is set to "non-suitable cell".

UE:

- None

Preamble:

- The UE is brought to state 3N-A on NR Cell 1 according to TS 38.508-1 [4].

11.8.1.3.2 Test procedure sequence

Table 11.8.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | NR Cell 1 is set “Off” cell”, WLAN Cell 27 is set to “Serving cell”. | - | - | - | - |
| 2-10 | UE performs 5GMM Registration procedure on WLAN Cell 27 by executing steps 1 to 9 of Table 4.5.2.2-3 in TS38.508-1 [4]. | - | - | - | - |
| 11 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST on WLAN Cell 27? | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 1 | P |
| 12 | The SS establishes an IPSec child security association according to the IKEv2 specification in RFC 7296 [34] |  |  | - | - |
| 13 | The SS transmits an PDU SESSION ESTABLISHMENT ACCEPT on WLAN Cell 27. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT |  |  |

11.8.1.3.3 Specific message contents

Table 11.8.1.3.3-1: PDU SESSION ESTABLISHMENT REQUEST (step 11, Table 11.8.1.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | The value used in the PDU Session request message on NR Cell 1 in Preamble. |  |  |

### 11.8.2 Inter-system mobility between untrusted Non-3GPP and 3GPP system/Handover from N3IWF/5GC to NR / UE in 5GMM-DEREGISTERED states

11.8.2.1 Test Purpose (TP)

(1)

**With** { the UE supports N1 mode, the UE supports IP address preservation between N3IWF/5GC and NR, at least one PDN Connections have been established between the UE and the N3IWF/5GC via untrusted non-3GPP, UE is in state 5GMM-DEREGISTERED }

**ensure that** {

**when** { UE detects WiFi becomes not suitable, performs Registration procedure and handover of existing PDU session from N3IWF/5GC to NR }

**then** { UE performs the PDU Session Establishment procedure with the PDU Session ID of the PDU Session to be transferred }

}

11.8.2.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 23.502, clause 4.9.2.1

[TS 23.502, clause 4.9.2.1]

Clause 4.9.2.1 specifies how to hand over a UE from a source Untrusted non-3GPP access to a target 3GPP access and how a UE can handover a PDU Session from untrusted non-3GPP access to 3GPP access. It is based on the PDU Session Establishment procedure for 3GPP access as specified in clause 4.3.2.

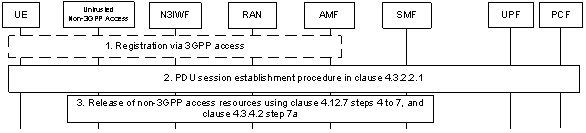


Figure 4.9.2.1-1: Handover of a PDU Session procedure from untrusted non-3GPP access to 3GPP access (non-roaming and roaming with local breakout)

1. If the UE is not registered via 3GPP access, the UE shall initiate Registration procedure as defined in clause 4.2.2.2.2.

2. The UE performs a PDU Session Establishment procedure with the PDU Session ID of the PDU Session to be moved as specified clause 4.3.2.2.1 (PDU Session Establishment for Non-roaming and Roaming with Local Breakout).

When sending the PDU Session Establishment Accept, within the N1 SM container and in the N2 SM information, the SMF shall include all QoS information (e.g. QoS Rule(s) in N1 SM container, QFI(s) and QoS Profile(s) in N2 SM information) for the QoS Flow(s) that are applicable to the PDU Session for the target access.

3. If the User Plane of the PDU Session is activated in non-3GPP access, the SMF executes the release of resources in non-3GPP access by initiating a Namf\_Communication\_N1N2MessageTransfer (to send N2 resource release request) which triggers performing steps 4 to 7 specified in clause 4.12.7, followed by step 7a/7b specified in clause 4.3.4.2 in order to release the resources over the source non-3GPP access. Because the PDU Session shall not be released, the SMF shall not send the PDU Session Release Command to the UE. Hence, in steps 4 and 7 of clause 4.12.7 as well as in step 7a of clause 4.3.4.2, the messages do not include the N1 SM container but only the N2 Resource Release Request (resp. Ack). Since the PDU Session is not to be released, the SMF shall not execute step 11 of clause 4.3.4.2 and the SM context between the AMF and the SMF is maintained.

If the User Plane of the PDU Session is deactivated in non-3GPP access, this step is skipped.

The steps 2 and 3 shall be repeated for all PDU Sessions to be moved from to untrusted non-3GPP access to 3GPP access.

If the UE is moving to the NB-IoT RAT type of 3GPP access, the PDU Session Establishment request would be rejected by AMF when the UP resources exceeds the UE's maximum number of supported UP resources as described in clause 5.4.5.2.4 of TS 24.501 [25].

11.8.2.3 Test description

11.8.2.3.1 Pre-test conditions

- WLAN Cell 27 is configured according to TS 38.508-1 [4]

- NR Cell 1 is configured according to TS 38.508-1 [4], Table 4.4.2-3.

- NR Cell 1 and WLAN Cell 27 belong to the same PLMN and WLAN Cell 27 is set to '' Serving cell'', NR Cell 1is set to "non-suitable cell".

UE:

- None

Preamble:

- The UE is brought to state 3W-A on WLAN Cell 27 according to TS 38.508-1 [4].

11.8.2.3.2 Test procedure sequence

Table 11.8.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | WLAN Cell 27 is set “Off” cell”, NR Cell 1 is set to “Serving cell”. | - | - | - | - |
| 2 | UE performs 5GMM Registration procedure on NR Cell 1 by executing steps 1 to 15 of Table 4.5.2.2-2 in TS38.508-1 [4]. | - | - | - | - |
| 3 | The UE transmits a PDU SESSION ESTABLISHMENT REQUEST message on NR Cell 1? | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 1 | P |
| 4 | The SS transmits a PDU SESSION ESTABLISHMENT ACCEPT on NR cell 1. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |

11.8.2.3.3 Specific message contents

Table 11.8.2.3.3-1: PDU SESSION ESTABLISHMENT REQUEST (step 3, Table 11.8.2.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | The value used in the PDU Session request message on WLAN Cell 27 in Preamble. |  |  |

### 11.8.3 Inter-system mobility between untrusted Non-3GPP and 3GPP system/Handover from E-UTRAN/EPC to N3IWF/5GC

11.8.3.1 Test Purpose (TP)

(1)

**With** { UE supports S1 mode, the UE supports IP address preservation between EPC and N3IWF/5GS, at least one PDN Connections have been established between the UE and the EPC via E-UTRAN, UE in state EMM-REGISTERED. }

**ensure that** {

**when** { UE detects E-UTRAN becomes not suitable and performs a handover of existing PDN connection from EPC/E-UTRAN to N3IWF/5GC }

**then** { UE requested PDU Session Establishment with Existing PDU Session indication in 5GC via Untrusted non-3GPP Access via N3IWF }

}

11.8.3.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 23.502, clause 4.9.2.2 and TS 23.502, clause 4.11.2.3.

[TS 23.502, clause 4.9.2.2]

4.9.2.2 Handover of a PDU Session procedure from 3GPP to untrusted non-3GPP access (non-roaming and roaming with local breakout)

Clause 4.9.2.2 specifies how to hand over a UE from a source 3GPP access to a target Untrusted non-3GPP access and how a UE can handover a PDU Session from 3GPP access to untrusted non-3GPP access. It is based on the PDU Session Establishment procedure for non-3GPP access as specified in clause 4.12.5.



Figure 4.9.2.2-1: Handover of a PDU Session from 3GPP access to untrusted non-3GPP access (non-roaming and roaming with local breakout)

1. If the UE is not registered via untrusted non-3GPP access, the UE shall initiate Registration procedure as defined in clause 4.12.2.

2. The UE performs PDU Session Establishment procedure with the PDU Session ID of the PDU Session to be moved as specified in clause 4.12.5.

When sending the PDU Session Establishment Accept, within the N1 SM container and in the N2 SM information, the SMF shall include all QoS information (e.g. QoS Rule(s) in N1 SM container, QFI(s) and QoS Profile(s) in N2 SM information) for the QoS Flow(s) that are applicable to the PDU Session for the target access.

3. If the User Plane of the PDU Session is activated in 3GPP access, the SMF executes the release of resource in 3GPP access by performing step 3b, then steps 4 to 7a/7b specified in clause 4.3.4.2 (UE or network requested PDU Session Release for Non-Roaming and Roaming with Local Breakout) in order to release the resources over the source 3GPP access. Because the PDU Session shall not be released, the SMF shall not send the PDU Session Release Command to the UE. Hence, in steps 3b, 4, 6 and 7a of clause 4.3.4.2, messages do not include the N1 SM container but only the N2 Resource Release Request (resp. Ack). Since the PDU Session is not to be released, the SMF shall not execute step 11 of clause 4.3.4.2 and the SM context between the AMF and the SMF is maintained.

If the User Plane of the PDU Session is deactivated in 3GPP access, this step is skipped.

The steps 2 and 3 shall be repeated for all PDU Sessions to be moved from 3GPP access to untrusted non-3GPP access.

If the PDU Session is associated with Control Plane Only Indication, the AMF shall reject the PDU Session establishment request as the Control Plane CIoT Optimisation feature is not supported over non-3GPP accesses as described in clause 5.4.5.2.5 of TS 24.501 [25].

[TS 23.502, clause 4.11.2.3]

The following procedure is used by UEs in single-registration mode on mobility from EPS to 5GS.

In the case of network sharing the UE selects the target PLMN ID according to clause 5.18.3 of TS 23.501 [2].

This procedure is also used by UEs in dual-registration mode to perform registration in 5GS when the UE is also registered in EPC. The procedure is the General Registration procedure as captured in clause 4.2.2. Difference from that procedure are captured below.

The UE has one or more ongoing PDN connections including one or more EPS bearers. During the PDN connection establishment, the UE allocates the PDU Session ID and sends it to the SMF+PGW-C via PCO, as described in clause 4.11.1.1.



Figure 4.11.2.3-1: Mobility procedure from EPS to 5GS without N26 interface

0. The UE is attached in EPC as specified in clause 4.11.2.4.1.

1. Step 1 in clause 4.2.2.2.2 (General Registration) with the following clarifications:

The UE indicates that it is moving from EPC. The UE in single registration mode provides the Registration type set to "mobility registration update", a 5G-GUTI mapped from the 4G-GUTI and a native 5G-GUTI (if available) as an Additional GUTI. The UE includes the UE Policy Container containing the list of PSIs, indication of UE support for ANDSP and OSId if available. The UE shall select the 5G-GUTI for the additional GUTI as follows, listed in decreasing order of preference:

- a native 5G-GUTI assigned by the PLMN to which the UE is attempting to register, if available;

- a native 5G-GUTI assigned by an equivalent PLMN to the PLMN to which the UE is attempting to register, if available;

- a native 5G-GUTI assigned by any other PLMN, if available.

The UE in dual registration mode provides the Registration type set to "initial registration" and a native 5G-GUTI or SUCI. In single registration mode, the UE also includes at least the S-NSSAIs (with values for the Serving PLMN) associated with the established PDN connections in the Requested NSSAI in RRC Connection Establishment.

2. Step 2 as in clause 4.2.2.2.

3. Step 3 as in clause 4.2.2.2.2 (General Registration), with the following modifications:

If the Registration type is "mobility registration update" and the UE indicates that it is moving from EPC in step 1 and the AMF is configured to support 5GS-EPS interworking procedure without N26 interface, the AMF treats this registration request as "initial Registration" and the AMF skips the PDU Session status synchronization.

NOTE 1: The UE operating in single registration mode includes the PDU Session IDs corresponding to the PDN connections to the PDU Session status.

If the UE has provided a 5G-GUTI mapped from 4G-GUTI in step 1 and the AMF is configured to support 5GS-EPS interworking procedure without N26 interface, the AMF does not perform steps 4 and 5 in clause 4.2.2.2 (UE context transfer from the MME).

4. Steps 4-13 as in clause 4.2.2.2.2 (General Registration), with the following modifications:

If the UE has included an additional GUTI in the Registration Request, then the new AMF attempts to retrieve the UE's security context from the old AMF in steps 4 and 5.

If the UE's security context is not available in the old AMF or if the UE has not provided an additional GUTI then the AMF retrieves the SUCI from the UE in steps 6 and 7.

5. Step 14 as in clause 4.2.2.2.2 (General Registration), with the following modifications:

If the UE indicates that it is moving from EPC and the Registration type is set to "initial registration" or "mobility registration update" in step 1 and AMF is configured to support 5GS-EPS interworking without N26 procedure, the AMF sends an Nudm\_UECM\_Registration Request message to the HSS+UDM indicating that registration of an MME at the HSS+UDM, if any, shall not be cancelled. The HSS+UDM does not send cancel location to the old MME.

NOTE 2: If the UE does not maintain registration in EPC, upon reachability time-out, the MME can implicitly detach the UE and release the possible remaining PDN connections in EPC.

The subscription profile the AMF receives from HSS+UDM includes the DNN/APN and SMF+PGW-C FQDN for S5/S8 interface for each PDN connection established in EPC. For emergency PDU Session, the AMF receives Emergency Information containing SMF+PGW-C FQDN from HSS+UDM.

6. Steps 15-19c as in clause 4.2.2.2.2 (General Registration).

7. Step 21 as in clause 4.2.2.2.2 (General Registration) with the following modifications:

The AMF includes an "Interworking without N26" indicator to the UE.

If the UE had provided PDU Session Status information in step 1, the AMF Sets the PDU Session Status to not synchronized.

8. Step 22 as in clause 4.2.2.2.2 (General Registration)

9. UE requested PDU Session Establishment procedure as in clause 4.3.2.2.1.

If the UE had setup PDN Connections in EPC which it wants to transfer to 5GS and maintain the same IP address/prefix and the UE received "Interworking without N26" indicator in step 7, the UE performs the UE requested PDU Session Establishment Procedure as in clause 4.3.2.2 and sets the Request Type to "Existing PDU Session" or "Existing Emergency PDU Session" in step 1 of the procedure. The UE provides a DNN for non-emergency PDU Session, the PDU Session ID and S-NSSAI corresponding to the existing PDN connection it wants to transfer from EPS to 5GS. The S-NSSAI is set as described in clause 5.15.7.2 of TS 23.501 [2].

If the Request Type indicates "Existing Emergency PDU Session", the AMF shall use the Emergency Information received from the HSS+UDM which contains SMF+PGW-C FQDN for S5/S8 interface for the emergency PDN connection established in EPS and the AMF shall use the S-NSSAI locally configured in Emergency Configuration Data.

UEs in single-registration mode performs this step for each PDN connection immediately after the step 8. UEs in dual-registration mode may perform this step any time after step 8. Also, UEs in dual-registration mode may perform this step only for a subset of PDU Sessions. The AMF determines the S5/S8 interface of the SMF+PGW-C for the PDU Session based on the DNN received from the UE and the SMF+PGW-C ID in the subscription profile received from the HSS+UDM in step 5 or when the HSS+UDM notifies the AMF for the new SMF+PGW-C ID in the updated subscription profile. The AMF queries the NRF in serving PLMN by issuing the Nnrf\_NFDiscovery\_Request including the FQDN for the S5/S8 interface of the SMF+PGW-C and the NRF provides the IP address or FQDN of the N11/N16 interface of the SMF+PGW-C. The AMF invokes the Nsmf\_PDUSession\_CreateSMContext service with the SMF address provided by the NRF. The AMF includes the PDU Session ID to the request sent to the SMF+PGW-C.

The SMF+PGW-C uses the PDU Session ID to determine the correct PDU Session.

After step 16a of Figure 4.3.2.2.1-1 in clause 4.3.2.2.1, user plane is switched from EPS to 5GS.

As specified clause 4.3.2.2, if the SMF has not yet registered for the PDU Session ID, then the SMF registers with the UDM using Nudm\_UECM\_Registration (SUPI, DNN, PDU Session ID) and if Session Management Subscription data for corresponding SUPI, DNN and S-NSSAI is not available, then SMF retrieves the Session Management Subscription data using Nudm\_SDM\_Get (SUPI, Session Management Subscription data, DNN, S-NSSAI) and subscribes to be notified when this subscription data is modified using Nudm\_SDM\_Subscribe (SUPI, Session Management Subscription data, DNN, S-NSSAI).

NOTE 3: The SMF can, instead of the Nudm\_SDM\_Get service operation, use the Nudm\_SDM\_Subscribe service operation with an Immediate Report Indication that triggers the UDM to immediately return the subscribed data if the corresponding feature is supported by both the SMF and the UDM.

10. The SMF+PGW-C performs release of the resources in EPC for the PDN connections(s) transferred to 5GS by performing the PDN GW initiated bearer deactivation procedure as defined in clause 5.4.4.1 of TS 23.401 [13], except the steps 4-7.

11.8.3.3 Test description

11.8.3.3.1 Pre-test conditions

- WLAN Cell 27 is configured according to TS 38.508-1 [4]

- E-UTRA Cell 1 is configured according to TS 38.508-1 [4], Table 4.4.2-3.

- E-UTRA Cell 1 and WLAN Cell 27 belong to the same PLMN and E-UTRA Cell 1 is set to '' Serving cell'', WLAN Cell 27 is set to "non-suitable cell".

UE:

- None

Preamble:

- The UE is brought to state 3E-A On E-UTRA Cell according to TS 38.508-1 [4].

11.8.3.3.2 Test procedure sequence

Table 11.8.3.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | E-UTRA Cell 1 is set “Off” cell”, WLAN Cell 27 is set to “Serving cell”. | - | - | - | - |
| 2-10 | UE performs 5GMM Registration procedure on WLAN Cell 27 by executing steps 1 to 9 of Table 4.5.2.2-3 in TS38.508-1 [4]. | - | - | - | - |
| 11 | Check: Does the UE transmit a PDU SESSION ESTABLISHMENT REQUEST on WLAN Cell 27? | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 1 | P |
| 12 | The SS establishes an IPSec child security association according to the IKEv2 specification in RFC 7296 [34] |  |  | - | - |
| 13 | The SS transmits an PDU SESSION ESTABLISHMENT ACCEPT on WLAN Cell 27. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT |  |  |

11.8.3.3.3 Specific message contents

Table 11.8.3.3.3-1: PDU SESSION ESTABLISHMENT REQUEST (step 11, Table 11.8.3.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: TS 38.508-1 [4], Table 4.7.2-1 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | The value present in Protocol configuration options in the PDN CONNECTIVITY REQUEST message on E-UTRA Cell 1 in Preamble. |  |  |

### 11.8.4 Inter-system mobility between untrusted Non-3GPP and 3GPP system/Handover from N3IWF/5GC to E-UTRAN/EPC

11.8.4.1 Test Purpose (TP)

(1)

**With** { the UE supports N1 mode and S1 mode, the UE supports IP address preservation between E-UTRAN/EPC and N3IWF/5GS, at least one PDU sessions have been established in 5GC via untrusted non-3GPP access and N3IWF, UE is in 5GMM-DEREGISTERED state and EMM-DEREGISTERED state }

**ensure that** {

**when** { UE detects WiFi becomes not suitable, attach to E-UTRAN and handover of existing PDU session from N3IWF/5GC to E-UTRAN/EPC }

**then** { UE initiates Handover Attach procedure in E-UTRAN with "Handover" indication and PDN Connection establishment with "Handover" indication }

}

11.8.4.2 Conformance requirements

References: The conformance requirements covered in the current TC are specified in: TS 23.502, clause 4.9.2.1 and TS 23.502, clause 4.11.2.2.

[TS 23.502, clause 4.9.2.1]

Clause 4.9.2.1 specifies how to hand over a UE from a source Untrusted non-3GPP access to a target 3GPP access and how a UE can handover a PDU Session from untrusted non-3GPP access to 3GPP access. It is based on the PDU Session Establishment procedure for 3GPP access as specified in clause 4.3.2.

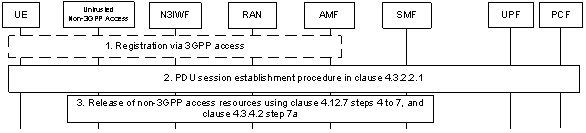


Figure 4.9.2.1-1: Handover of a PDU Session procedure from untrusted non-3GPP access to 3GPP access (non-roaming and roaming with local breakout)

1. If the UE is not registered via 3GPP access, the UE shall initiate Registration procedure as defined in clause 4.2.2.2.2.

2. The UE performs a PDU Session Establishment procedure with the PDU Session ID of the PDU Session to be moved as specified clause 4.3.2.2.1 (PDU Session Establishment for Non-roaming and Roaming with Local Breakout).

When sending the PDU Session Establishment Accept, within the N1 SM container and in the N2 SM information, the SMF shall include all QoS information (e.g. QoS Rule(s) in N1 SM container, QFI(s) and QoS Profile(s) in N2 SM information) for the QoS Flow(s) that are applicable to the PDU Session for the target access.

3. If the User Plane of the PDU Session is activated in non-3GPP access, the SMF executes the release of resources in non-3GPP access by initiating a Namf\_Communication\_N1N2MessageTransfer (to send N2 resource release request) which triggers performing steps 4 to 7 specified in clause 4.12.7, followed by step 7a/7b specified in clause 4.3.4.2 in order to release the resources over the source non-3GPP access. Because the PDU Session shall not be released, the SMF shall not send the PDU Session Release Command to the UE. Hence, in steps 4 and 7 of clause 4.12.7 as well as in step 7a of clause 4.3.4.2, the messages do not include the N1 SM container but only the N2 Resource Release Request (resp. Ack). Since the PDU Session is not to be released, the SMF shall not execute step 11 of clause 4.3.4.2 and the SM context between the AMF and the SMF is maintained.

If the User Plane of the PDU Session is deactivated in non-3GPP access, this step is skipped.

The steps 2 and 3 shall be repeated for all PDU Sessions to be moved from to untrusted non-3GPP access to 3GPP access.

If the UE is moving to the NB-IoT RAT type of 3GPP access, the PDU Session Establishment request would be rejected by AMF when the UP resources exceeds the UE's maximum number of supported UP resources as described in clause 5.4.5.2.4 of TS 24.501 [25].

[TS 23.502, clause 4.11.2.2]

The following procedure is used by UEs in single-registration or dual registration mode on mobility from 5GS to EPS.

In the case of network sharing the UE selects the target PLMN ID according to clause 5.18.3 of TS 23.501 [2].

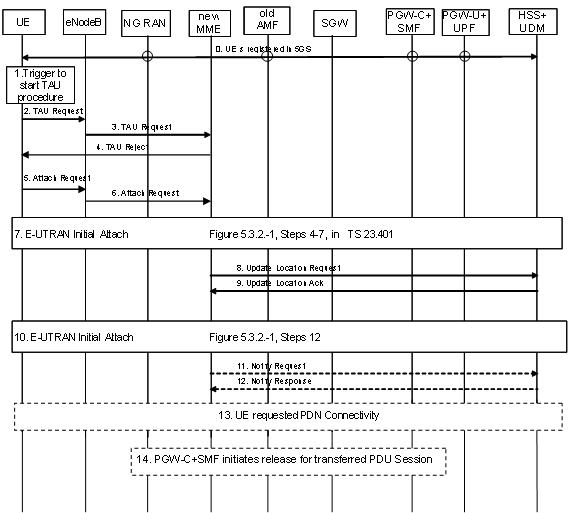


Figure 4.11.2.2-1: Mobility procedure from 5GS to EPS without N26 interface

The UE operating in single-registration mode can start the procedure from Step 1 or Step 5. The UE operating in dual-registration mode starts the procedure from Step 5.

NOTE 1: The network has indicated the "Interworking without N26" to the UE. To support IP address preservation, the UE in single-registration mode starts the procedure from Step 5. If the UE in single-registration mode starts the procedure from Step 1, the IP address preservation is not provided.

0. UE is registered in 5GS and established PDU sessions. The FQDN for the S5/S8 interface of the PGW-C+SMF is also stored in the UDM by the PGW-C+SMF during PDU Session setup in addition to what is specified in clause 4.3.2.2.1 and clause 4.3.2.2.2.

NOTE 2: At 5GS to EPS mobility, the MME use the FQDN for the S5/S8 interface of the PGW-C+SMF to find the PGW-C+SMF, and when UE moves back from EPS to 5GS, the AMF uses FQDN for the S5/S8 interface of the PGW-C+SMF to find the PGW-C+SMF.

1. Step 1 as in clause 5.3.3.1 (Tracking Area Update) in TS 23.401 [13].

2. Step 2 as in clause 5.3.3.1 (Tracking Area Update) in TS 23.401 [13] with the following modifications:

The UE shall provide a EPS-GUTI that is mapped from the 5G-GUTI following the mapping rules specified in TS 23.501 [2]. The UE indicates that it is moving from 5GC.

3. Step 3 as in clause 5.3.3.1 (Tracking Area Update) in TS 23.401 [13].

4. If the MME determined that the old node is an AMF based on UE's GUTI mapped from 5G-GUTI and the MME is configured to support 5GS-EPS interworking without N26 procedure, the MME sends a TAU Reject to the UE.

5. Step 1 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13] with the modifications captured in clause 4.11.2.4.1.

6. Step 2 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13].

7. Steps 4-7 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13], with the modifications captured in clause 4.11.2.4.1.

8. Step 8 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13], with the modifications captured in clause 4.11.2.4.1.

9. Step 11 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13], with the following modifications:

The subscription profile the MME receives from HSS+UDM includes per DNN/APN at most one PGW-C+SMF FQDN as described in in clause 5.17.2.1 in TS 23.501 [2].

10. Steps 12-24 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13], with the modifications as described in clause 4.11.2.4.1.

11. Step 25 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13].

12. Step 26 as in clause 5.3.2.1 (E-UTRAN Initial Attach) in TS 23.401 [13].

13. If the UE has remaining PDU Sessions in 5GS which it wants to transfer to EPS and maintain the same IP address/prefix, the UE performs the UE requested PDN Connectivity Procedure as specified in TS 23.401 [13] clause 5.10.2 and sets the Request Type to "handover" in Step 1 of the procedure with modification captured in clause 4.11.2.4.2. UE provides an APN and the PDU Session ID corresponding to the PDU Session it wants to transfer to EPS. The UE provides the PDU Session ID in PCO as described in clause 4.11.1.1.

UEs in single-registration mode performs this step for each PDU Session immediately after completing the E-UTRAN Initial Attach procedure. UEs in dual-registration mode may perform this step any time after the completing of E-UTRAN Initial Attach procedure. Also, UEs in dual-registration mode may perform this step only for a subset of PDU Sessions.

The MME determines the PGW-C+SMF address for the Create Session Request based on the APN received from the UE and the subscription profile received from the HSS+UDM in Step 9 or when the HSS+UDM notifies the MME for the new PGW-C+SMF ID in the updated subscription profile.

The PGW-C+SMF uses the PDU Session ID to correlate the transferred PDN connection with the PDU Session in 5GC.

As a result of the procedure the PGW-U+UPF starts routing DL data packets to the Serving GW for the default and any dedicated EPS bearers established for this PDN connection.

14. The PGW-C+SMF initiates release of the PDU Session(s) in 5GS transferred to EPS as specified in clause 4.3.4.2 with the following clarification:

In step 2, the PGW-C+SMF shall not release IP address/prefix(es) allocated for the PDU Session.

If UP connection of the PDU Session is not active, step 3b is not executed, thus the steps triggered by step 3b are not executed;

If UP connection of the PDU Session is active, the SMF invokes the Namf\_Communication\_N1N2MessageTransfer service operation without including N1 SM container (PDU Session Release Command).

11.8.4.3 Test description

11.8.4.3.1 Pre-test conditions

- WLAN Cell 27 is configured according to TS 38.508-1 [4]

- E-UTRA Cell 1 is configured according to TS 38.508-1 [4], Table 4.4.2-3.

- NR Cell 1 and WLAN Cell 27 belong to the same PLMN and WLAN Cell 27 is set to '' Serving cell'', E-UTRA Cell 1 is set to "non-suitable cell".

UE:

- None

Preamble:

- The UE is brought to state 3W-A on WLAN Cell 27 according to TS 38.508-1 [4].

11.8.4.3.2 Test procedure sequence

Table 11.8.4.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | WLAN Cell 27 is set “Off” cell”, E-UTRA Cell 1 is set to “Serving cell”. | - | - | - | - |
| 2-4 | Steps 1 to 3 of the generic test procedure described in TS36.508 [18] Table 4.5.2.3-1 in are performed on E-UTRA Cell 1. | - | - | - | - |
| 5 | Check: Does the UE transmit an ATTACH REQUEST message including a PDN CONNECTIVITY REQUEST message? | --> | RRC: RRCConnectionSetupComplete  NAS: ATTACH REQUEST  NAS: PDN CONNECTIVITY REQUEST | 1 | P |
| 6-17 | Steps 5 to 16 of the generic test procedure described in TS36.508 [18] Table 4.5.2.3-1 in are performed on E-UTRA Cell 1. | - | - | - | - |

11.8.4.3.3 Specific message contents

Table 11.8.4.3.3-1: ATTACH REQUEST (step 5, table 11.8.4.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7.2-4. | | | |
| Information Element | Value/Remark | Comment | Condition |
| NAS key set identifier | KSIASME that was created when the UE last registered to EPC E-UTRA |  |  |
| EPS mobile identity | GUTI, assigned by E-UTRA Cell 1 at the initial registration when the UE entered S1 |  |  |
| Last visited registered TAI | The TAI the last visited E-UTRA Cell belonged to, if any. Not included if the UE does not have last stored EPC TAI. |  |  |
| Old GUTI type | "Native GUTI" |  |  |
| ESM message container | PDN CONNECTIVITY REQUEST message to active PDU sessions which the UE intends to transfer to EPS. |  |  |

Table 11.8.4.3.3-2: PDN CONNECTIVITY REQUEST (Table 11.8.4.3.3-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.7.3-20 | | | |
| Information Element | Value/remark | Comment | Condition |
| EPS bearer identity | 0 | No EPS bearer identity assigned, for coding see Table 9.11.4.8.1 in TS 24.501 [22] |  |
| Procedure transaction identity | Any value from 1 to 254 |  |  |
| PDN connectivity request message identity | '1101 0000'B | PDN connectivity request |  |
| Request type | '010'B | Handover |  |
| PDN type | Any value between '001'B, '010'B, '011'B and '100'B | The allowed values are respectively IPv4, IPv6, IPv4v6 and "unused but interpreted as IPv6 by the network" |  |
| Protocol configuration options | The value used in the PDU Session request message on WLAN Cell 27 in Preamble. |  |  |

### 11.8.5 Inter-system mobility between untrusted Non-3GPP and 3GPP system/Handover from 5GS to EPC/ePDG

11.8.5.1 Test Purpose (TP)

(1)

**With** { the UE supports N1 mode and S1 mode and IP address preservation between EPC/ePDG and 5GS, at least one PDU Sessions have been established between the UE and the SMF/UPF via NG-RAN }

**ensure that** {

**when** { When UE detect cellular not available and performs a handover of existing PDU session to ePDG/EPC }

**then** { the UE shall include the CFG\_REQUEST Configuration payload containing the type of IP address, the "IDr" payload containing the APN in the Identification Data, the "IDi" payload containing the NAI, the N1\_MODE\_CAPABILITY Notify payload. }

}

11.8.5.2 Conformance requirements

[Rel-15, TS 24.302, clause 7.2.2.1]

Once the ePDG has been selected, the UE shall initiate the IPsec tunnel establishment procedure using the IKEv2 protocol as defined in IETF RFC 7296 [28] and 3GPP TS 33.402 [15].

The UE shall send an IKE\_SA\_INIT request message to the selected ePDG in order to setup an IKEv2 security association. Upon receipt of an IKE\_SA\_INIT response, the UE shall send an IKE\_AUTH request message to the ePDG, including:

- The type of IP address (IPv4 address or IPv6 prefix or both) that needs to be configured in an IKEv2 CFG\_REQUEST Configuration Payload. If the UE requests for both IPv4 address and IPv6 prefix, the UE shall send two configuration attributes in the CFG\_REQUEST Configuration Payload: one for the IPv4 address and the other for the IPv6 prefix;

- The "IDr" payload, containing the APN in the Identification Data, for non-emergency session establishment. For emergency session establishment, the UE shall format the "IDr" payload according to clause 7.2.5. The UE shall set the ID Type field of the "IDr" payload to ID\_FQDN as defined in IETF RFC 7296 [28]. The UE indicates a request for the default APN by omitting the "IDr" payload, which is in accordance with IKEv2 protocol as defined in IETF RFC 7296 [28]; and

- The "IDi" payload containing the NAI.

If the UE supports N1 mode, the UE shall indicate the PDU session ID in the IKE\_AUTH request message. If N1 mode capability is disabled, the UE may indicate the PDU session ID in the IKE\_AUTH request message.

In order to indicate the PDU session ID in the IKE\_AUTH request message, the UE shall include the N1\_MODE\_CAPABILITY Notify payload as defined in clause 8.2.9.15 in the IKE\_AUTH request message and shall:

- if the UE is establishing a PDN connection not related to any existing PDU session or any existing PDN connection, allocate a PDU session ID which is not currently being used by another PDU session over either 3GPP access or non-3GPP access, set the PDU Session ID field of the N1\_MODE\_CAPABILITY Notify payload to the allocated PDU session ID, and associate the allocated PDU session ID with the PDN connection that is being established;

if the UE is transferring an existing PDU session from 5GS, set the PDU Session ID field of the N1\_MODE\_CAPABILITY Notify payload to the PDU session ID of the existing PDU session that is being transferred, and associate the PDU session ID with the PDN connection that is being established. If the existing PDU session is a non-emergency PDU session, the UE shall in addition associate the S-NSSAI of the existing PDU session that is being transferred and the related PLMN ID with the PDN connection that is being established; or

- if the UE is transferring an existing PDN connection from EPS and a PDU session ID is associated with the PDN connection that is being transferred, set the PDU Session ID field of the N1\_MODE\_CAPABILITY Notify payload to the PDU session ID associated with the existing PDN connection. If the existing PDN connection is a non-emergency PDN connection and an S-NSSAI and a related PLMN ID are associated with the existing PDN connection, the UE shall in addition associate the S-NSSAI and the related PLMN ID with the PDN connection that is being established.

…

During the IKEv2 authentication and security association establishment for handover, the UE supporting IP address preservation for NBM, shall provide an indication about Attach Type, which indicates Handover Attach. During the IKEv2 authentication and security association establishment for transfer of an existing PDU session from 5GS, the UE shall provide an indication about Attach Type, which indicates Handover Attach. To indicate attach due to handover, the UE shall include the previously allocated home address information during the IPSec tunnel establishment. Depending on the IP version, the UE shall include either the INTERNAL\_IP4\_ADDRESS or the INTERNAL\_IP6\_ADDRESS attribute or both in the CFG\_REQUEST Configuration Payload within the IKE\_AUTH request message to indicate the home address information which is in accordance with IKEv2 protocol as defined in IETF RFC 7296 [28]. If the previously allocated home address information consists of both an IPv4 address and an IPv6 prefix, then the UE shall include the INTERNAL\_IP4\_ADDRESS attribute and the INTERNAL\_IP6\_ADDRESS attribute in the CFG\_REQUEST configuration payload within the IKE\_AUTH request message. If the previously allocated home address information consists of an IPv4 address only, then the UE shall include the INTERNAL\_IP4\_ADDRESS attribute and shall not include the INTERNAL\_IP6\_ADDRESS attribute in the CFG\_REQUEST configuration payload within the IKE\_AUTH request message. If the previously allocated home address information consists of an IPv6 prefix only, then the UE shall include the INTERNAL\_IP6\_ADDRESS attribute and shall not include the INTERNAL\_IP4\_ADDRESS attribute in the CFG\_REQUEST configuration payload within the IKE\_AUTH request message. The UE shall support IPSec ESP (see IETF RFC 4303 [32]) in order to provide secure tunnels between the UE and the ePDG as specified in 3GPP TS 33.402 [15].

…

After the successful authentication with the 3GPP AAA server, the UE receives from the ePDG an IKE\_AUTH response message containing a single CFG\_REPLY Configuration Payload including the assigned remote IP address information (IPv4 address or IPv6 prefix) as described in clause 7.4.1. Depending on the used IP mobility management mechanism the following cases can be differentiated:

- If DSMIPv6 is used for IP mobility management, the UE configures a remote IP address based on the IP address information contained in the INTERNAL\_IP4\_ADDRESS or INTERNAL\_IP6\_SUBNET attribute of the CFG\_REPLY Configuration Payload. The UE uses the remote IP address as Care-of-Address to contact the HA.

- If NBM is used for IP mobility management and the UE performs an initial attach, the UE configures a home address based on the address information from the CFG\_REPLY Configuration Payload. Otherwise, if NBM is used and the UE performs a handover attach, the UE continues to use its IP address configured before the handover, if the address information provided in the CFG\_REPLY Configuration Payload does match with the UE's IP address configured before the handover. If the UE's IP address (IPv4 address or IPv6 prefix) does not match with the address information of the CFG\_REPLY Configuration Payload, the UE shall configure a new home address based on the IP address information contained in the INTERNAL\_IP4\_ADDRESS, INTERNAL\_IP6\_SUBNET or INTERNAL\_IP6\_ADDRESS attribute of the CFG\_REPLY Configuration Payload. In the latter case, the IP address preservation is not possible.

NOTE 3: In case of IPv6 address, the UE performs the match only on the IPv6 prefix provided within the CFG\_REPLY Configuration Payload contained in the INTERNAL\_IP6\_SUBNET or INTERNAL\_IP6\_ADDRESS.

…

During the IKEv2 authentication and security association establishment, following the UE's initial IKE\_AUTH request message to the ePDG, if the UE subsequently receives an IKE\_AUTH response message from the ePDG containing the EAP-Request/AKA-Challenge, after verifying the received authentication parameters and successfully authenticating the ePDG as specified in 3GPP TS 33.402 [15], the UE shall send a new IKE\_AUTH request message to the ePDG including the EAP-Response/AKA-Challenge. In addition, the UE shall provide the requested mobile device identity if available, as specified in clause 7.2.6.

If the UE supports P-CSCF restoration extension for untrusted WLAN as specified in 3GPP TS 23.380 [66], the UE shall send its capability indication of the support of P-CSCF restoration to the ePDG by including the P-CSCF\_RESELECTION\_SUPPORT Notify payload within an IKE\_AUTH request message. The content of the P-CSCF\_RESELECTION\_SUPPORT Notify payload is described in clause 8.2.9.4.

If the UE supports N1 mode and the UE receives the N1\_MODE\_INFORMATION Notify payload as defined in clause 8.2.9.16 in the IKE\_AUTH response message, the UE shall delete the associated S-NSSAI, if any, and (re‑)associate the S-NSSAI in the S-NSSAI Value field of the N1\_MODE\_INFORMATION Notify payload with the PDU session associated with the IKEv2 security association that was established, and if the UE receives the N1\_MODE\_S\_NSSAI\_PLMN\_ID Notify payload as defined in clause 8.2.9.17 in the IKE\_AUTH response message, the UE shall delete the associated PLMN ID, if any, and (re-)associate the PLMN ID that the S-NSSAI relates to in the S-NSSAI PLMN ID field of the N1\_MODE\_S\_NSSAI\_PLMN\_ID Notify payload with the PDU session associated with the IKEv2 security association that was established.

11.8.5.3 Test description

11.8.5.3.1 Pre-test conditions

System Simulator:

- WLAN Cell 27 is configured according to TS 36.508[18], Table 4.4.8-1 with condition IMSoWLAN.

- NR Cell 1 is configured according to TS 38.508-1 [4], Table 4.4.2-3.

- NR Cell 1 is set to "Serving cell".

UE:

- The UE is configured to use IMS preconditions.

Preamble:

- The UE is brought to state 1N-A according to TS 38.508-1 [4], Table 4.4A.2-1. The UE is initially attached to the 3GPP Access network and establish at least an IMS PDU session with 5GC network.

11.8.5.3.2 Test procedure sequence

Table 11.8.5.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | NR Cell is set ”“Off” cell”， WLAN Cell is set to “Serving cell ” | - |  | - | - |
| 2 | UE associates with the WLAN AP and obtains the local IP address. | - | - | - | - |
| 3 | UE transmit a DNS Query message with QNAME set to FQDN of the ePDG | --> | DNS Query | - | - |
| 4 | The SS transmits a DNS Response message with the IP address of the ePDG. | <-- | DNS Response | - | - |
| 5 | UE transmit an IKE\_SA\_INIT request message to the ePDG | --> | IKE\_SA\_INIT Request | - | - |
| 6 | SS transmits an IKE\_SA\_INIT response message to UE | <-- | IKE\_SA\_INIT Response | - | - |
| 7 | Check: Does UE transmit an IKE\_AUTH request including the CFG\_REQUEST Configuration payload containing the type of IP address, the "IDr" payload containing the APN in the Identification Data, the "IDi" payload containing the NAI, N1\_MODE\_CAPABILITY Notify payload? | --> | IKE\_AUTH Request | 1 | P |
| 8 | The SS transmits an IKE\_AUTH Response message including an EAP-Request/AKA-Challenge. | <-- | IKE\_AUTH Response | - | - |
| 9 | UE transmit an IKE\_AUTH Request message including the EAP-Response/AKA-Challenge | --> | IKE\_AUTH Request | - | - |
| 10 | The SS transmits an IKE\_AUTH Response message including EAP-Success. | <-- | IKE\_AUTH Response | - | - |
| 11 | UE transmit an IKE\_AUTH Request message with Authentication payload. | --> | IKE\_AUTH Request | - | - |
| 12 | The SS transmits an IKE\_AUTH Response message with Authentication and Configuration payloads. | <-- | IKE\_AUTH Response | - | - |

11.8.5.3.3 Specific message contents

Table 11.8.5.3.3-1: Message DNS Query (step 3, Table 11.8.5.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: IETF RFC 1035 [56] | | | |
| Information Element | Value/remark | Comment | Condition |
| QR= | ‘0’ | Query |  |
| OPCODE= | ‘0000’ | QUERY |  |
| QNAME= | Operator provisioned FQDN of the ePDG. |  | pc\_ePDG\_FQDN\_Provisioned |
| Operator Identifier FQDN format shall be  "epdg.epc.mnc<MNC>.mcc<MCC>.pub.3gppnetwork.org" |  | pc\_ePDG\_FQDN\_constructed |
| QTYPE= | A | query for the IPv4 address | IPv4 |
| AAAA | query for the IPv6 address | IPv6 |
| QCLASS= | IN |  |  |

|  |  |
| --- | --- |
| Condition | Explanation |
| IPv4 | DNS query for IPv4 address |
| IPv6 | DNS query for IPv6 address |

Table 11.8.5.3.3-2: Message DNS Response (step 4, Table 11.8.5.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: IETF RFC 1035 [56] | | | |
| Information Element | Value/remark | Comment | Condition |
| QR= | ‘1’ | Response |  |
| OPCODE= | ‘0000’ | QUERY |  |
| QNAME= | Same as received in DNS Query |  |  |
| QTYPE= | A |  |  |
| QCLASS= | IN |  |  |
| RR { |  |  |  |
| NAME | Same as received in DNS Query |  |  |
| TYPE | Same as received in DNS Query | A for IPv4  AAAA for IPv6 |  |
| CLASS | IN |  |  |
| RDATA | IP address of ePDG |  |  |
| } |  |  |  |

Table 11.8.5.3.3-2A: IKE\_AUTH request (step 7, Table 11.8.5.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: 36.508 table 4.7G-3 | | | |
| Information Element | Value/remark | Comment | Condition |
| IKE Header |  |  |  |
| Next Payload | ‘00101111’B | CP |  |
| Exchange Type | ‘00100011’B | IKE\_AUTH |  |
| Configuration Payload |  |  |  |
| Next Payload | ‘00000000’B | Notify payload |  |
| CFG Type | ‘00000001’B | CFG\_REQUEST |  |
| Attribute Type | ‘00000001’B | INTERNAL\_IP4\_ADDRESS | IPv4 |
| IPv4 Address | Previously allocated IPv4 address in cellular network |  | IPv4 |
| Attribute Type | ‘00001000’B | INTERNAL\_IP6\_ADDRESS | IPv6 |
| IPv6 Address | Previously allocated IPv6 address in cellular network |  | IPv6 |
| Attribute Type | ‘00010100’B | P\_CSCF\_IP4\_ADDRESS | IPv4 |
| IPv4 Address | Not checked |  | IPv4 |
| Attribute Type | ‘00010101’B | P\_CSCF\_IP6\_ADDRESS | IPv6 |
| IPv6 Address | Not checked |  | IPv6 |
| Notify payload | ‘000101001’B |  |  |
| Next Payload | ‘00100100’B | IDr payload |  |
| Notify Message Type | ‘1100011101000111’B | N1\_MODE\_CAPABILITY Notify payload |  |
| PDU Session ID | PDU Session ID of the transferred PDU session from 5GC |  |  |
| IDr payload | ‘00100100’B |  |  |
| Next Payload | ‘00100011’B | IDi payload |  |
| ID Type | ‘00000010’B | ID\_FQDN |  |
| Identification Data | APN |  |  |
| IDi payload | ‘00100011’B |  |  |
| Next Payload | ‘00000000’B | No Next Payload if Notify payload is the last payload |  |
| ID Type | ‘00000011’B | NAI |  |
| Identification Data | Not checked |  |  |
| NOTE 1: The order of Payloads/fields is not checked, unless explicitly specified. Additional Payloads/fields are ignored. | | | |

|  |  |
| --- | --- |
| Condition | Explanation |
| IPv4 | If the UE requests an IPv4 address |
| IPv6 | If the UE requests an IPv6 address |
| NOTE: At least one of IPv4 and IPv6 shall be true. | |

Table 11.8.5.3.3-2B: IKE\_AUTH request (step 9, Table 11.8.5.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: 36.508 table 4.7G-3 | | | |
| Information Element | Value/remark | Comment | Condition |
| IKE Header |  |  |  |
| Next Payload | ‘00110000’B | EAP |  |
| Exchange Type | ‘00100011’B | IKE\_AUTH |  |
| Extensible Authentication Payload |  |  |  |
| Next Payload | ‘00000000’B | No Next Payload if EAP is the last payload |  |
| Code | ‘00000010’B | Response |  |
| Identifier | Not checked |  |  |
| Type | Not checked |  |  |
| Type\_Data | Not checked |  |  |
| NOTE 1: The order of Payloads/fields is not checked, unless explicitly specified. Additional Payloads/fields are ignored. | | | |

Table 11.8.5.3.3-3: IKE\_AUTH request (step 11, Table 11.8.5.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: 36.508 table 4.7G-3 | | | |
| Information Element | Value/remark | Comment | Condition |
| IKE Header |  |  |  |
| Next Payload | ‘00101111’B | AUTH |  |
| Exchange Type | ‘00100011’B | IKE\_AUTH |  |
| Authentication Payload |  |  |  |
| Next Payload | ‘00000000’B | No Next Payload if AUTH is the last payload |  |
| Authentication Method | Not checked |  |  |
| Authentication Data | Not checked |  |  |
| NOTE 1: The order of Payloads/fields is not checked, unless explicitly specified. Additional Payloads/fields are ignored. | | | |

Table11.8.5.3.3-4: IKE\_AUTH response (step 12, Table 11.8.5.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation path: 36.508 table 4.7G-4 | | | |
| Information Element | Value/remark | Comment | Condition |
| IKE Header |  |  |  |
| Next Payload | ‘00101111’B | CP |  |
| Exchange Type | ‘00100011’B | IKE\_AUTH |  |
| Configuration Payload |  |  |  |
| Next Payload | Set by the SS |  |  |
| CFG Type | ‘00000010’B | CFG\_REPLY |  |
| Attribute Type | ‘00000001’B | INTERNAL\_IP4\_ADDRESS | IPv4 |
| IPv4 Address | Previously allocated IPv4 address in cellular network |  | IPv4 |
| Attribute Type | ‘00001000’B | INTERNAL\_IP6\_ADDRESS | IPv6 |
| IPv6 Address | Previously allocated IPv6 address in cellular network |  | IPv6 |
| Attribute Type | ‘00010100’B | P\_CSCF\_IP4\_ADDRESS |  |
| IPv4 Address | Set by the SS |  |  |
| Attribute Type | ‘00010101’B | P\_CSCF\_IP6\_ADDRESS |  |
| IPv6 Address | Set by the SS |  |  |

|  |  |
| --- | --- |
| Condition | Explanation |
| IPv4 | If the UE requested an IPv4 address |
| IPv6 | If the UE requested an IPv6 address |

### 11.8.6 Inter-system mobility between untrusted Non-3GPP and 3GPP system/Handover from EPC/ePDG to 5GS/ UE in 5GMM-DEREGISTERED and EMM-DEREGISTERED states

11.8.6.1 Test Purpose (TP)

(1)

**With** { the UE supports N1 mode and S1 mode and supports IP address preservation between EPC/ePDG and 5GS, at least one PDN Connections have been established between the UE and the EPC/ePDG via untrusted non-3GPP, UE is in 5GMM-DEREGISTERED state and EMM-DEREGISTERED state }

**ensure that** {

**when** { UE detects WiFi becomes not suitable, performs Registration procedure and handover of existing PDU session from ePDG/EPC to 5GC }

**then** { the UE includes the "Existing PDU Session" indication and the DNN, the PDU Session ID corresponding to the existing PDN connection it wants to transfer from EPC/ePDG to 5GS during the PDU session establishment }

11.8.6.2 Conformance requirements

[Rel-15, TS 23.502, clause 4.11.4.1]

Handover from EPC/ePDG to 5GS



Figure 4.11.4.1-1: Handover from EPC/ePDG to 5GS

0. Initial status: one or more PDN Connections have been established between the UE and the EPC/ePDG via untrusted non-3GPP access as specified in clauses 7.2.4 and 7.6.3 of TS 23.402 [26] with modification described in clauses 4.11.4.3.3 and 4.11.4.3.5.

1. For the UE to move its PDU session(s) from EPC/ePDG to 5GC/3GPP access, the UE is not registered in 5GS via 3GPP access, the UE performs Registration procedure of type initial registration in 5GS via 3GPP access as described in clause 4.2.2.2 of TS 23.502.

2. The UE initiates a UE requested PDU Session Establishment via 3GPP Access according to clause 4.3.2.2 and includes the "Existing PDU Session" indication and the PDU Session ID.

For Request Type "Existing PDU Session", the UE provides a DNN, the PDU Session ID and S-NSSAI corresponding to the existing PDN connection it wants to transfer from EPC/ePDG to 5GS. The S-NSSAI and PLMN ID sent to the UE are set in the same way as for EPS to 5GS mobility as specified in clause 5.15.7.1 of TS 23.501 [2].

If the Request Type indicates "Existing Emergency PDU Session", the AMF shall use the Emergency Information containing SMF+PGW-C FQDN for the S2b interface it has received from the HSS+UDM. The SMF+PGW-C FQDN was sent by PGW-C when the Emergency PDN connection was established in EPC via ePDG and the AMF shall use the S-NSSAI locally configured in Emergency Configuration Data.

3. The combined PGW+SMF/UPF initiates a PDN GW initiated Resource Allocation Deactivation with GTP on S2b as described in clause 7.9.2 of TS 23.402 [26] to release the EPC and ePDG resources when S6b is used. When S6b is not used between SMF+PGW-C and AAA, impacts to step 5 of TS 23.402 [26] Figure 7.9.2-1 are captured in clause 4.11.4.3.6.

[Rel-15, TS 23.502, clause 4.2.2.2]

Registration procedures General

A UE needs to register with the network to get authorized to receive services, to enable mobility tracking and to enable reachability. The UE initiates the Registration procedure using one of the following Registration types:

-Initial Registration to the 5GS;

-Mobility Registration Update upon changing to a new Tracking Area (TA) outside the UE's Registration Area in both CM-CONNECTED and CM-IDLE state, or when the UE needs to update its capabilities or protocol parameters that are negotiated in Registration procedure with or without changing to a new TA, a change in the UE's Preferred Network Behaviour that would create an incompatibility with the Supported Network Behaviour provided by the serving AMF, or when the UE intends to retrieve LADN Information, or with NR satellite access upon changing to a suitable cell indicating multiple TAs for the RPLMN all of which are outside the UE's Registration Area in both CM-CONNECTED and CM-IDLE state, or when the Multi-USIM UE needs a new 5G-GUTI assignment; or

-Periodic Registration Update (due to a predefined time period of inactivity); or

-Emergency Registration; or

-Disaster Roaming Initial Registration, as specified in clause 5.40 of TS 23.501 [2]; or

-Disaster Roaming Mobility Registration Update, as specified in clause 5.40 of TS 23.501 [2]; or

-SNPN Onboarding Registration allows the UE to access an ON-SNPN for the purpose of provisioning the UE with SO-SNPN credentials to enable SO-SNPN access. SNPN Onboarding Registration is only applicable for registration with ON-SNPN i.e. when the UE uses PLMN credentials for accessing an ONN the UE initiates an Initial Registration. The SNPN Onboarding Registration is specified in clause 4.2.2.2.4.

[Rel-15, TS 23.502, clause 4.3.2.2]

UE Requested PDU Session Establishment

PDU Session establishment. The procedure is used to:

-Establish a new PDU Session;

-Handover a PDN Connection in EPS to PDU Session in 5GS without N26 interface;

-Switching an existing PDU Session between non-3GPP access and 3GPP access. The specific system behaviour in this case is further defined in clauses 4.9.2 and 4.9.3; or

-Request a PDU Session for Emergency services.

The Request Type indicates "Existing PDU Session" if the request refers to an existing PDU Session switching between 3GPP access and non-3GPP access or to a PDU Session handover from an existing PDN connection in EPC. If the request refers to an existing PDN connection in EPC, the S-NSSAI is set as described in clause 5.15.7.2 of TS 23.501 [2]

[Rel-15, TS 23.402, clause 7.9.2-1]

PDN GW initiated Resource Allocation Deactivation with GTP on S2b

This procedure can be used to deactivate a dedicated bearer or deactivate all bearers belonging to a PDN address, for example, due to IP CAN session modification requests from the PCRF or due to handover from Non-3GPP to 3GPP access. If the default bearer belonging to a PDN connection is deactivated, the PDN GW deactivates all bearers belonging to the PDN connection.

When it is performed for a handover, the connections associated with the PDN address are released, but the PDN address is kept in the PDN GW.

1. The PDN GW initiated Resource Allocation Deactivation can also be triggered during handovers from Non-3GPP to 3GPP.

2. The PDN GW sends a Delete Bearer Request message (EPS Bearer Identity or Linked EPS Bearer Identity, Cause) to the ePDG. The Linked EPS Bearer Identity shall be present and set to the identity of the default bearer associated with the PDN connection if the PDN GW requests to release all the bearers of the PDN connection. Otherwise, the EPS Bearer Identity shall be present and set to the identity of the dedicated S2b bearer(s) to release if the PDN GW requests to deactivate dedicated S2b bearer(s).

3a. If the PDN connection has multiple active S2b bearers, and the ePDG maintained a binding with a IPsec SA for the S2b bearer that is being released, then it shall use the IKEv2 INFORMATIONAL exchange with Delete Payloads, as defined in [9], to remove the IPsec SA between ePDG and UE over SWu for the deactivated S2b bearer. Otherwise, the IKEv2 tunnel release is triggered from the ePDG if all bearers belonging to the PDN connection are released.

3b. The resources may be released in the non-3GPP IP access according to the conditions in step 3a.

4. The ePDG deletes the bearer contexts related to the Delete Bearer Request, and acknowledges the bearer deactivation to the PDN GW by sending a Delete Bearer Response (EPS Bearer Identity, User Location Information) message.

5. In the case where the resources corresponding to the PDN connection are released in PDN GW, the PDN GW informs the 3GPP AAA Server of the PDN disconnection. If the UE no longer has any context in the 3GPP AAA Server, the 3GPP AAA Server notifies the HSS as described in clause 12.1.2.

6. The PDN GW deletes the bearer context related to the deactivated EPS bearer. If the dedicated bearer deactivation procedure was triggered by receiving a PCC decision message from the PCRF, the PDN GW indicates to the PCRF whether the requested PCC decision was successfully enforced by completing the PCRF-initiated IP CAN Session Modification procedure or the PCEF initiated IP-CAN Session Modification procedure as defined in TS 23.203 [19], proceeding after the completion of IP CAN bearer signalling. If requested by the PCRF, the PDN GW forwards to the PCRF following information extracted from User Location Information it may have received from the ePDG.

11.8.6.3 Test description

11.8.6.3.1 Pre-test conditions

System Simulator:

- WLAN Cell 27 is configured according to Table 4.4.8-1 in TS 36.508[7] with condition IMSoWLAN.

- NR Cell 1 is configured according to table 6.3.2.2-1 in TS 38.508-1[4].

- WLAN Cell 27 is set to "Serving cell", NR Cell 1 is set to "non-suitable cell".

UE:

- The UE can establish an ePDG Tunnel and register onto IMS network.

Preamble:

- The UE accesses the EPC network through the ePDG, and registers to IMS, as defined in TS 36.508[7] clause 4.5A.23.

11.8.6.3.2 Test procedure sequence

Table 11.8.6.3.2-1: Main behaviour

| St | Procedure | Message Sequence | | TP | Verdict |
| --- | --- | --- | --- | --- | --- |
|  |  | U - S | Message |  |  |
| 1 | NR Cell is set to “serving cell”, WLAN Cell is set to “Off cell”. | - | - | - | - |
| 2-16 | The UE performs the registration procedure by executing steps 1-15 of table 4.5.2.2-2 in TS 38.508-1 [4], registration type is initial registration. | - | - | - | - |
| 17 | Check: Does UE transmit an UL *NAS TRANSPORT* message including the PDU Session Type of Existing PDU Session, DNN, PDU Session ID? | --> | NR RRC: *ULInformationTransfer*  5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | 1 | P |
| 18 | The SS transmits an *RRCReconfiguration* message containing a PDU SESSIONSTABLISHMENT E ACCEPT message. | <-- | NR RRC: *RRCReconfiguration*  5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |
| 19 | The UE transmits an *RRCReconfigurationComplete* message. | --> | NR RRC: *RRCReconfigurationComplete* | - | - |
| 20 | IMS re-registration on NR as specified in TS 34.229-5 [41], annex A.12, takes place. | - | - | - | - |
| 21 | EPC and ePDG resource release | - | - | - | - |

11.8.6.3.3 Specific message contents

Table 11.8.6.3.3-1: UL NAS TRANSPORT (step 17, Table 11.8.6.3.2-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 clause 4.7.1 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDU session ID | PDU Session ID of the transferred PDU Session from EPC |  |  |
| Request type | ‘010’ | Existing PDU session |  |
| DNN | IMS |  |  |

## 11.9 Inter-system mobility with established MA PDU session in 5GS

### 11.9.1 Inter-system mobility with established MA PDU session in 5GS/ATSSS/Single-registration mode with N26/establishing a PDN connection as the user plane resource of an MA PDU session is supported/Handover from NR/5GC to E-UTRAN/EPC

11.9.1.1 Test Purpose (TP)

(1)

**with** { UE is registered over 3GPP and non-3GPP access connected to 5GC and UE indicates its support of establishing a PDN connection as the user plane resource of an MA PDU session during the MA PDU session establishment procedure }

**ensure that** {

**when** { UE detects a suitable EPC E-UTRA cell after the serving NGC cell becomes not suitable }

**then** { UE performs a Inter-system change from N1 mode to S1 mode by initiating and successfully completing a TAU procedure, mapped EPC context used and MA PDU session over non-3GPP access was kept }

}

11.9.1.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clauses 4.8.2.3, 6.4.1.2 and TS 24.193 clause 4.6. Unless otherwise stated these are Rel-17 requirements.

[TS 24.501, clause 4.8.2.3]

At inter-system change from N1 mode to S1 mode in EMM-IDLE mode when:

a) the UE supports non-IP PDN type and at least one PDU session of Unstructured PDU session type is active;

b) the UE supports IPv4 PDN type and at least one PDU session of IPv4 PDU session type is active;

c) the UE supports IPv6 PDN type and at least one PDU session of IPv6 PDU session type is active;

d) the UE supports IPv4v6 PDN type and at least one PDU session of IPv4v6 PDU session type is active; or

e) at least one PDU session of Ethernet PDU session type is active and:

1) the UE supports non-IP PDN type; or

2) the UE and the network support Ethernet PDN type in S1 mode;

the UE shall proceed as follows:

a) if the UE supports sending an ATTACH REQUEST message containing a PDN CONNECTIVITY REQUEST message with request type set to "handover" or "handover of emergency bearer services" to transfer a PDU session from N1 mode to S1 mode and the UE has received an "interworking without N26 interface supported" indication from the network, the UE shall:

1) enter substates EMM-DEREGISTERED.NORMAL-SERVICE and 5GMM- DEREGISTERED.NO-CELL-AVAILABLE for 3GPP access;

2) map the PDU session(s) which the UE intends to transfer to EPS to the default EPS bearer context of the corresponding PDN connection(s) as specified in subclause 6.1.4.2; and

3) initiate an EPS attach procedure and include in the ATTACH REQUEST message a PDN CONNECTIVITY REQUEST message with:

- the request type set to "handover of emergency bearer services" to activate a default EPS bearer context for an active emergency PDU session, if the session to be transferred is an emergency PDU session; or

- the request type set to "handover" message to activate a default EPS bearer context for an active non-emergency PDU session, if the session to be transferred is a non-emergency PDU session. If the selected PDU session is an MA PDU session established over 3GPP access, the UE shall include the ATSSS request parameter in the Protocol configuration options IE or the Extended protocol configuration options IE of the ESM INFORMATION RESPONSE message.

…

After having successfully registered in N1 mode over 3GPP access, the UE shall reset the registration attempt counter for 3GPP access, and the attach attempt counter or tracking area updating attempt counter (see 3GPP TS 24.301 [15]) and:

a) if the UE supports the PDU session establishment procedure with request type set to "existing PDU session" or "existing emergency PDU session" to transfer a PDN connection from S1 mode to N1 mode and the UE has received an "interworking without N26 interface supported" indication from the network, attempt to transfer the PDN connection(s) which the UE intends to transfer to 5GS, if any, from S1 mode to N1 mode by:

- if the PDN connection which the UE intends to transfer is a PDN connection for emergency bearer services, initiating the PDU session establishment procedure with request type set to "existing emergency PDU session" to transfer the PDN connection for emergency bearer services; and

- if the PDN connection which the UE intends to transfer is a non-emergency PDN connection, initiating the PDU session establishment procedure with request type set to:

1) "MA PDU request", if the PDN connection to be transferred is a user-plane resource of an MA PDU session; or

2) "existing PDU session" to transfer the non-emergency PDN connection; and

b) otherwise, establish PDU session(s) corresponding to the PDN connection(s) which the UE intends to transfer to 5GS, if any, by initiating the PDU session establishment procedure with request type set to "initial request".

See subclause 5.1.4.3 for coordination between 5GMM and EMM and subclause 6.1.4.2 for coordination between 5GSM and ESM.

[TS 24.501, clause 6.4.1.2]

In order to initiate the UE-requested PDU session establishment procedure, the UE shall create a PDU SESSION ESTABLISHMENT REQUEST message.

…

If the UE requests to establish a new MA PDU session and the UE supports to establish a PDN connection as the user plane resource of an MA PDU session, the UE shall include the ATSSS request parameter in the Extended protocol configuration options IE of the PDU SESSION ESTABLISHMENT REQUEST message.

[TS 24.193, clause 4.6]

In the network supporting N26 interface:

a) if the UE established an MA PDU session over non-3GPP access only, no EPS bearer identity can be assigned to any QoS flow of the MA PDU session as specified in 3GPP TS 23.502 [3];

b) if the UE established an MA PDU session over 3GPP access and non-3GPP access and the user plane of the MA PDU session over 3GPP access is released, the EPS bearer identity assigned for the MA PDU session can be revoked as specified in 3GPP TS 23.502 [3];

c) for an inter-system change from N1 mode to S1 mode:

1) if the UE established an MA PDU session over 3GPP access only, the UE follows the procedure as specified in clause 6.1.4.1 of 3GPP TS 24.501 [6]; or

2) if the UE established an MA PDU session over 3GPP access and non-3GPP access, the UE follows the procedure as specified in clause 6.1.4.1 of 3GPP TS 24.501 [6], and

A) if the MA PDU session is transferred to EPS as a PDN connection and the UE did not indicate its support of establishing a PDN connection as the user plane resource of an MA PDU session during the MA PDU session establishment procedure as specified in clause 6.4.1.2 of 3GPP TS 24.501 [6], the SMF can initiate the network-requested PDU session release procedure over non-3GPP access as specified in clause 6.3.3.2 of 3GPP TS 24.501 [6] or perform a local release of the MA PDU session. The UE performs a local release of the MA PDU session over 3GPP access and non-3GPP access;

NOTE 1: If the UE receives from the network a PDU SESSION RELEASE COMMAND message which indicates to release the MA PDU session over non-3GPP access and the UE has already performed or is performing a local release of the MA PDU session, the error handling as specified in clause 6.3.3.6 of 3GPP TS 24.501 [6] is applied.

NOTE 2: The QoS flow(s) with EBI assigned over non-3GPP access is also transferred to the corresponding PDN connection.

B) if the MA PDU session is transferred to EPS as a PDN connection and the UE indicated its support of establishing a PDN connection as the user plane resource of an MA PDU session during the MA PDU session establishment procedure as specified in clause 6.4.1.2 of 3GPP TS 24.501 [6], the SMF can keep the MA PDU session over non-3GPP access; or

C) if the MA PDU session is not transferred to EPS as a PDN connection and the SMF decides to move the traffic of the MA PDU session from 3GPP access to non-3GPP access, the SMF can initiate the network-requested PDU session modification procedure as specified in clause 6.3.2.2 of 3GPP TS 24.501 [6]; and

d) for an inter-system change from S1 mode to N1 mode, if the UE requests an MA PDU session or the related URSP or UE local configuration does not mandate that the PDU session is established over a single access when transferring the PDN connection to 3GPP access, the PDN connection can be converted by the network to an MA PDU session via the UE-requested PDU session modification procedure (see clause 5.2.5).

11.9.1.3 Test Description

11.9.1.3.1 Pre-test conditions

System Simulator:

- WLAN Cell 27 is configured according to TS 38.508-1[4], clause.4.1.3.1.

- NR Cell 1 is configured according to TS 38.508-1 [4].

- E-UTRA Cell 1 is configured to TS 36.508 [7].

- NR Cell 1, WLAN Cell 27 and E-UTRA Cell 1 belong to the same PLMN and both NR Cell 1 and WLAN cell 27 are set to '' Serving cell''. E-UTRA Cell 1 is set to "non-suitable cell".

UE:

- UE is registered over both 3GPP access and non-3GPP access to 5GC in the same PLMN.

Preamble:

- UE is brought to state 3W-A and state 3N-A with UE test loop mode B active according to TS 38.508-1 [4].

11.9.1.3.2 Test procedure sequence

Table 11.9.1.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **St** | **Procedure** | **Message Sequence** | | **TP** | **Verdict** |
|  |  | **U - S** | **Message** |  |  |
| 1 | Cause the UE to request to establish an MA PDU session by MMI or AT command. | - | - | - | - |
| - | EXCEPTION: In parallel to the events described in steps 2-3 below the events specified in Table 10.4.2.2.3.2-2 may take place. | - | - | - | - |
| 2 | The UE transmits a PDU SESSION ESTABLISHMENT REQUEST message and sets the request type to "MA PDU request" in the UL NAS TRANSPORT message, include the ATSSS request parameter in the Extended protocol configuration options IE and sets the ATSSS-ST bits in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message according to the ATSSS functionality and steering mode that UE supports on NR Cell 1  Note: PDU SESSION ESTABLISHMENT REQUEST is included in UL NAS transport. UL NAS transport message is included in dedicatedNAS-Message of *ULInformationTransfer* message. | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | - | - |
| 3 | The SS transmits a PDU SESSION ESTABLISHMENT ACCEPT on NR cell 1. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |
| 4 | NR Cell 1 is set "Non-suitable cell”, E-UTRA Cell 1 is set to “Serving cell”. | - | - | - | - |
| 5 | The UE performs on the E-UTRA Cell 1 the TAU procedure for Inter-system change from N1 mode to S1 mode in 5GMM/EMM-IDLE mode as described in TS 38.508-1 [4], Table 4.9.7.2.2-1, 'connected without release'? | - | - | - | - |
| 6 | The SS transmits one IP Packet on MA PDU session established on WLAN Cell 27. | <-- | IP packet | - | - |
| 7 | Check: Does the UE loop back the IP Packet? | - | - | 1 | P |

Table 11.9.1.3.2-2: Parallel behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **St** | **Procedure** | **Message Sequence** | | **TP** | **Verdict** |
|  |  | **U - S** | **Message** |  |  |
| 1 | The UE transmits a PDU SESSION ESTABLISHMENT REQUEST message and sets the request type to "MA PDU request" in the UL NAS TRANSPORT message, include the ATSSS request parameter in the Extended protocol configuration options IE and sets the ATSSS-ST bits in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message according to the ATSSS functionality and steering mode that UE supports on WLAN Cell 27.  Note: PDU SESSION ESTABLISHMENT REQUEST is included in UL NAS transport. UL NAS transport message is included in dedicatedNAS-Message of *ULInformationTransfer* message. | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | - | - |
| 2 | The SS transmits an PDU SESSION ESTABLISHMENT ACCEPT on WLAN Cell 27. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT |  |  |

11.9.1.3.3 Specific message contents

FFS

### 11.9.2 Inter-system mobility with established MA PDU session in 5GS/ATSSS/Single-registration mode with N26/establishing a PDN connection as the user plane resource of an MA PDU session is not supported/Handover from NR/5GC to E-UTRAN/EPC/

11.9.2.1 Test Purpose (TP)

(1)

**with** { UE is registered over 3GPP and non-3GPP access connected to 5GC and UE did not include the ATSSS request parameter in the Extended protocol configuration options IE during the MA PDU session establishment procedure }

**ensure that** {

**when** { UE detects a suitable EPC E-UTRA cell after the serving NGC cell becomes not suitable }

**then** { UE performs a local release of the MA PDU session over 3GPP access and non-3GPP access and enters 5GMM-IDLE state }

}

11.9.2.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clauses 4.8.2.3, 6.4.1.2 and TS 24.193 clause 4.6. Unless otherwise stated these are Rel-17 requirements.

[TS 24.501, clause 4.8.2.3]

At inter-system change from N1 mode to S1 mode in EMM-IDLE mode when:

a) the UE supports non-IP PDN type and at least one PDU session of Unstructured PDU session type is active;

b) the UE supports IPv4 PDN type and at least one PDU session of IPv4 PDU session type is active;

c) the UE supports IPv6 PDN type and at least one PDU session of IPv6 PDU session type is active;

d) the UE supports IPv4v6 PDN type and at least one PDU session of IPv4v6 PDU session type is active; or

e) at least one PDU session of Ethernet PDU session type is active and:

1) the UE supports non-IP PDN type; or

2) the UE and the network support Ethernet PDN type in S1 mode;

the UE shall proceed as follows:

a) if the UE supports sending an ATTACH REQUEST message containing a PDN CONNECTIVITY REQUEST message with request type set to "handover" or "handover of emergency bearer services" to transfer a PDU session from N1 mode to S1 mode and the UE has received an "interworking without N26 interface supported" indication from the network, the UE shall:

1) enter substates EMM-DEREGISTERED.NORMAL-SERVICE and 5GMM- DEREGISTERED.NO-CELL-AVAILABLE for 3GPP access;

2) map the PDU session(s) which the UE intends to transfer to EPS to the default EPS bearer context of the corresponding PDN connection(s) as specified in subclause 6.1.4.2; and

3) initiate an EPS attach procedure and include in the ATTACH REQUEST message a PDN CONNECTIVITY REQUEST message with:

- the request type set to "handover of emergency bearer services" to activate a default EPS bearer context for an active emergency PDU session, if the session to be transferred is an emergency PDU session; or

- the request type set to "handover" message to activate a default EPS bearer context for an active non-emergency PDU session, if the session to be transferred is a non-emergency PDU session. If the selected PDU session is an MA PDU session established over 3GPP access, the UE shall include the ATSSS request parameter in the Protocol configuration options IE or the Extended protocol configuration options IE of the ESM INFORMATION RESPONSE message.

…

After having successfully registered in N1 mode over 3GPP access, the UE shall reset the registration attempt counter for 3GPP access, and the attach attempt counter or tracking area updating attempt counter (see 3GPP TS 24.301 [15]) and:

a) if the UE supports the PDU session establishment procedure with request type set to "existing PDU session" or "existing emergency PDU session" to transfer a PDN connection from S1 mode to N1 mode and the UE has received an "interworking without N26 interface supported" indication from the network, attempt to transfer the PDN connection(s) which the UE intends to transfer to 5GS, if any, from S1 mode to N1 mode by:

- if the PDN connection which the UE intends to transfer is a PDN connection for emergency bearer services, initiating the PDU session establishment procedure with request type set to "existing emergency PDU session" to transfer the PDN connection for emergency bearer services; and

- if the PDN connection which the UE intends to transfer is a non-emergency PDN connection, initiating the PDU session establishment procedure with request type set to:

1) "MA PDU request", if the PDN connection to be transferred is a user-plane resource of an MA PDU session; or

2) "existing PDU session" to transfer the non-emergency PDN connection; and

b) otherwise, establish PDU session(s) corresponding to the PDN connection(s) which the UE intends to transfer to 5GS, if any, by initiating the PDU session establishment procedure with request type set to "initial request".

See subclause 5.1.4.3 for coordination between 5GMM and EMM and subclause 6.1.4.2 for coordination between 5GSM and ESM.

[TS 24.501, clause 6.4.1.2]

In order to initiate the UE-requested PDU session establishment procedure, the UE shall create a PDU SESSION ESTABLISHMENT REQUEST message.

…

If the UE requests to establish a new MA PDU session and the UE supports to establish a PDN connection as the user plane resource of an MA PDU session, the UE shall include the ATSSS request parameter in the Extended protocol configuration options IE of the PDU SESSION ESTABLISHMENT REQUEST message.

[TS 24.193, clause 4.6]

In the network supporting N26 interface:

a) if the UE established an MA PDU session over non-3GPP access only, no EPS bearer identity can be assigned to any QoS flow of the MA PDU session as specified in 3GPP TS 23.502 [3];

b) if the UE established an MA PDU session over 3GPP access and non-3GPP access and the user plane of the MA PDU session over 3GPP access is released, the EPS bearer identity assigned for the MA PDU session can be revoked as specified in 3GPP TS 23.502 [3];

c) for an inter-system change from N1 mode to S1 mode:

1) if the UE established an MA PDU session over 3GPP access only, the UE follows the procedure as specified in clause 6.1.4.1 of 3GPP TS 24.501 [6]; or

2) if the UE established an MA PDU session over 3GPP access and non-3GPP access, the UE follows the procedure as specified in clause 6.1.4.1 of 3GPP TS 24.501 [6], and

A) if the MA PDU session is transferred to EPS as a PDN connection and the UE did not indicate its support of establishing a PDN connection as the user plane resource of an MA PDU session during the MA PDU session establishment procedure as specified in clause 6.4.1.2 of 3GPP TS 24.501 [6], the SMF can initiate the network-requested PDU session release procedure over non-3GPP access as specified in clause 6.3.3.2 of 3GPP TS 24.501 [6] or perform a local release of the MA PDU session. The UE performs a local release of the MA PDU session over 3GPP access and non-3GPP access;

NOTE 1: If the UE receives from the network a PDU SESSION RELEASE COMMAND message which indicates to release the MA PDU session over non-3GPP access and the UE has already performed or is performing a local release of the MA PDU session, the error handling as specified in clause 6.3.3.6 of 3GPP TS 24.501 [6] is applied.

NOTE 2: The QoS flow(s) with EBI assigned over non-3GPP access is also transferred to the corresponding PDN connection.

B) if the MA PDU session is transferred to EPS as a PDN connection and the UE indicated its support of establishing a PDN connection as the user plane resource of an MA PDU session during the MA PDU session establishment procedure as specified in clause 6.4.1.2 of 3GPP TS 24.501 [6], the SMF can keep the MA PDU session over non-3GPP access; or

C) if the MA PDU session is not transferred to EPS as a PDN connection and the SMF decides to move the traffic of the MA PDU session from 3GPP access to non-3GPP access, the SMF can initiate the network-requested PDU session modification procedure as specified in clause 6.3.2.2 of 3GPP TS 24.501 [6]; and

d) for an inter-system change from S1 mode to N1 mode, if the UE requests an MA PDU session or the related URSP or UE local configuration does not mandate that the PDU session is established over a single access when transferring the PDN connection to 3GPP access, the PDN connection can be converted by the network to an MA PDU session via the UE-requested PDU session modification procedure (see clause 5.2.5).

11.9.2.3 Test Description

11.9.2.3.1 Pre-test conditions

System Simulator:

- WLAN Cell 27 is configured according to TS 38.508-1[4], clause.4.1.3.1.

- NR Cell 1 is configured according to TS 38.508-1 [4].

- E-UTRA Cell 1 is configured to TS 36.508 [7].

- NR Cell 1, WLAN Cell 27 and E-UTRA Cell 1 belong to the same PLMN and both NR Cell 1 and WLAN cell 27 are set to '' Serving cell''. E-UTRA Cell 1 is set to "non-suitable cell".

UE:

- UE is registered over both 3GPP access and non-3GPP access to 5GC in the same PLMN.

Preamble:

- The UE is brought to state 3W-A and state 3N-A active according to TS 38.508-1 [4].

11.9.2.3.2 Test procedure sequence

Table 11.9.2.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | Cause the UE to request to establish an MA PDU session by MMI or AT command. | - | - | - | - |
| - | EXCEPTION: In parallel to the events described in steps 2-3 below the events specified in Table 10.4.2.2.3.2-2 may take place. | - | - | - | - |
| 2 | The UE transmits a PDU SESSION ESTABLISHMENT REQUEST message and sets the request type to "MA PDU request" in the UL NAS TRANSPORT message, sets the ATSSS-ST bits in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message according to the ATSSS functionality and steering mode that UE supports on NR Cell 1  Note: PDU SESSION ESTABLISHMENT REQUEST is included in UL NAS transport. UL NAS transport message is included in dedicatedNAS-Message of *ULInformationTransfer* message. | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | - | - |
| 3 | The SS transmits a PDU SESSION ESTABLISHMENT ACCEPT on NR cell 1. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |
| 4 | The SS transmits an *RRCRelease* message | <-- | NR RRC:*RRCRelease* | - | - |
| 5 | NR Cell 1 is set "Non-suitable cell”, E-UTRA Cell 1 is set to “Serving cell”. | - | - | - | - |
| - | The following messages are sent and shall be received on Eutra cell 1 | - | - | - | - |
| 6 | The UE transmits an *RRCConnectionRequest* message. | --> | RRC: *RRCConnectionRequest* |  |  |
| 7 | SS transmits an *RRCConnectionSetup* message. | <-- | RRC: *RRCConnectionSetup* |  |  |
| 8 | Check: Does the UE transmit a TRACKING AREA UPDATE REQUEST message with EPS bearer context status is absent? | --> | RRC: *RRCConnectionSetupComplete* NAS: TRACKING AREA UPDATE REQUEST | 1 | P |
| 9a1-13b1 | The UE performs steps 4a1-8b2b1in TAU procedure for Inter-system change from N1 mode to S1 mode in 5GMM/EMM-IDLE mode as described in TS 38.508-1 [4], Table 4.9.7.2.2-1. | - | - | - | - |

Table 11.9.2.3.2-2: Parallel behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE transmits a PDU SESSION ESTABLISHMENT REQUEST message and sets the request type to "MA PDU request" in the UL NAS TRANSPORT message, sets the ATSSS-ST bits in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message according to the ATSSS functionality and steering mode that UE supports on WLAN Cell 27.  Note: PDU SESSION ESTABLISHMENT REQUEST is included in UL NAS transport. UL NAS transport message is included in dedicatedNAS-Message of *ULInformationTransfer* message. | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | - | - |
| 2 | The SS transmits an PDU SESSION ESTABLISHMENT ACCEPT on WLAN Cell 27. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT |  |  |

11.9.2.3.3 Specific message contents

FFS

### 11.9.3 Inter-system mobility with established MA PDU session in 5GS/ATSSS/Single-registration mode without N26/establishing a PDN connection as the user plane resource of an MA PDU session is supported/Handover from NR/5GC to E-UTRAN/EPC

11.9.3.1 Test Purpose (TP)

(1)

**with** {UE is registered over 3GPP and non-3GPP access connected to 5GC and UE indicates its support of establishing a PDN connection as the user plane resource of an MA PDU session during the MA PDU session establishment procedure }

**ensure that** {

**when** { UE detects a suitable EPC E-UTRA cell after the serving NGC cell becomes not suitable }

**then** { UE performs a Inter-system change from N1 mode to S1 mode by initiating and successfully completing an ATTACH or a TAU procedure, mapped EPC context used and performs a local release of the MA PDU session over 3GPP access and MA PDU session over non-3GPP access was kept}

}

11.9.3.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clauses 4.8.2.3, 6.4.1.2 and TS 24.193 clause 4.6. Unless otherwise stated these are Rel-17 requirements.

[TS 24.501, clause 4.8.2.3]

At inter-system change from N1 mode to S1 mode in EMM-IDLE mode when:

a) the UE supports non-IP PDN type and at least one PDU session of Unstructured PDU session type is active;

b) the UE supports IPv4 PDN type and at least one PDU session of IPv4 PDU session type is active;

c) the UE supports IPv6 PDN type and at least one PDU session of IPv6 PDU session type is active;

d) the UE supports IPv4v6 PDN type and at least one PDU session of IPv4v6 PDU session type is active; or

e) at least one PDU session of Ethernet PDU session type is active and:

1) the UE supports non-IP PDN type; or

2) the UE and the network support Ethernet PDN type in S1 mode;

the UE shall proceed as follows:

a) if the UE supports sending an ATTACH REQUEST message containing a PDN CONNECTIVITY REQUEST message with request type set to "handover" or "handover of emergency bearer services" to transfer a PDU session from N1 mode to S1 mode and the UE has received an "interworking without N26 interface supported" indication from the network, the UE shall:

1) enter substates EMM-DEREGISTERED.NORMAL-SERVICE and 5GMM- DEREGISTERED.NO-CELL-AVAILABLE for 3GPP access;

2) map the PDU session(s) which the UE intends to transfer to EPS to the default EPS bearer context of the corresponding PDN connection(s) as specified in subclause 6.1.4.2; and

3) initiate an EPS attach procedure and include in the ATTACH REQUEST message a PDN CONNECTIVITY REQUEST message with:

- the request type set to "handover of emergency bearer services" to activate a default EPS bearer context for an active emergency PDU session, if the session to be transferred is an emergency PDU session; or

- the request type set to "handover" message to activate a default EPS bearer context for an active non-emergency PDU session, if the session to be transferred is a non-emergency PDU session. If the selected PDU session is an MA PDU session established over 3GPP access, the UE shall include the ATSSS request parameter in the Protocol configuration options IE or the Extended protocol configuration options IE of the ESM INFORMATION RESPONSE message.

After successful completion of the EPS attach procedure, the UE shall reset the registration attempt counter for 3GPP access and the attach attempt counter (see 3GPP TS 24.301 [15]), enter substates EMM-REGISTERED.NORMAL-SERVICE and 5GMM-REGISTERED.NO-CELL-AVAILABLE for 3GPP access and attempt to activate each of the other default EPS bearer contexts, if any, by initiating a stand-alone PDN connectivity procedure with request type set to "handover" for non-emergency PDU session or "handover of emergency bearer services" for emergency PDU session in the PDN CONNECTIVITY REQUEST message. If the EPS attach procedure is unsuccessful the UE shall enter substates EMM-DEREGISTERED.NORMAL-SERVICE and 5GMM-DEREGISTERED.NO-CELL-AVAILABLE for 3GPP access; and

b) otherwise, enter substates EMM-REGISTERED.NORMAL-SERVICE and 5GMM-REGISTERED.NO-CELL-AVAILABLE for 3GPP access and initiate a tracking area update procedure (see 3GPP TS 24.301 [15]).

…

After having successfully registered in N1 mode over 3GPP access, the UE shall reset the registration attempt counter for 3GPP access, and the attach attempt counter or tracking area updating attempt counter (see 3GPP TS 24.301 [15]) and:

a) if the UE supports the PDU session establishment procedure with request type set to "existing PDU session" or "existing emergency PDU session" to transfer a PDN connection from S1 mode to N1 mode and the UE has received an "interworking without N26 interface supported" indication from the network, attempt to transfer the PDN connection(s) which the UE intends to transfer to 5GS, if any, from S1 mode to N1 mode by:

- if the PDN connection which the UE intends to transfer is a PDN connection for emergency bearer services, initiating the PDU session establishment procedure with request type set to "existing emergency PDU session" to transfer the PDN connection for emergency bearer services; and

- if the PDN connection which the UE intends to transfer is a non-emergency PDN connection, initiating the PDU session establishment procedure with request type set to:

1) "MA PDU request", if the PDN connection to be transferred is a user-plane resource of an MA PDU session; or

2) "existing PDU session" to transfer the non-emergency PDN connection; and

b) otherwise, establish PDU session(s) corresponding to the PDN connection(s) which the UE intends to transfer to 5GS, if any, by initiating the PDU session establishment procedure with request type set to "initial request".

See subclause 5.1.4.3 for coordination between 5GMM and EMM and subclause 6.1.4.2 for coordination between 5GSM and ESM.

[TS 24.501, clause 6.4.1.2]

In order to initiate the UE-requested PDU session establishment procedure, the UE shall create a PDU SESSION ESTABLISHMENT REQUEST message.

…

If the UE requests to establish a new MA PDU session and the UE supports to establish a PDN connection as the user plane resource of an MA PDU session, the UE shall include the ATSSS request parameter in the Extended protocol configuration options IE of the PDU SESSION ESTABLISHMENT REQUEST message.

[TS 24.193, clause 4.6]

In the network supporting N26 interface:

a) if the UE established an MA PDU session over non-3GPP access only, no EPS bearer identity can be assigned to any QoS flow of the MA PDU session as specified in 3GPP TS 23.502 [3];

b) if the UE established an MA PDU session over 3GPP access and non-3GPP access and the user plane of the MA PDU session over 3GPP access is released, the EPS bearer identity assigned for the MA PDU session can be revoked as specified in 3GPP TS 23.502 [3];

c) for an inter-system change from N1 mode to S1 mode:

1) if the UE established an MA PDU session over 3GPP access only, the UE follows the procedure as specified in clause 6.1.4.1 of 3GPP TS 24.501 [6]; or

2) if the UE established an MA PDU session over 3GPP access and non-3GPP access, the UE follows the procedure as specified in clause 6.1.4.1 of 3GPP TS 24.501 [6], and

A) if the MA PDU session is transferred to EPS as a PDN connection and the UE did not indicate its support of establishing a PDN connection as the user plane resource of an MA PDU session during the MA PDU session establishment procedure as specified in clause 6.4.1.2 of 3GPP TS 24.501 [6], the SMF can initiate the network-requested PDU session release procedure over non-3GPP access as specified in clause 6.3.3.2 of 3GPP TS 24.501 [6] or perform a local release of the MA PDU session. The UE performs a local release of the MA PDU session over 3GPP access and non-3GPP access;

NOTE 1: If the UE receives from the network a PDU SESSION RELEASE COMMAND message which indicates to release the MA PDU session over non-3GPP access and the UE has already performed or is performing a local release of the MA PDU session, the error handling as specified in clause 6.3.3.6 of 3GPP TS 24.501 [6] is applied.

NOTE 2: The QoS flow(s) with EBI assigned over non-3GPP access is also transferred to the corresponding PDN connection.

B) if the MA PDU session is transferred to EPS as a PDN connection and the UE indicated its support of establishing a PDN connection as the user plane resource of an MA PDU session during the MA PDU session establishment procedure as specified in clause 6.4.1.2 of 3GPP TS 24.501 [6], the SMF can keep the MA PDU session over non-3GPP access; or

C) if the MA PDU session is not transferred to EPS as a PDN connection and the SMF decides to move the traffic of the MA PDU session from 3GPP access to non-3GPP access, the SMF can initiate the network-requested PDU session modification procedure as specified in clause 6.3.2.2 of 3GPP TS 24.501 [6]; and

d) for an inter-system change from S1 mode to N1 mode, if the UE requests an MA PDU session or the related URSP or UE local configuration does not mandate that the PDU session is established over a single access when transferring the PDN connection to 3GPP access, the PDN connection can be converted by the network to an MA PDU session via the UE-requested PDU session modification procedure (see clause 5.2.5).

[TS 24.301, clause 6.6.1.2.2]

The network initiates the ESM information request procedure by sending an ESM INFORMATION REQUEST message to the UE, starting timer T3489 and entering the state PROCEDURE TRANSACTION PENDING (see example in figure 6.6.1.2.2.1). This message shall be sent only after the security context has been setup, and if the ESM information transfer flag has been set in the PDN CONNECTIVITY REQUEST message. The MME shall set the EPS bearer identity of the ESM INFORMATION REQUEST message to the value "no EPS bearer identity assigned" and include the PTI from the associated PDN CONNECTIVITY REQUEST message.

11.9.3.3 Test description

11.9.3.3.1 Pre-test conditions

System Simulator:

- WLAN Cell 27 is configured according to 38.508-1 [4], clause 4.4.1.3.1.

- NR Cell 1 is configured according to TS 38.508-1 [4].

- E-UTRA Cell 1 is configured to TS 36.508 [7].

- NR Cell 1, WLAN Cell 27 and E-UTRA Cell 1 belong to the same PLMN and Both NR Cell 1 and WLAN cell 27 are set to '' Serving cell''. E-UTRA Cell 1 is set to "non-suitable cell".

UE:

- UE is registered over both 3GPP access and non-3GPP access to 5GC in the same PLMN.

Preamble:

- The UE is brought to state 3W-A and state 3N-A with PDU SESSION INACTIVE, and UE test loop mode B active according to TS 38.508-1 [4].

11.9.3.3.2 Test procedure sequence

Table 11.9.3.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U – S | Message |  |  |
| 1 | Cause the UE to request to establish an MA PDU session by MMI or AT command. | - | - | - | - |
| - | EXCEPTION: In parallel to the events described in steps 2-3 below the events specified in Table 11.9.3.3.2-2 may take place. | - | - | - | - |
| 2 | The UE transmits a PDU SESSION ESTABLISHMENT REQUEST message and sets the request type to "MA PDU request" in the UL NAS TRANSPORT message, include the ATSSS request parameter in the Extended protocol configuration options IE and sets the ATSSS-ST bits in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message according to the ATSSS functionality and steering mode that UE supports on NR Cell 1  Note: PDU SESSION ESTABLISHMENT REQUEST is included in UL NAS transport. UL NAS transport message is included in dedicatedNAS-Message of ULInformationTransfer message. | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | - | - |
| 3 | The SS transmits an PDU SESSION ESTABLISHMENT ACCEPT on NR cell 1. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |
| 4 | The SS transmits an *RRCRelease* message | <-- | NR RRC:RRCRelease | - | - |
| 5 | NR Cell 1 is set to "Non-Suitable cell", E-UTRA Cell 1 is set to “Serving cell”. | - | - | - | - |
| - | EXCEPTION: The following messages are to be observed on E-UTRA Cell 1 unless explicitly stated otherwise. | - | - | - | - |
| 6 | The UE sends an *RRCConnectionRequest* message on E-UTRA cell 1? | --> | RRC: *RRCConnectionRequest* | - | - |
| 7 | SS transmits an *RRCConnectionSetup* message. | <-- | RRC: *RRCConnectionSetup* | - | - |
| - | EXCEPTION: EXCEPTION: Steps 7a1-7b3 describes optional behaviour that depends on the UE implementation. | - | - | - | - |
| 7a1 | If the UE tries to preserve the IP address of the PDN connection, then check does the UE transmit an ATTACH REQUEST message with the ATSSS request parameter in the Protocol configuration options IE or the ESM information transfer flag has been set in the PDN CONNECTIVITY REQUEST message? | --> | RRC: *RRCConnectionSetupComplete* NAS: ATTACH REQUEST | 1 | P |
| 7b1 | Else the UE transmits a TRACKING AREA UPDATE REQUEST message. | --> | RRC: *RRCConnectionSetupComplete* NAS: TRACKING AREA UPDATE REQUEST | - | - |
| 7b2 | The SS transmites a TRACKING AREA UPDATE REJECT message to UE. | <-- | RRC: *DLInformationTransfer*  NAS: TRACKING AREA UPDATE REQUEST REJECT | - | - |
| 7b3 | Check: does the UE transmit an ATTACH REQUEST message with the ATSSS request parameter in the Protocol configuration options IE or the ESM information transfer flag has been set in the PDN CONNECTIVITY REQUEST message? | --> | RRC: *ULInformationTransfer*  NAS: ATTACH REQUEST | - | - |
| 8-12 | Steps 5 to 9 of the generic test procedure for UE registration (TS 36.508 [7] Table 4.5.2.3-1). | - | - | - | - |
| - | EXCEPTION: If the ESM information transfer flag has been set in the PDN CONNECTIVITY REQUEST message in step 7a1 or 7b3. Steps 13a1 to 13a2 take place. | - | - | - | - |
| 13a1 | SS transmits an *ESM INFORMATION REQUEST* message. | <-- | NAS: ESM INFORMATION REQUEST | - | - |
| 13a2 | Check: does the UE transmit a NAS: ESM INFORMATION RESPONSE including the ATSSS request parameter in the Extended protocol configuration options IE. | --> | NAS: ESM INFORMATION RESPONSE | 1 | P |
| 14-20 | Steps 10 to 16 of the generic test procedure for UE registration (TS 36.508 [7] Table 4.5.2.3-1). | - | - | - | - |
| 21 | The SS transmits one IP packet on MA PDU session established on WLAN Cell 27. | <-- | - | - | - |
| 22 | Check: Does the UE loop back the IP packet? | --> | - | 1 | P |

Table 11.9.3.3.2-2: Parallel behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE transmits a PDU SESSION ESTABLISHMENT REQUEST message and sets the request type to "MA PDU request" in the UL NAS TRANSPORT message, include the ATSSS request parameter in the Extended protocol configuration options IE and sets the ATSSS-ST bits in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message according to the ATSSS functionality and steering mode that UE supports on WLAN Cell 27.  Note: PDU SESSION ESTABLISHMENT REQUEST is included in UL NAS transport. UL NAS transport message is included in dedicatedNAS-Message of ULInformationTransfer message. | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | - | - |
| 2 | The SS transmits an PDU SESSION ESTABLISHMENT ACCEPT on WLAN Cell 27. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT |  |  |

11.9.3.3.3 Specific message contents

FFS

### 11.9.4 Inter-system mobility with established MA PDU session in 5GS/ATSSS/Single-registration mode without N26/establishing a PDN connection as the user plane resource of an MA PDU session is not supported/Handover from NR/5GC to E-UTRAN/EPC

11.9.4.1 Test Purpose (TP)

(1)

**with** {UE is registered over 3GPP and non-3GPP access connected to 5GC and UE did not indicate its support of establishing a PDN connection as the user plane resource of an MA PDU session during the MA PDU session establishment procedure}

**ensure that** {

**when** {UE detects a suitable EPC E-UTRA cell after the serving NGC cell becomes not suitable}

**then** {UE performs a local release of the MA PDU session over 3GPP access and non-3GPP access}

}

11.9.4.2 Conformance requirements

References: The conformance requirements covered in the present TC are specified in: TS 24.501, clauses 4.8.2.3, 6.4.1.2 and TS 24.193 clause 4.6. Unless otherwise stated these are Rel-17 requirements.

[TS 24.501, clause 4.8.2.3]

At inter-system change from N1 mode to S1 mode in EMM-IDLE mode when:

a) the UE supports non-IP PDN type and at least one PDU session of Unstructured PDU session type is active;

b) the UE supports IPv4 PDN type and at least one PDU session of IPv4 PDU session type is active;

c) the UE supports IPv6 PDN type and at least one PDU session of IPv6 PDU session type is active;

d) the UE supports IPv4v6 PDN type and at least one PDU session of IPv4v6 PDU session type is active; or

e) at least one PDU session of Ethernet PDU session type is active and:

1) the UE supports non-IP PDN type; or

2) the UE and the network support Ethernet PDN type in S1 mode;

the UE shall proceed as follows:

a) if the UE supports sending an ATTACH REQUEST message containing a PDN CONNECTIVITY REQUEST message with request type set to "handover" or "handover of emergency bearer services" to transfer a PDU session from N1 mode to S1 mode and the UE has received an "interworking without N26 interface supported" indication from the network, the UE shall:

1) enter substates EMM-DEREGISTERED.NORMAL-SERVICE and 5GMM- DEREGISTERED.NO-CELL-AVAILABLE for 3GPP access;

2) map the PDU session(s) which the UE intends to transfer to EPS to the default EPS bearer context of the corresponding PDN connection(s) as specified in subclause 6.1.4.2; and

3) initiate an EPS attach procedure and include in the ATTACH REQUEST message a PDN CONNECTIVITY REQUEST message with:

- the request type set to "handover of emergency bearer services" to activate a default EPS bearer context for an active emergency PDU session, if the session to be transferred is an emergency PDU session; or

- the request type set to "handover" message to activate a default EPS bearer context for an active non-emergency PDU session, if the session to be transferred is a non-emergency PDU session. If the selected PDU session is an MA PDU session established over 3GPP access, the UE shall include the ATSSS request parameter in the Protocol configuration options IE or the Extended protocol configuration options IE of the ESM INFORMATION RESPONSE message.

After successful completion of the EPS attach procedure, the UE shall reset the registration attempt counter for 3GPP access and the attach attempt counter (see 3GPP TS 24.301 [15]), enter substates EMM-REGISTERED.NORMAL-SERVICE and 5GMM-REGISTERED.NO-CELL-AVAILABLE for 3GPP access and attempt to activate each of the other default EPS bearer contexts, if any, by initiating a stand-alone PDN connectivity procedure with request type set to "handover" for non-emergency PDU session or "handover of emergency bearer services" for emergency PDU session in the PDN CONNECTIVITY REQUEST message. If the EPS attach procedure is unsuccessful the UE shall enter substates EMM-DEREGISTERED.NORMAL-SERVICE and 5GMM-DEREGISTERED.NO-CELL-AVAILABLE for 3GPP access; and

b) otherwise, enter substates EMM-REGISTERED.NORMAL-SERVICE and 5GMM-REGISTERED.NO-CELL-AVAILABLE for 3GPP access and initiate a tracking area update procedure (see 3GPP TS 24.301 [15]).

…

After having successfully registered in N1 mode over 3GPP access, the UE shall reset the registration attempt counter for 3GPP access, and the attach attempt counter or tracking area updating attempt counter (see 3GPP TS 24.301 [15]) and:

a) if the UE supports the PDU session establishment procedure with request type set to "existing PDU session" or "existing emergency PDU session" to transfer a PDN connection from S1 mode to N1 mode and the UE has received an "interworking without N26 interface supported" indication from the network, attempt to transfer the PDN connection(s) which the UE intends to transfer to 5GS, if any, from S1 mode to N1 mode by:

- if the PDN connection which the UE intends to transfer is a PDN connection for emergency bearer services, initiating the PDU session establishment procedure with request type set to "existing emergency PDU session" to transfer the PDN connection for emergency bearer services; and

- if the PDN connection which the UE intends to transfer is a non-emergency PDN connection, initiating the PDU session establishment procedure with request type set to:

1) "MA PDU request", if the PDN connection to be transferred is a user-plane resource of an MA PDU session; or

2) "existing PDU session" to transfer the non-emergency PDN connection; and

b) otherwise, establish PDU session(s) corresponding to the PDN connection(s) which the UE intends to transfer to 5GS, if any, by initiating the PDU session establishment procedure with request type set to "initial request".

See subclause 5.1.4.3 for coordination between 5GMM and EMM and subclause 6.1.4.2 for coordination between 5GSM and ESM.

[TS 24.501, clause 6.4.1.2]

In order to initiate the UE-requested PDU session establishment procedure, the UE shall create a PDU SESSION ESTABLISHMENT REQUEST message.

…

If the UE requests to establish a new MA PDU session and the UE supports to establish a PDN connection as the user plane resource of an MA PDU session, the UE shall include the ATSSS request parameter in the Extended protocol configuration options IE of the PDU SESSION ESTABLISHMENT REQUEST message.

[TS 24.193, clause 4.6]

In the network supporting N26 interface:

a) if the UE established an MA PDU session over non-3GPP access only, no EPS bearer identity can be assigned to any QoS flow of the MA PDU session as specified in 3GPP TS 23.502 [3];

b) if the UE established an MA PDU session over 3GPP access and non-3GPP access and the user plane of the MA PDU session over 3GPP access is released, the EPS bearer identity assigned for the MA PDU session can be revoked as specified in 3GPP TS 23.502 [3];

c) for an inter-system change from N1 mode to S1 mode:

1) if the UE established an MA PDU session over 3GPP access only, the UE follows the procedure as specified in clause 6.1.4.1 of 3GPP TS 24.501 [6]; or

2) if the UE established an MA PDU session over 3GPP access and non-3GPP access, the UE follows the procedure as specified in clause 6.1.4.1 of 3GPP TS 24.501 [6], and

A) if the MA PDU session is transferred to EPS as a PDN connection and the UE did not indicate its support of establishing a PDN connection as the user plane resource of an MA PDU session during the MA PDU session establishment procedure as specified in clause 6.4.1.2 of 3GPP TS 24.501 [6], the SMF can initiate the network-requested PDU session release procedure over non-3GPP access as specified in clause 6.3.3.2 of 3GPP TS 24.501 [6] or perform a local release of the MA PDU session. The UE performs a local release of the MA PDU session over 3GPP access and non-3GPP access;

NOTE 1: If the UE receives from the network a PDU SESSION RELEASE COMMAND message which indicates to release the MA PDU session over non-3GPP access and the UE has already performed or is performing a local release of the MA PDU session, the error handling as specified in clause 6.3.3.6 of 3GPP TS 24.501 [6] is applied.

NOTE 2: The QoS flow(s) with EBI assigned over non-3GPP access is also transferred to the corresponding PDN connection.

B) if the MA PDU session is transferred to EPS as a PDN connection and the UE indicated its support of establishing a PDN connection as the user plane resource of an MA PDU session during the MA PDU session establishment procedure as specified in clause 6.4.1.2 of 3GPP TS 24.501 [6], the SMF can keep the MA PDU session over non-3GPP access; or

C) if the MA PDU session is not transferred to EPS as a PDN connection and the SMF decides to move the traffic of the MA PDU session from 3GPP access to non-3GPP access, the SMF can initiate the network-requested PDU session modification procedure as specified in clause 6.3.2.2 of 3GPP TS 24.501 [6]; and

d) for an inter-system change from S1 mode to N1 mode, if the UE requests an MA PDU session or the related URSP or UE local configuration does not mandate that the PDU session is established over a single access when transferring the PDN connection to 3GPP access, the PDN connection can be converted by the network to an MA PDU session via the UE-requested PDU session modification procedure (see clause 5.2.5).

[TS 24.301, clause 6.6.1.2.2]

The network initiates the ESM information request procedure by sending an ESM INFORMATION REQUEST message to the UE, starting timer T3489 and entering the state PROCEDURE TRANSACTION PENDING (see example in figure 6.6.1.2.2.1). This message shall be sent only after the security context has been setup, and if the ESM information transfer flag has been set in the PDN CONNECTIVITY REQUEST message. The MME shall set the EPS bearer identity of the ESM INFORMATION REQUEST message to the value "no EPS bearer identity assigned" and include the PTI from the associated PDN CONNECTIVITY REQUEST message.

11.9.4.3 Test description

11.9.4.3.1 Pre-test conditions

System Simulator:

- WLAN Cell 27 is configured according to 38.508-1 [4], clause 4.4.1.3.1.

- NR Cell 1 is configured according to TS 38.508-1 [4].

- E-UTRA Cell 1 is configured to TS 36.508 [7].

- NR Cell 1, WLAN Cell 27 and E-UTRA Cell 1 belong to the same PLMN and Both NR Cell 1 and WLAN cell 27 are set to '' Serving cell''. E-UTRA Cell 1 is set to "non-suitable cell".

UE:

- UE is registered over both 3GPP access and non-3GPP access to 5GC in the same PLMN.

Preamble:

- The UE is brought to state 3W-A and state 3N-A with PDU SESSION INACTIVE according to TS 38.508-1 [4].

11.9.4.3.2 Test procedure sequence

Table 11.9.4.3.2-1: Main behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U – S | Message |  |  |
| 1 | Cause the UE to request to establish an MA PDU session by MMI or AT command. | - | - | - | - |
| - | EXCEPTION: In parallel to the events described in steps 2-3 below the events specified in Table 11.9.4.3.2-2 may take place. | - | - | - | - |
| 2 | The UE transmits a PDU SESSION ESTABLISHMENT REQUEST message and sets the request type to "MA PDU request" in the UL NAS TRANSPORT message, include the ATSSS request parameter in the Extended protocol configuration options IE and sets the ATSSS-ST bits in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message according to the ATSSS functionality and steering mode that UE supports on NR Cell 1  Note: PDU SESSION ESTABLISHMENT REQUEST is included in UL NAS transport. UL NAS transport message is included in dedicatedNAS-Message of ULInformationTransfer message. | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | - | - |
| 3 | The SS transmits an PDU SESSION ESTABLISHMENT ACCEPT on NR cell 1. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT | - | - |
| 4 | The SS transmits an *RRCRelease* message | <-- | NR RRC:*RRCRelease* | - | - |
| 5 | NR Cell 1 is set to "Non-suitable cell", E-UTRA Cell 1 is set to “Serving cell”. | - | - | - | - |
| - | EXCEPTION: The following messages are to be observed on E-UTRA Cell 1 unless explicitly stated otherwise. | - | - | - | - |
| 6 | The UE sends an *RRCConnectionRequest* message on E-UTRA cell 1? | --> | RRC: *RRCConnectionRequest* | - | - |
| 7 | SS transmits an *RRCConnectionSetup* message. | <-- | RRC: *RRCConnectionSetup* | - | - |
| - | EXCEPTION: Steps 7a1-7b3 describes optional behaviour that depends on the UE implementation. | - | - | - | - |
| 7a1 | If the UE tries to preserve the IP address of the PDN connection, then check: Does the UE transmit an ATTACH REQUEST message. The PDN CONNECTIVITY REQUEST message is piggybacked in ATTACH REQUEST with the request type is set to "initial request"? | --> | RRC: *RRCConnectionSetupComplete*  NAS: ATTACH REQUEST  NAS: PDN CONNECTIVITY REQUEST | 1 | P |
| 7b1 | Else check: Does the UE transmit a TRACKING AREA UPDATE REQUEST message with EPS bearer context status is not present? | --> | RRC: *RRCConnectionSetupComplete* NAS: TRACKING AREA UPDATE REQUEST | 1 | P |
| 7b2 | The SS transmits a TRACKING AREA UPDATE REJECT message to UE. | <-- | RRC: *DLInformationTransfer*  NAS: TRACKING AREA UPDATE REQUEST REJECT | - | - |
| 7b3 | Check: Does the UE transmit an ATTACH REQUEST message. The PDN CONNECTIVITY REQUEST message is piggybacked in ATTACH REQUEST with the request type is set to "initial request"? | --> | RRC: *RRCConnectionSetupComplete*  NAS: ATTACH REQUEST  NAS: PDN CONNECTIVITY REQUEST | 1 | P |
| 8-21b1 | Steps 5 to 18b1 of the generic test procedure for UE registration (TS 36.508 [7] Table 4.5.2.3-1). | - | - | - | - |

Table 11.9.4.3.2-2: Parallel behaviour

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| St | Procedure | Message Sequence | | TP | Verdict |
|  |  | U - S | Message |  |  |
| 1 | The UE transmits a PDU SESSION ESTABLISHMENT REQUEST message and sets the request type to "MA PDU request" in the UL NAS TRANSPORT message on WLAN Cell 27, and sets the ATSSS-ST bits in the 5GSM capability IE of the PDU SESSION ESTABLISHMENT REQUEST message according to the ATSSS functionality and steering mode that UE supports.  Note: PDU SESSION ESTABLISHMENT REQUEST is included in UL NAS transport. UL NAS transport message is included in dedicatedNAS-Message of ULInformationTransfer message. | --> | 5GMM: UL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT REQUEST | - | - |
| 2 | The SS transmits an PDU SESSION ESTABLISHMENT ACCEPT on WLAN Cell 27. | <-- | 5GMM: DL NAS TRANSPORT  5GSM: PDU SESSION ESTABLISHMENT ACCEPT |  |  |

11.9.4.3.3 Specific message contents

FFS