**3GPP TSG-CT WG1 Meeting #134-eC1-22xxxx**

**E-meeting, 17-25 February 2022**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
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|  | **24.501** | **CR** | **3981** | **rev** | **1** | **Current version:** | **17.5.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network |  | Core Network | **x** |

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|  |
| ***Title:***  | Failure case for 5G SRVCC |
|  |  |
| ***Source to WG:*** | Nokia, Nokia Shanghai Bell |
| ***Source to TSG:*** | C1 |
|  |  |
| ***Work item code:*** | 5GProtoc17, 5G\_SRVCC |  | ***Date:*** | 2022-02-22 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-17 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)...Rel-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
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| ***Reason for change:*** | CR #0373 to TS 23.216 (initial version in [S2-2200285](https://www.3gpp.org/ftp/tsg_sa/WG2_Arch/TSGS2_149E_Electronic_2022-02/Docs/S2-2200285.zip)) proposes a stage 2 requirement that the AMF shall send a session reestablishment trigger notification to UE when the NG-RAN (source) decides to terminate the HO procedure before completion. |
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| ***Summary of change:*** | The NAS transport procedure is extended to fulfil the stage 2 requirement. |
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| ***Consequences if not approved:*** | The stage 2 requirement is not implemented. |
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| ***Clauses affected:*** | 5.4.5.3.1, 5.4.5.3.2, 5.4.5.3.3, 5.5.1.2.2, 5.5.1.3.2, 9.11.3.1, 9.11.3.39, 9.11.3.40 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS 23.216 CR 0373 |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

##### 5.4.5.3.1 General

The purpose of the network-initiated NAS transport procedure is to provide a transport of:

a) a single 5GSM message;

b) SMS;

c) an LPP message;

d) an SOR transparent container;

e) a single uplink 5GSM message which was not forwarded due to routing failure;

f) a single uplink 5GSM message which was not forwarded due to congestion control;

g) a UE policy container;

h) a single uplink 5GSM message which was not forwarded, because the PLMN's maximum number of PDU sessions has been reached;

h1) a single uplink 5GSM message which was not forwarded, because the maximum number of PDU sessions with active user-plane resources has been reached;

h2) a single uplink 5GSM message which was not forwarded, because of ongoing network slice-specific authentication and authorization procedure for the S-NSSAI that is requested;

h3) a single uplink 5GSM message which was not forwarded, because the UE requested to establish an MA PDU session for LADN DNN;

i) a single uplink 5GSM message which was not forwarded due to service area restrictions;

i1) a single uplink 5GSM message which was not forwarded because the UE is registered to a PLMN via a satellite NG-RAN cell that is not allowed to operate at the present UE location;

j) a UE parameters update transparent container;

k) a location services message;

l) a CIoT user data container;

l1) a single uplink CIoT user data container or control plane user data which was not forwarded due to routing failure;

l2) a single uplink CIoT user data container which was not forwarded due to congestion control;

m) a Service-level-AA container;

m1) an event notification for upper layers; or

n) multiple of the above types.

from the AMF to the UE in a 5GMM message.

\*\*\*\*\* Next change \*\*\*\*\*

##### 5.4.5.3.2 Network-initiated NAS transport procedure initiation

In 5GMM-CONNECTED mode, the AMF initiates the NAS transport procedure by sending the DL NAS TRANSPORT message, as shown in figure 5.4.5.3.2.1.

In case a) in subclause 5.4.5.3.1, i.e. upon reception from an SMF of a 5GSM message without an N1 SM delivery skip allowed indication for a UE or a 5GSM message with an N1 SM delivery skip allowed indication for a UE in the 5GMM-CONNECTED mode, the AMF shall:

a) include the PDU session information (PDU session ID) in the PDU session ID IE;

b) set the Payload container type IE to "N1 SM information"; and

c) set the Payload container IE to the 5GSM message.

In case b) in subclause 5.4.5.3.1, i.e. upon reception from an SMSF of an SMS payload, the AMF shall:

a) set the Payload container type IE to "SMS";

b) set the Payload container IE to the SMS payload; and

c) select the access type to deliver the DL NAS TRANSPORT message as follows in case the access type selection is required:

1) if the UE to receive the DL NAS TRANSPORT message is registered to the network via both 3GPP access and non-3GPP access, the 5GMM context of the UE indicates that SMS over NAS is allowed, the UE is in MICO mode, and the UE is in 5GMM-IDLE mode for 3GPP access and in 5GMM-CONNECTED mode for non-3GPP access, then the AMF selects non-3GPP access. Otherwise, the AMF selects either 3GPP access or non-3GPP access.

 If the delivery of the DL NAS TRANSPORT message over 3GPP access has failed, the AMF may re-send the DL NAS TRANSPORT message over the non-3GPP access.

 If the delivery of the DL NAS TRANSPORT message over non-3GPP access has failed, the AMF may re-send the DL NAS TRANSPORT message over the 3GPP access; and

2) otherwise, the AMF selects 3GPP access.

NOTE 1: The AMF selects an access type between 3GPP access and non-3GPP access based on operator policy.

In case c) in subclause 5.4.5.3.1 i.e. upon reception from an LMF of an LPP message payload, the AMF shall:

a) set the Payload container type IE to "LTE Positioning Protocol (LPP) message container";

b) set the Payload container IE to the LPP message payload received from the LMF;

c) set the Additional information IE to an LCS correlation identifier received from the LMF from which the LPP message was received.

NOTE 2: The LCS Correlation Identifier is assigned originally by the AMF except for LPP message transfer associated with event reporting for periodic or triggered location as described in subclause 6.3.1 of 3GPP TS 23.273 [6B], where the LMF assigns the correlation identifier. AMF and LMF assigned correlation identifiers can be distinguished by an implementation specific convention (e.g. use of a different number of octets) to enable an AMF to distinguish one from the other when received in the Additional Information IE in an UL NAS Transport message.

In case d) in subclause 5.4.5.3.1 i.e. upon reception of a steering of roaming information (see 3GPP TS 23.122 [5]) from the UDM to be forwarded to the UE, the AMF shall:

a) set the Payload container type IE to "SOR transparent container"; and

b) set the Payload container IE to the steering of roaming information received from the UDM (see 3GPP TS 29.503 [20AB]).

In case e) in subclause 5.4.5.3.1, i.e. upon sending a single uplink 5GSM message which was not forwarded due to routing failure, the AMF shall:

a) include the PDU session ID in the PDU session ID IE;

b) set the Payload container type IE to "N1 SM information";

c) set the Payload container IE to the 5GSM message which was not forwarded;

d) set the 5GMM cause IE to the 5GMM cause #90 "payload was not forwarded" or 5GMM cause #91 "DNN not supported or not subscribed in the slice".

 The AMF sets the 5GMM cause IE to the 5GMM cause #91 "DNN not supported or not subscribed in the slice", if the 5GSM message could not be forwarded since SMF selection fails because:

1) the DNN is not supported in the slice identified by the S-NSSAI used by the AMF; or

2) neither the DNN provided by the UE nor the wildcard DNN are in the subscribed DNN list of the UE for the S-NSSAI used by the AMF.

 Otherwise, the AMF sets the 5GMM cause IE to the 5GMM cause #90 "payload was not forwarded"; and

e) optionally include the Back-off timer value IE if the 5GMM cause IE is set to 5GMM cause #91 "DNN not supported or not subscribed in the slice" due to the DNN is not supported in the slice.

In case f) in subclause 5.4.5.3.1, i.e. upon sending a single uplink 5GSM message which was not forwarded due to congestion control, the AMF shall:

a) include the PDU session ID in the PDU session ID IE;

b) set the Payload container type IE to "N1 SM information";

c) set the Payload container IE to the 5GSM message which was not forwarded;

d) set the 5GMM cause IE to the 5GMM cause #22 "Congestion", the 5GMM cause #67 "insufficient resources for specific slice and DNN" or the 5GMM cause #69 "insufficient resources for specific slice"; and

e) include the Back-off timer value IE.

In case g) in subclause 5.4.5.3.1, i.e. upon reception of a UE policy container from the PCF to be forwarded to the UE, the AMF shall:

a) set the Payload container type IE to "UE policy container"; and

b) set the Payload container IE to the UE policy container received from the PCF.

In case h) in subclause 5.4.5.3.1, i.e. upon sending a single uplink 5GSM message which was not forwarded, because the PLMN's maximum number of PDU sessions has been reached, the AMF shall:

a) include the PDU session ID in the PDU session ID IE;

b) set the Payload container type IE to "N1 SM information";

c) set the Payload container IE to the 5GSM message which was not forwarded; and

d) set the 5GMM cause IE to the 5GMM cause #65 "maximum number of PDU sessions reached".

In case h1) in subclause 5.4.5.3.1, i.e. upon sending a single uplink 5GSM message which was not forwarded, because the maximum number of PDU sessions with active user-plane resources has been reached, the AMF shall:

a) include the PDU session ID in the PDU session ID IE;

b) set the Payload container type IE to "N1 SM information";

c) set the Payload container IE to the 5GSM message which was not forwarded; and

d) set the 5GMM cause IE to the 5GMM cause #92 "insufficient user-plane resources for the PDU session".

In case h2) in subclause 5.4.5.3.1, i.e. upon sending a single uplink 5GSM message which was not forwarded because the UE requested to establish a PDU session associated with an S-NSSAI or to modify a PDU session associated with an S-NSSAI for which:

a) the AMF is performing network slice-specific authentication and authorization and determined to reject the request based on local policy; or

b) the network slice-specific authentication and authorization has failed or the authorization has been revoked;

the AMF shall:

a) include the PDU session ID in the PDU session ID IE;

b) set the Payload container type IE to "N1 SM information";

c) set the Payload container IE to the 5GSM message which was not forwarded; and

d) set the 5GMM cause IE to the 5GMM cause #90 "payload was not forwarded".

In case h3) in subclause 5.4.5.3.1, i.e. upon sending a single uplink 5GSM message which was not forwarded because the UE requested to establish an MA PDU session for LADN DNN, the AMF shall:

a) include the PDU session ID in the PDU session ID IE;

b) set the Payload container type IE to "N1 SM information";

c) set the Payload container IE to the 5GSM message which was not forwarded; and

d) set the 5GMM cause IE to the 5GMM cause #90 "payload was not forwarded".

In case i) in subclause 5.4.5.3.1, i.e. upon sending a single uplink 5GSM message which was not forwarded due to service area restrictions, the AMF shall:

a) include the PDU session ID in the PDU session ID IE;

b) set the Payload container type IE to "N1 SM information";

c) set the Payload container IE to the 5GSM message which was not forwarded; and

d) set the 5GMM cause IE to the 5GMM cause #28 "Restricted service area".

In case i1) in subclause 5.4.5.3.1, i.e. upon sending a single uplink 5GSM message which was not forwarded because the UE is registered to a PLMN via a satellite NG-RAN cell that is not allowed to operate at the present UE location, the AMF shall:

a) include the PDU session ID in the PDU session ID IE;

b) set the Payload container type IE to "N1 SM information";

c) set the Payload container IE to the 5GSM message which was not forwarded; and

d) set the 5GMM cause IE to the 5GMM cause #78 "PLMN not allowed to operate at the present UE location".

In case j) in subclause 5.4.5.3.1 i.e. upon reception of UE parameters update data (see 3GPP TS 23.502 [9]) from the UDM to be forwarded to the UE, the AMF shall:

a) set the Payload container type IE to "UE parameters update transparent container"; and

b) set the contents of the Payload container IE to the UE parameters update data (see 3GPP TS 23.502 [9]) received from the UDM.

For case k) in subclause 5.4.5.3.1 upon reception from a location services application of a Location services message payload, the AMF shall:

a) set the Payload container type IE to "Location services message container"; and

b) set the Payload container IE to the Location services message payload.

For case k) in subclause 5.4.5.3.1 upon reception from an LMF of a Location services message payload, the AMF shall:

a) set the Payload container type IE to "Location services message container";

b) set the Payload container IE to the Location services message payload; and

c) set the Additional information IE to routing information associated with the LMF from which the Location services message payload was received.

NOTE 3: Case k) in subclause 5.4.5.3.1 supports transport of a Location services message container between a UE and an AMF and between a UE and an LMF. For transport between a UE and an LMF, the Additional information IE is included and provides routing information for the LMF. For transport between a UE and an AMF, the Additional information IE is not included.

In case l) in subclause 5.4.5.3.1, i.e. upon reception from an SMF of a user data container payload, the AMF shall:

a) include the PDU session ID in the PDU session ID IE;

b) set the Payload container type IE to "CIoT user data container"; and

c) set the Payload container IE to the user data container.

For case l1) in subclause 5.4.5.3.1, i.e. upon sending a single uplink CIoT user data container or control plane user data which was not forwarded due to routing failure, the AMF shall:

a) include the PDU session ID in the PDU session ID IE;

b) set the Payload container type IE to " CIoT user data container";

c) set the Payload container IE to the CIoT user data container or control plane user data which was not forwarded; and

d) set the 5GMM cause IE to the 5GMM cause #90 "payload was not forwarded".

NOTE 4: For case l1) in subclause 5.4.5.3.1, this is also applied for a single uplink CIoT user data container or control plane user data in the CONTROL PLANE SERVICE REQUEST message which was not forwarded due to routing failure.

For case l2) in subclause 5.4.5.3.1, i.e. upon sending a single uplink CIoT user data container which was not forwarded due to congestion control, the AMF shall:

a) include the PDU session ID in the PDU session ID IE;

b) set the Payload container type IE to " CIoT user data container";

c) set the Payload container IE to the CIoT user data container which was not forwarded;

d) set the 5GMM cause IE to the 5GMM cause #22 "Congestion" and include the Back-off timer value IE.

In case m) in subclause 5.4.5.3.1, the AMF shall:

a) set the Payload container type IE to "Service-level-AA container"; and

b) set the Payload container IE to the Service-level-AA container;

In case m1) in subclause 5.4.5.3.1, i.e. if the AMF needs to send an event notification indicator for upper layers to the UE which set the "EventNotification" bit of the 5GMM capability IE in the last REGISTRATION REQUEST message to "Event notification supported", the AMF shall:

a) set the Payload container type IE to "Event notification"; and

b) set the Payload container IE to the event notification indicator.

In case n) in subclause 5.4.5.3.1, the AMF shall:

a) set the Payload container type IE to "Multiple payloads";

b) set each payload container entry of the Payload container IE (see subclause 9.11.3.39) as follows:

i) set the payload container type field of the payload container entry to a payload container type value set in the Payload container type IE as specified for cases a) to m) above;

ii) set the payload container entry contents field of the payload container entry to the payload container contents set in the Payload container IE as specified for cases a) to m) above;

iii) set the optional IE fields, if any, to the optional associated information as specified for cases a) to m) above.



Figure 5.4.5.3.2.1: Network-initiated NAS transport procedure

\*\*\*\*\* Next change \*\*\*\*\*

##### 5.4.5.3.3 Network-initiated NAS transport of messages

Upon reception of a DL NAS TRANSPORT message, the UE shall stop the timer T3346 if running.

Upon reception of a DL NAS TRANSPORT message, if the Payload container type IE is set to:

a) "N1 SM information" and the 5GMM cause IE is not included in the DL NAS TRANSPORT message, the 5GSM message in the Payload container IE and the PDU session ID are handled in the 5GSM procedures specified in clause 6;

b) "SMS", the UE shall forward the content of the Payload container IE to the SMS stack entity;

c) "LTE Positioning Protocol (LPP) message container", the UE shall forward the payload container type, the content of the Payload container IE and the routing information included in the Additional information IE to the upper layer location services application;

d) "SOR transparent container" and if the Payload container IE:

1) successfully passes the integrity check (see 3GPP TS 33.501 [24]), the ME shall store the received SOR counter as specified in annex C and proceed as follows:

i) If the Payload container IE indicates a list of preferred PLMN/access technology combinations is provided and the list type indicates "PLMN ID and access technology list", then the ME shall replace the highest priority entries in the "Operator Controlled PLMN Selector with Access Technology" list stored in the ME.

 If the SOR-CMCI is present and the Store SOR-CMCI in ME indicator is set to "Store SOR-CMCI in ME" then the UE shall store or delete the SOR-CMCI in the non-volatile memory of the ME as described in annex C.1;

ii) If the list type indicates "secured packet", then the ME shall behave as if a SMS is received with protocol identifier set to SIM data download, data coding scheme set to class 2 message and SMS payload as secured packet contents of SOR transparent container IE. The SMS payload is forwarded to UICC as specified in 3GPP TS 23.040 [4A]; or

iii) If the Payload container IE indicates "HPLMN indication that 'no change of the "Operator Controlled PLMN Selector with Access Technology" list stored in the UE is needed and thus no list of preferred PLMN/access technology combinations is provided'", the UE operates in SNPN access operation mode and the Payload container IE includes SOR-SNPN-SI, the ME shall replace SOR-SNPN-SI of the selected entry of the "list of subscriber data" or associated with the selected PLMN subscription, as specified in 3GPP TS 23.122 [5] with the received SOR-SNPN-SI.

Editor's note (WI eNPN, CR#3584): Whether the UE can receive the SOR-SNPN-SI when registering or registered to a PLMN is FFS.

 If the SOR-CMCI is present and the Store SOR-CMCI in ME indicator is set to "Store SOR-CMCI in ME" then the UE shall store or delete the SOR-CMCI in the non-volatile memory of the ME as described in annex C.1;

 If the ACK bit of the SOR header for SOR data type in the SOR transparent container is set to "acknowledgement requested" and the list type indicates:

A) "PLMN ID and access technology list"; or

B) "secured packet" and the ME receives status bytes from the UICC indicating that the UICC has received the secured packet successfully;

 then the ME shall send an acknowledgement in the Payload container IE of an UL NAS TRANSPORT message with Payload type IE set to "SOR transparent container" as specified in subclause 5.4.5.2.2. In the Payload container IE carrying the acknowledgement, the UE shall set the ME support of SOR-CMCI indicator to "SOR-CMCI supported by the ME".

 The UE shall proceed with the behaviour as specified in 3GPP TS 23.122 [5] annex C; or

2) does not successfully pass the integrity check (see 3GPP TS 33.501 [24]) then the UE shall discard the content of the payload container IE and proceed with the behaviour as specified in 3GPP TS 23.122 [5] annex C.

e) Void;

f) Void;

g) "N1 SM information" and:

1) the 5GMM cause IE is set to the 5GMM cause #22 "Congestion", the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded due to DNN based congestion control along with the 5GSM message from the Payload container IE of the DL NAS TRANSPORT message, and the time value from the Back-off timer value IE;

2) the 5GMM cause IE is set to the 5GMM cause #28 "Restricted service area", the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded due to service area restrictions along with the 5GSM message from the Payload container IE of the DL NAS TRANSPORT message, enters the state 5GMM-REGISTERED.NON-ALLOWED-SERVICE and, if the DL NAS TRANSPORT message is received over 3GPP access, performs the registration procedure for mobility and periodic registration update without waiting for the release of the N1 NAS signalling connection (see subclauses 5.3.5 and 5.5.1.3);

3) the 5GMM cause IE is set to the 5GMM cause #65 "maximum number of PDU sessions reached", the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded because the PLMN's maximum number of PDU sessions has been reached, along with the 5GSM message from the Payload container IE of the DL NAS TRANSPORT message;

4) the 5GMM cause IE is set to the 5GMM cause #67 "insufficient resources for specific slice and DNN", the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded due to S-NSSAI and DNN based congestion control along with the 5GSM message from the Payload container IE of the DL NAS TRANSPORT message, and the time value from the Back-off timer value IE;

5) the 5GMM cause IE is set to the 5GMM cause #69 "insufficient resources for specific slice", the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded due to S-NSSAI only based congestion control along with the 5GSM message from the Payload container IE of the DL NAS TRANSPORT message, and the time value from the Back-off timer value IE;

5a) the 5GMM cause IE is set to the 5GMM cause #78 "PLMN not allowed to operate at the present UE location", the UE 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;

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.

h) "UE policy container", the UE policy container in the Payload container IE is handled in the UE policy delivery procedures specified in Annex D;

i) "UE parameters update transparent container" and if the Payload container IE

1) successfully passes the integrity check (see 3GPP TS 33.501 [24]), the ME shall store the received UE parameter update counter as specified in annex C and proceed as follows:

i) if the UE parameters update list includes a UE parameters update data set with UE parameters update data set type indicating "Routing indicator update data",

A) the ME shall behave as if an SMS is received with protocol identifier set to SIM data download, data coding scheme set to class 2 message and SMS payload as secured packet contents of UE parameters update transparent container IE. The SMS payload is forwarded to UICC as specified in 3GPP TS 23.040 [4A]; and

B) if the ACK bit of the UE parameters update header in the UE parameters update transparent container is set to "acknowledgment requested" and if the ME receives status bytes from the UICC indicating that the UICC has received the secured packet successfully, the ME shall send an acknowledgement in the Payload container IE of an UL NAS TRANSPORT message with Payload type IE set to "UE parameters update transparent container" as specified in subclause 5.4.5.2.2; and

C) if the ME receives a REFRESH command from the UICC as specified in 3GPP TS 31.111 [22A] and if the REG bit of the UE parameters update header in the UE parameters update transparent container IE is set to "re-registration requested", and:

C1) the UE is registered over 3GPP access, then the UE shall wait until the emergency services over 3GPP access, if any, are completed, enter 5GMM-IDLE mode over 3GPP access or 5GMM-CONNECTED mode with RRC inactive indication, perform a de-registration procedure, and then delete its 5G-GUTI if the UE is registered to different PLMN or SNPN on non-3GPP access or the UE is not registered over non-3GPP access, or wait until the de-registration procedure over non-3GPP access specified in case C2) or C3) is completed before deleting its 5G-GUTI if the UE is registered to same PLMN or SNPN on non-3GPP access, and then initiate a registration procedure for initial registration as specified in subclause 5.5.1.2;

C2) the UE is registered over non-3GPP access and does not have emergency services ongoing over non-3GPP access, then the UE shall locally release the N1 NAS signalling connection and enter 5GMM-IDLE mode over non-3GPP access, perform a de-registration procedure, and then delete its 5G-GUTI if the UE is registered to different PLMN or SNPN on 3GPP access or the UE is not registered over 3GPP access, or wait until the de-registration procedure over 3GPP access specified in case C1) is completed before deleting its 5G-GUTI if the UE is registered to same PLMN or SNPN on 3GPP access, and then initiate a registration procedure for initial registration as specified in subclause 5.5.1.2; and

C3) the UE is registered over non-3GPP access and has an emergency services ongoing over non-3GPP access, then the UE shall wait until the emergency services are completed before locally releasing the N1 NAS signalling connection and enter 5GMM-IDLE mode over non-3GPP access, perform a de-registration procedure, and then delete its 5G-GUTI if the UE is registered to different PLMN or SNPN on 3GPP access or if the UE is not registered over 3GPP access, or wait until the de-registration procedure over 3GPP access specified in case C1) is completed before deleting its 5G-GUTI if the UE is registered to same PLMN or SNPN on 3GPP access, and then initiate a registration procedure for initial registration as specified in subclause 5.5.1.2.

ii) if the UE parameters update list includes a UE parameters update data set with UE parameters update data set type indicating "Default configured NSSAI update data",

A) if the ACK bit of the UE parameters update header in the UE parameters update transparent container is set to "acknowledgment requested" and if the UE parameters update list does not include a UE parameters update data set with UE parameters update data set type indicating "Routing indicator update data", the ME shall send an acknowledgement in the Payload container IE of an UL NAS TRANSPORT message with Payload type IE set to "UE parameters update transparent container" as specified in subclause 5.4.5.2.2

B) the ME shall replace the stored default configured NSSAI with the default configured NSSAI included in the default configured NSSAI update data. In case of SNPN, the ME shall replace the stored default configured NSSAI associated with the selected entry of the "list of subscriber data" or the PLMN subscription with the default configured NSSAI included in the default configured NSSAI update data; and

C) if the REG bit of the UE parameters update header in the UE parameters update transparent container is set to "re-registration requested" and the UE parameters update list does not include a UE parameters update data set with UE parameters update data set type indicating "Routing indicator update data", the UE shall wait until it enters 5GMM-IDLE mode and then the UE shall initiate a registration procedure for mobility registration update as specified in subclause 5.5.1.3.

 if the UE parameters update list does not include a UE parameters update data set with UE parameters update data set type indicating "Routing indicator update data", the UE used the old default configured NSSAI to create the requested NSSAI in a REGISTRATION REQUEST message, the UE does not have a configured NSSAI for the current PLMN and the UE has an allowed NSSAI for the current PLMN which contains one or more S-NSSAIs that are not included in the new default configured NSSAI, the UE shall wait until it enters 5GMM-IDLE mode and then the UE shall initiate a registration procedure for mobility and periodic registration update as specified in subclause 5.5.1.3; and

iii) if the UE parameters update list includes a UE parameters update data set with UE parameters update data set type indicating "Disaster roaming information update data",

A) if the ACK bit of the UE parameters update header in the UE parameters update transparent container is set to "acknowledgment requested" and if the UE parameters update list does not include a UE parameters update data set with UE parameters update data set type indicating "Routing indicator update data" or a UE parameters update data set with UE parameters update data set type indicating "Default configured NSSAI update data", the ME shall send an acknowledgement in the Payload container IE of an UL NAS TRANSPORT message with Payload type IE set to "UE parameters update transparent container" as specified in subclause 5.4.5.2.2;

B) the UE shall delete the indication of whether disaster roaming is enabled in the UE stored in the ME, if any, and store the indication of whether disaster roaming is enabled in the UE included in the disaster roaming information update data in the ME; and

C) if the REG bit of the UE parameters update header in the UE parameters update transparent container is set to "re-registration requested" and the UE parameters update list does not include a UE parameters update data set with UE parameters update data set type indicating "Routing indicator update data", the UE shall wait until it enters 5GMM-IDLE mode and then the UE shall initiate a registration procedure for mobility registration update as specified in subclause 5.5.1.3.

2) does not successfully pass the integrity check (see 3GPP TS 33.501 [24]) then the UE shall discard the content of the payload container IE;

j) "Location services message container" and the 5GMM cause IE is not included in the DL NAS TRANSPORT message, the UE shall forward the payload container type, the content of the Payload container IE and the routing information in the Additional information IE if included to the upper layer location services application;

k) "CIoT user data container", the UE shall forward the content of the Payload container IE and the PDU session ID to the 5GSM sublayer;

l) "CIoT user data container" and:

1) the 5GMM cause IE is set to the 5GMM cause #22 "Congestion", the UE passes to the 5GSM sublayer an indication that the CIoT user data was not forwarded due to DNN based congestion control along with the CIoT user data from the Payload container IE of the DL NAS TRANSPORT message, and the time value from the Back-off timer value IE.

2) the 5GMM cause IE is set to the 5GMM cause #90 "payload was not forwarded", the UE passes to the 5GSM sublayer an indication that the user data container was not forwarded due to routing failure along with the user data container from the Payload container IE and the PDU session ID from the PDU session ID IE of the DL NAS TRANSPORT message.

m) "Service-level-AA container" and the Service-level device ID included in the Service-level-AA container is set to a CAA-level UAV ID, the UE shall forward the content of the Payload container IE to the upper layer application for UAS corresponding to the CAA-level UAV ID;

m1) "Event notification", the UE shall provide the received event notification indicator(s) to the upper layers. If the type of the event notification indicator is set to "SRVCC handover cancelled indicator", the UE shall operate as described in 3GPP TS 23.216 [6A]; or

n) "Multiple payloads", the UE shall first decode the content of the Payload container IE (see subclause 9.11.3.39) to obtain the number of payload container entries and for each payload container entry, the UE shall:

1) decode the payload container type field;

2) decode the optional IE fields and the payload container contents field in the payload container entry; and

3) handle the content of each payload container entry the same as the content of the Payload container IE and the associated optional IEs as specified in bullets a) to m) above according to the payload container type field.

\*\*\*\*\* Next change \*\*\*\*\*

5.5.1.2.2 Initial registration initiation

The UE in state 5GMM-DEREGISTERED shall initiate the registration procedure for initial registration by sending a REGISTRATION REQUEST message to the AMF,

a) when the UE performs initial registration for 5GS services;

b) when the UE performs initial registration for emergency services;

c) when the UE performs initial registration for SMS over NAS;

d) when the UE moves from GERAN to NG-RAN coverage or the UE moves from a UTRAN to NG-RAN coverage and the following applies:

1) the UE initiated a GPRS attach or routing area updating procedure while in A/Gb mode or Iu mode; or

2) the UE has performed 5G-SRVCC from NG-RAN to UTRAN as specified in 3GPP TS 23.216 [6A],

 and since then the UE did not perform a successful EPS attach or tracking area updating procedure in S1 mode or registration procedure in N1 mode;

e) when the UE performs initial registration for onboarding services in SNPN; and

f) when the UE performs initial registration for disaster roaming services;

with the following clarifications to initial registration for emergency services:

a) the UE shall not initiate an initial registration for emergency services over the current access, if the UE is already registered for emergency services over the non-current access, unless the initial registration has to be initiated to perform handover of an existing emergency PDU session from the non-current access to the current access; and

NOTE 1: Transfer of an existing emergency PDU session between 3GPP access and non-3GPP access is needed e.g. if the UE determines that the current access is no longer available.

b) the UE can only initiate an initial registration for emergency services over non-3GPP access if it cannot register for emergency services over 3GPP access.

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

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

a) if:

1) the UE:

i) was previously registered in S1 mode before entering state EMM-DEREGISTERED; and

ii) has received an "interworking without N26 interface not supported" indication from the network; and

2) EPS security context and a valid 4G-GUTI are available;

 then the UE shall create a 5G-GUTI mapped from the valid 4G-GUTI and indicate the mapped 5G-GUTI in the 5GS mobile identity IE. The UE shall include the UE status IE with the EMM registration status set to "UE is not in EMM-REGISTERED state" and shall include an ATTACH REQUEST message as specified in 3GPP TS 24.301 [15] in the EPS NAS message container IE.

 Additionally, if the UE holds a valid 5G‑GUTI, the UE shall include the 5G-GUTI in the Additional GUTI IE in the REGISTRATION REQUEST message in the following order:

1) a valid 5G-GUTI that was previously assigned by the same PLMN with which the UE is performing the registration, if available;

2) a valid 5G-GUTI that was previously assigned by an equivalent PLMN, if available; and

3) a valid 5G-GUTI that was previously assigned by any other PLMN, if available;

b) if:

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

2) the UE is registering with a SNPN, the UE holds a valid 5G-GUTI that was previously assigned, over 3GPP access or non-3GPP access, by the same SNPN with which the UE is performing the registration, and the UE is not initiating the initial registration for onboarding services in SNPN, the UE shall indicate the 5G-GUTI in the 5GS mobile identity IE;

c) if 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:

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

2) the UE is registering with an SNPN, the UE holds a valid 5G-GUTI that was previously assigned, over 3GPP access or non-3GPP access, by any other SNPN, and the UE is not initiating the initial registration for onboarding services in SNPN, the UE shall indicate the 5G-GUTI in the 5GS mobile identity IE and shall additionally include the NID of the other SNPN in the NID IE;

e) if a SUCI other than an onboarding SUCI is available, and the UE is not initiating the initial registration for onboarding services in SNPN, the UE shall include the SUCI other than an onboarding SUCI in the 5GS mobile identity IE;

f) if the UE does not hold a valid 5G-GUTI or SUCI other than an onboarding SUCI, and is initiating the initial registration for emergency services, the PEI shall be included in the 5GS mobile identity IE; and

g) if the UE is initiating the initial registration for onboarding services in SNPN, an onboarding SUCI shall be included in the 5GS mobile identity IE.

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].

NOTE 3: The value of the 5GMM registration status included by the UE in the UE status IE is not used by the AMF.

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

If the UE requests the use of SMS over NAS, the UE shall include the 5GS update type IE in the REGISTRATION REQUEST message with the SMS requested bit set to "SMS over NAS supported". When the 5GS update type IE is included in the REGISTRATION REQUEST for reasons other than requesting the use of SMS over NAS, and the UE does not need to register for SMS over NAS, the UE shall set the SMS requested bit of the 5GS update type IE to "SMS over NAS not supported" in the REGISTRATION REQUEST message.

If the UE supports MICO mode and requests the use of MICO mode, then the UE shall include the MICO indication IE in the REGISTRATION REQUEST message. If the UE requests to use an active time value, it shall include the active time value in the T3324 IE in the REGISTRATION REQUEST message. Additionally, if the UE supports strictly periodic registration timer, the UE shall set the Strictly Periodic Registration Timer Indication bit of the MICO indication IE in the REGISTRATION REQUEST message to "strictly periodic registration timer supported".

If the UE needs to use the UE specific DRX parameters, the UE shall include the Requested DRX parameters IE in the REGISTRATION REQUEST message.

If the UE is in NB-N1 mode and if the UE needs to use the UE specific DRX parameters for NB-N1 mode, the UE shall include the Requested NB-N1 mode DRX parameters IE in the REGISTRATION REQUEST message.

If the UE supports eDRX and requests the use of eDRX, the UE shall include the Requested extended DRX parameters IE in the REGISTRATION REQUEST message.

If the UE needs to request LADN information for specific LADN DNN(s) or indicates a request for LADN information as specified in 3GPP TS 23.501 [8], the UE shall include the LADN indication IE in the REGISTRATION REQUEST message and:

- 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 or both 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;

b) the allowed NSSAI for the current PLMN, or a subset thereof as described below; 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 nor in the pending NSSAI.

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.

If all the S-NSSAI(s) corresponding to the slice(s) to which the UE intends to register are included in the pending NSSAI, the UE shall not include a requested NSSAI in the REGISTRATION REQUEST message.

The subset of configured NSSAI provided in the requested NSSAI consists of one or more S-NSSAIs in the configured NSSAI applicable to the current PLMN, if the S-NSSAI is neither in the rejected NSSAI f 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 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.

NOTE 4: If the UE has stored mapped S-NSSAI(s) for the rejected NSSAI, and one or more S-NSSAIs in the stored mapped S-NSSAI(s) for the configured NSSAI are not included in the stored mapped S-NSSAI(s) for the rejected NSSAI, then a S-NSSAI in the configured NSSAI associated to one or more of these mapped S-NSSAI(s) for the configured NSSAI are available to be included in the requested NSSAI together with their mapped S-NSSAI.

NOTE 5: If one or more mapped S-NSSAIs in the stored mapped S-NSSAI(s) for the configured NSSAI are not included in the stored rejected NSSAI for the failed or revoked NSSAA, a S-NSSAI in the configured NSSAI associated to one or more of these mapped S-NSSAI(s) for the configured NSSAI are available to be included in the registration request together with their mapped S-NSSAI.

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

NOTE 7: The number of S-NSSAI(s) included in the requested NSSAI cannot exceed eight.

If the UE initiates an initial registration for onboarding services in SNPN, the UE shall not include the Requested NSSAI IE in the REGISTRATION REQUEST message.

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

NOTE 8: The UE does not have to set the Follow-on request indicator to 1, even if the UE has to request resources for V2X communication over PC5 reference point, ProSe direct discovery over PC5 or ProSe direct communication over PC5.

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; additionally, if the UE supports EPS-UPIP, the UE shall set the EPS-UPIP bit to "EPS-UPIP supported" in the S1 UE network capability IE in the REGISTRATION REQUEST message; and

- if the UE supports sending an ATTACH REQUEST message containing a PDN CONNECTIVITY REQUEST message with request type set to "handover" to transfer a PDU session from N1 mode to S1 mode, set the HO attach bit to "attach request message containing PDN connectivity request with request type set to handover to transfer PDU session from N1 mode to S1 mode supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

Editor's note: While 3GPP TSG-SA has approved a Rel-17 WID and CRs on EPS-UPIP, 3GPP TSG- RAN has not yet approved a WID to do the RAN work.

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 supports the Location Services (LCS) notification mechanisms in N1 mode as specified in 3GPP TS 23.273 [6B], the UE shall set the 5G-LCS bit to "LCS notification mechanisms supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

If the UE is in NB-N1 mode, then the UE shall set the Control plane CIoT 5GS optimization bit to "Control plane CIoT 5GS optimization supported" in the 5GMM capability IE of the REGISTRATION REQUEST message. If the UE is capable of NB-S1 mode, then the UE shall set the Control plane CIoT EPS optimization bit to "Control plane CIoT EPS optimization supported" in the S1 UE network capability IE of the REGISTRATION REQUEST message.

If the UE supports N3 data transfer and multiple user-plane resources in NB-N1 mode (see 3GPP TS 36.306 [25D], 3GPP TS 36.331 [25A]), then the UE shall set the Multiple user-plane resources support bit to "Multiple user-plane resources supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

If the UE supports 5G-SRVCC from NG-RAN to UTRAN as specified in 3GPP TS 23.216 [6A], the UE shall:

- set the 5G-SRVCC from NG-RAN to UTRAN capability bit to "5G-SRVCC from NG-RAN to UTRAN supported" in the 5GMM capability IE of the REGISTRATION REQUEST message; and

- include the Mobile station classmark 2 IE and the Supported codecs IE in the REGISTRATION REQUEST message.

If the UE supports service gap control, then the UE shall set the SGC bit to "service gap control supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

If the UE supports the restriction on use of enhanced coverage, the UE shall set the RestrictEC bit to "Restriction on use of enhanced coverage supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

If the UE supports network slice-specific authentication and authorization, the UE shall set the NSSAA bit to "network slice-specific authentication and authorization supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

If the UE supports CAG feature, the UE shall set the CAG bit to "CAG Supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

When the UE is not in NB-N1 mode, if the UE supports RACS, the UE shall:

a) set the RACS bit to "RACS supported" in the 5GMM capability IE of the REGISTRATION REQUEST message;

b) if the UE has an applicable network-assigned UE radio capability ID for the current UE radio configuration in the selected PLMN or SNPN, include the applicable network-assigned UE radio capability ID in the UE radio capability ID IE of the REGISTRATION REQUEST message; and

c) if the UE:

1) does not have an applicable network-assigned UE radio capability ID for the current UE radio configuration in the selected PLMN or SNPN; and

2) has an applicable manufacturer-assigned UE radio capability ID for the current UE radio configuration,

 include the applicable manufacturer-assigned UE radio capability ID in the UE radio capability ID IE of the REGISTRATION REQUEST message.

If the UE has one or more stored UE policy sections identified by a UPSI with the PLMN ID part indicating the HPLMN or the selected PLMN, the UE shall set the Payload container type IE to "UE policy container" and include the UE STATE INDICATION message (see annex D) in the Payload container IE of the REGISTRATION REQUEST message.

NOTE 9: In this version of the protocol, the UE can only include the Payload container IE in the REGISTRATION REQUEST message to carry a payload of type "UE policy container".

If the UE does not have a valid 5G NAS security context, the UE shall send the REGISTRATION REQUEST message without including the NAS message container IE. The UE shall include the entire REGISTRATION REQUEST message (i.e. containing cleartext IEs and non-cleartext IEs, if any) in the NAS message container IE that is sent as part of the SECURITY MODE COMPLETE message as described in subclauses 4.4.6 and 5.4.2.3.

If the UE has a valid 5G NAS security context and the UE needs to send non-cleartext IEs, the UE shall send a REGISTRATION REQUEST message including the NAS message container IE as described in subclause 4.4.6. If the UE does not need to send non-cleartext IEs, the UE shall send a REGISTRATION REQUEST message without including the NAS message container IE.

If the UE supports ciphered broadcast assistance data and needs to obtain new ciphering keys, the UE shall include the Additional information requested IE with the CipherKey bit set to "ciphering keys for ciphered broadcast assistance data requested" in the REGISTRATION REQUEST message.

The UE shall set the WUSA bit to "WUS assistance information reception supported" in the 5GMM capability IE if the UE supports WUS assistance information. The UE may include its UE paging probability information in the Requested WUS assistance information IE if the UE has set the WUSA bit to "WUS assistance information reception supported" in the 5GMM capability IE and the UE is not performing the initial registration for emergency services.

The UE shall set the NR-PSSI bit to "NR paging subgrouping supported" in the 5GMM capability IE if the UE supports PEIPS assistance information and the 5GS registration type IE in the REGISTRATION REQUEST message is not set to "emergency registration".

If the REGISTRATION REQUEST message includes a NAS message container IE, the AMF shall process the REGISTRATION REQUEST message that is obtained from the NAS message container IE as described in subclause 4.4.6.

If the UE supports V2X as specified in 3GPP TS 24.587 [19B], the UE shall set the V2X bit to "V2X supported" in the 5GMM capability IE of the REGISTRATION REQUEST message. If the UE supports V2X communication over E-UTRA-PC5 as specified in 3GPP TS 24.587 [19B], the UE shall set the V2XCEPC5 bit to "V2X communication over E-UTRA-PC5 supported" in the 5GMM capability IE of the REGISTRATION REQUEST message. If the UE supports V2X communication over NR-PC5 as specified in 3GPP TS 24.587 [19B], the UE shall set the V2XCNPC5 bit to "V2X communication over NR-PC5 supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

The UE shall set the ER-NSSAI bit to "Extended rejected NSSAI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

If the UE supports the NSSRG, then the UE shall set the NSSRG bit to "NSSRG supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

If the W-AGF acting on behalf of an N5GC device initiates an initial registration as specified in 3GPP TS 23.316 [6D], the W-AGF acting on behalf of the N5GC device shall include the N5GC indication IE with the N5GC device indication bit set to "N5GC device registration is requested" in the REGISTRATION REQUEST message.

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 may 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 configured in the UE.

If the UE supports ProSe direct discovery as specified in 3GPP TS 24.554 [19E], the UE shall set the ProSe-dd bit to "ProSe direct discovery supported" in the 5GMM capability IE of the REGISTRATION REQUEST message. If the UE supports ProSe direct communication as specified in 3GPP TS 24.554 [19E], the UE shall set the ProSe-dc bit to "ProSe direct communication supported" in the 5GMM capability IE of the REGISTRATION REQUEST message. If the UE supports acting as ProSe layer-2 UE-to-network relay UE as specified in 3GPP TS 24.554 [19E], the UE shall set the ProSe-l2relay bit to "Acting as a ProSe layer-2 UE-to-network relay UE supported" in the 5GMM capability IE of the REGISTRATION REQUEST message. If the UE supports acting as ProSe layer-3 UE-to-network relay UE as specified in 3GPP TS 24.554 [19E], the UE shall set the ProSe-l3relay bit to "Acting as a ProSe layer-3 UE-to-network relay UE supported" in the 5GMM capability IE of the REGISTRATION REQUEST message. If the UE supports acting as ProSe layer-2 UE-to-network remote UE as specified in 3GPP TS 24.554 [19E], the UE shall set the ProSe-l2rmt bit to "Acting as a ProSe layer-2 UE-to-network remote UE supported" in the 5GMM capability IE of the REGISTRATION REQUEST message. If the UE supports acting as ProSe layer-3 UE-to-network remote UE as specified in 3GPP TS 24.554 [19E], the UE shall set the ProSe-l3rmt bit to "Acting as a ProSe layer-3 UE-to-network remote UE supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

If the Multi-USIM 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 Multi-USIM 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 Multi-USIM 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 Multi-USIM UE sets:

- the reject paging request bit to "reject paging request supported";

- the N1 NAS signalling connection release bit to "N1 NAS signalling connection release supported"; or

- both of them;

and supports the paging restriction, then the UE shall set the paging restriction bit to "paging restriction supported" in the 5GMM capability IE of the REGISTRATION REQUEST message otherwise the UE shall not set the paging restriction bit to "paging restriction supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

If the UE supports MINT, the UE shall set the MINT bit to "MINT supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

If the UE initiates the registration procedure for disaster roaming services and:

a) the PLMN with disaster condition is the HPLMN and:

1) the Additional GUTI IE is included in the REGISTRATION REQUEST message and does not contain a valid 5G-GUTI that was previously assigned by the HPLMN; or

2) the Additional GUTI IE is not included in the REGISTRATION REQUEST message and the 5GS mobile identity IE contains neither the SUCI nor a valid 5G-GUTI that was previously assigned by the HPLMN; or

b) the PLMN with disaster condition is not the HPLMN and:

1) the Additional GUTI IE is included in the REGISTRATION REQUEST message and does not contain a valid 5G-GUTI that was previously assigned by the PLMN with disaster condition; or

2) the Additional GUTI IE is not included in the REGISTRATION REQUEST message and the 5GS mobile identity IE does not contain a valid 5G-GUTI that was previously assigned by the PLMN with disaster condition;

then the UE shall include in the REGISTRATION REQUEST message the PLMN with disaster condition IE indicating the PLMN with disaster condition.

If the UE supports event notification, the UE shall set the EventNotification bit to "Event notification supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

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**Figure 5.5.1.2.2.1: Registration procedure for initial registration**

\*\*\*\*\* Next change \*\*\*\*\*

5.5.1.3.2 Mobility and periodic registration update initiation

The UE in state 5GMM-REGISTERED shall initiate the registration procedure for mobility and periodic registration update by sending a REGISTRATION REQUEST message to the AMF,

a) when the UE detects 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 in 5GMM-IDLE mode;

c) when the UE receives a CONFIGURATION UPDATE COMMAND message indicating "registration requested" in the Registration requested bit of the Configuration update indication IE as specified in subclauses 5.4.4.3;

d) when the UE in state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE either receives a paging or the UE receives a NOTIFICATION message with access type indicating 3GPP access over the non-3GPP access for PDU sessions associated with 3GPP access;

NOTE 1: As an implementation option, MUSIM-capable UE is allowed to not respond to paging based on the information available in the paging message, e.g. voice service indication.

e) upon inter-system change from S1 mode to N1 mode and if the UE previously had initiated an attach procedure or a tracking area updating procedure when in S1 mode;

f) when the UE receives an indication of "RRC Connection failure" from the lower layers and does not have signalling pending (i.e. when the lower layer requests NAS signalling connection recovery) except for the case specified in subclause 5.3.1.4;

g) when the UE changes the 5GMM capability or the S1 UE network capability or both;

h) when the UE's usage setting changes;

i) when the UE needs to change the slice(s) it is currently registered to;

j) when the UE changes the UE specific DRX parameters;

k) when the UE in state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE receives a request from the upper layers to establish an emergency PDU session or perform emergency services fallback;

l) when the UE needs to register for SMS over NAS, indicate a change in the requirements to use SMS over NAS, or de-register from SMS over NAS;

m) when the UE needs to indicate PDU session status to the network after performing a local release of PDU session(s) as specified in subclauses 6.4.1.5 and 6.4.3.5;

n) when the UE in 5GMM-IDLE mode changes the radio capability for NG-RAN or E-UTRAN;

o) when the UE receives a fallback indication from the lower layers and does not have signalling pending (i.e. when the lower layer requests NAS signalling connection recovery, see subclauses 5.3.1.4 and 5.3.1.2);

p) void;

q) when the UE needs to request new LADN information;

r) when the UE needs to request the use of MICO mode or needs to stop the use of MICO mode or to request the use of new T3324 value;

s) when the UE in 5GMM-CONNECTED mode with RRC inactive indication enters a cell in the current registration area belonging to an equivalent PLMN of the registered PLMN and not belonging to the registered PLMN;

t) when the UE receives over 3GPP access a SERVICE REJECT message or a DL NAS TRANSPORT message, with the 5GMM cause value set to #28 "Restricted service area";

u) when the UE needs to request the use of eDRX, when a change in the eDRX usage conditions at the UE requires different extended DRX parameters, or needs to stop the use of eDRX;

NOTE 2: A change in the eDRX usage conditions at the UE can include e.g. a change in the UE configuration, a change in requirements from upper layers or the battery running low at the UE.

v) when the UE supporting 5G-SRVCC from NG-RAN to UTRAN changes the mobile station classmark 2 or the supported codecs;

w) when the UE in state 5GMM-REGISTERED.ATTEMPTING-REGISTRATION-UPDATE decides to request new network slices after being rejected due to no allowed network slices requested, or request S-NSSAI(s) which have been removed from the rejected NSSAI for the maximum number of UEs reached;

x) when the UE is not in NB-N1 mode and the applicable UE radio capability ID for the current UE radio configuration changes due to a revocation of the network-assigned UE radio capability IDs by the serving PLMN or SNPN;

y) when the UE receives a REGISTRATION REJECT message with 5GMM cause values #3, #6 or #7 without integrity protection over another access;

z) when the UE needs to request new ciphering keys for ciphered broadcast assistance data;

za) when due to manual CAG selection the UE has selected a CAG-ID which is not included in the "allowed CAG list" for the selected PLMN or a CAG-ID in a PLMN for which the entry in the "CAG information list" does not exist or when the UE has selected, without selecting a CAG-ID, a PLMN for which the entry in the "CAG information list" includes an "indication that the UE is only allowed to access 5GS via CAG cells";

zb) when the UE needs to start, stop or change the conditions for using the WUS assistance information or PEIPS assistance information;

zc) when the UE changes the UE specific DRX parameters in NB-N1 mode;

zd) when the UE in 5GMM-CONNECTED mode with RRC inactive indication enters a new cell with different RAT in current TAI list or not in current TAI list;

ze) when the UE enters state 5GMM-REGISTERED.NORMAL-SERVICE or 5GMM-REGISTERED.NON-ALLOWED-SERVICE (as described in subclause 5.3.5.2) over 3GPP access after the UE has sent a NOTIFICATION RESPONSE message over non-3GPP access in response to reception of a NOTIFICATION message over non-3GPP access as specified in subclause 5.6.3.1;

zf) when the UE supporting UAS services is not registered for UAS services and needs to register to the 5GS for UAS services;

zg) when the UE supporting MINT needs to perform the registration procedure for mobility and periodic registration update to register to the PLMN offering disaster roaming;

zh) when the MUSIM capable UE needs to request a new 5G-GUTI assignment; or

NOTE 3: Based on implementation, the MUSIM capable UE can request a new 5G-GUTI assignment (e.g. when the lower layers request to modify the timing of the paging occasions).

zi) when the MUSIM capable UE in state 5GMM-REGISTERED.NON-ALLOWED-SERVICE needs to requests the network to remove the paging restrictions.

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".

Editor's note: It is FFS how the new registration type is used in AMF.

Editor's note: It is FFS if changes are needed to align the usage for "disaster roaming mobility registration updating" and "mobility registration updating" wherever "mobility registration updating" is used in this specification.

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 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 supports the Location Services (LCS) notification mechanisms in N1 mode as specified in 3GPP TS 23.273 [6B], the UE shall set the 5G-LCS bit to " LCS notification mechanisms supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

For all cases except case b), when the UE is not in NB-N1 mode and the UE supports RACS, the UE shall set the RACS bit to "RACS supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

If the UE supports 5G-SRVCC from NG-RAN to UTRAN as specified in 3GPP TS 23.216 [6A], the UE shall set:

- the 5G-SRVCC from NG-RAN to UTRAN capability bit to "5G-SRVCC from NG-RAN to UTRAN supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b; and

- include the Mobile station classmark 2 IE and the Supported codecs IE in the REGISTRATION REQUEST message for all cases except case b.

If the UE supports the restriction on use of enhanced coverage, the UE shall set the RestrictEC bit to "Restriction on use of enhanced coverage supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

If the UE supports network slice-specific authentication and authorization, the UE shall set the NSSAA bit to "network slice-specific authentication and authorization supported" in the 5GMM capability IE of the REGISTRATION REQUEST message for all cases except case b.

If the UE supports CAG feature, the UE shall set the CAG bit to "CAG Supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

If the UE operating in the single-registration mode performs inter-system change from S1 mode to N1 mode and has one or more stored UE policy sections identified by a UPSI with the PLMN ID part indicating the HPLMN or the selected PLMN, the UE shall set the Payload container type IE to "UE policy container" and include the UE STATE INDICATION message (see annex D) in the Payload container IE of the REGISTRATION REQUEST message.

NOTE 4: In this version of the protocol, the UE can only include the Payload container IE in the REGISTRATION REQUEST message to carry a payload of type "UE policy container".

The UE in state 5GMM-REGISTERED shall initiate the registration procedure for mobility and periodic update by sending a REGISTRATION REQUEST message to the AMF when the UE needs to request the use of SMS over NAS transport or the current requirements to use SMS over NAS transport change in the UE. The UE shall set the SMS requested bit of the 5GS update type IE in the REGISTRATION REQUEST message as specified in subclause 5.5.1.2.2.

When initiating a registration procedure for mobility and periodic registration update and the UE needs to send the 5GS update type IE for a reason different than indicating a change in requirement to use SMS over NAS, the UE shall set the SMS requested bit of the 5GS update type IE in the REGISTRATION REQUEST message to the same value as indicated by the UE in the last REGISTRATION REQUEST message.

If the UE no longer requires the use of SMS over NAS, then the UE shall include the 5GS update type IE in the REGISTRATION REQUEST message with the SMS requested bit set to "SMS over NAS not supported".

After sending the REGISTRATION REQUEST message to the AMF the UE shall start timer T3510. If timer T3502 is currently running, the UE shall stop timer T3502. If timer T3511 is currently running, the UE shall stop timer T3511.

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

The UE shall handle the 5GS mobile identity IE in the REGISTRATION REQUEST message as follows:

a) if the UE is operating in the single-registration mode, performs inter-system change from S1 mode to N1 mode, and the UE holds a valid 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 mobile identity IE. Additionally, if the UE holds a valid 5G‑GUTI, the UE shall include the 5G-GUTI in the Additional GUTI IE in the REGISTRATION REQUEST message in the following order:

1) a valid 5G-GUTI that was previously assigned by the same PLMN with which the UE is performing the registration, if available;

2) a valid 5G-GUTI that was previously assigned by an equivalent PLMN, if available; and

3) a valid 5G-GUTI that was previously assigned by any other PLMN, if available; and

NOTE 5: The 5G-GUTI included in the Additional GUTI IE is a native 5G-GUTI.

b) for all other cases, if the UE holds a valid 5G-GUTI, the UE shall indicate the 5G-GUTI in the 5GS mobile identity IE. If the UE is registering with an SNPN and the valid 5G-GUTI was previously assigned by another SNPN, the UE shall additionally include the NID of the other SNPN in the NID IE.

 If the UE holds two valid native 5G-GUTIs and:

1) one of the valid native 5G-GUTI was assigned by the PLMN with which the UE is performing the registration, then the UE shall indicate the valid native 5G-GUTI assigned by the PLMN with which the UE is performing the registration. In addition, the UE shall include the other valid native 5G-GUTI in the Additional GUTI IE; or

2) none of the valid native 5G-GUTI was assigned by the PLMN with which the UE is performing the registration, then the UE shall indicate the valid native 5G-GUTI assigned over the same access via which the UE is performing the registration.

If the UE supports MICO mode and requests the use of MICO mode, then the UE shall include the MICO indication IE in the REGISTRATION REQUEST message. If the UE requests to use an active time value, it shall include the active time value in the T3324 IE in the REGISTRATION REQUEST message. Additionally, if the UE supports strictly periodic registration timer, the UE shall set the Strictly Periodic Registration Timer Indication bit of the MICO indication IE in the REGISTRATION REQUEST message to "strictly periodic registration timer supported". If the UE needs to stop the use of MICO mode, then the UE shall not include the MICO indication IE in the REGISTRATION REQUEST message.

If the UE needs to use or change the UE specific DRX parameters, the UE shall include the Requested DRX parameters IE in the REGISTRATION REQUEST message.

If the UE is in NB-N1 mode and if the UE needs to use or change the UE specific DRX parameters for NB-N1 mode, the UE shall include the Requested NB-N1 mode DRX parameters IE in the REGISTRATION REQUEST message.

If the UE supports eDRX and requests the use of eDRX, the UE shall include the Requested extended DRX parameters IE in the REGISTRATION REQUEST message.

If the UE needs to request LADN information for specific LADN DNN(s) or indicates a request for LADN information as specified in 3GPP TS 23.501 [8], the UE shall include the LADN indication IE in the REGISTRATION REQUEST message and:

- 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.

If the UE is initiating the registration procedure for mobility and periodic registration update, the UE may include the Uplink data status IE to indicate which PDU session(s) that is:

- not associated with control plane only indication;

- associated with the access type the REGISTRATION REQUEST message is sent over; and

- have pending user data to be sent over user plane.

If the UE has one or more active always-on PDU sessions associated with the access type over which the REGISTRATION REQUEST message is sent and the user-plane resources for these PDU sessions are not established, the UE shall include the Uplink data status IE and indicate that the UE has pending user data to be sent for those PDU sessions. If the UE is located outside the LADN service area, the UE shall not include the PDU session for LADN in the Uplink data status IE. If the UE is in a non-allowed area or is not in an allowed area as specified in subclause 5.3.5, the UE shall not include the Uplink data status IE except for emergency services or for high priority access. If the UE supports MUSIM and requests the network to release the NAS signalling connection, the UE shall not include the Uplink data status IE in the REGISTRATION REQUEST message.

If the UE has one or more active PDU sessions which are not accepted by the network as always-on PDU sessions and no uplink user data pending to be sent for those PDU sessions, the UE shall not include those PDU sessions in the Uplink data status IE in the REGISTRATION REQUEST message.

When the registration procedure for mobility and periodic registration update is initiated in 5GMM-IDLE mode, the UE may include a PDU session status IE in the REGISTRATION REQUEST message, indicating:

- which single access PDU sessions associated with the access type the REGISTRATION REQUEST message is sent over are active in the UE; and

- which MA PDU sessions are active and having user plane resources established in the UE on the access the REGISTRATION REQUEST message is sent over.

If the UE received a paging message with the access type indicating non-3GPP access, the UE shall include the Allowed PDU session status IE in the REGISTRATION REQUEST message indicating the PDU session(s) for which the UE allows to re-establish the user-plane resources over 3GPP access.

When the Allowed PDU session status IE is included in the REGISTRATION REQUEST message, the UE shall indicate that a PDU session is not allowed to be transferred to the 3GPP access if the 3GPP PS data off UE status is "activated" for the corresponding PDU session and the UE is not using the PDU session to send uplink IP packets for any of the 3GPP PS data off exempt services (see subclause 6.2.10).

If the UE operating in the single-registration mode performs inter-system change from S1 mode to N1 mode, the UE:

a) shall include the UE status IE with the EMM registration status set to "UE is in EMM-REGISTERED state" in the REGISTRATION REQUEST message;

NOTE 6: Inclusion of the UE status IE with this setting corresponds to the indication that the UE is "moving from EPC" as specified in 3GPP TS 23.502 [9], subclause 4.11.1.3.3 and 4.11.2.3.

NOTE 7: The value of the 5GMM registration status included by the UE in the UE status IE is not used by the AMF.

b) may include the PDU session status IE in the REGISTRATION REQUEST message indicating the status of the PDU session(s) mapped during the inter-system change from S1 mode to N1 mode from the PDN connection(s) for which the EPS indicated that interworking to 5GS is supported, if any (see subclause 6.1.4.1);

c) shall include a TRACKING AREA UPDATE REQUEST message as specified in 3GPP TS 24.301 [15] in the EPS NAS message container IE in the REGISTRATION REQUEST message if the registration procedure is initiated in 5GMM-IDLE mode and the UE has received an "interworking without N26 interface not supported" indication from the network;

c1) may include a TRACKING AREA UPDATE REQUEST message as specified in 3GPP TS 24.301 [15] in the EPS NAS message container IE in the REGISTRATION REQUEST message if the registration procedure is initiated in 5GMM-IDLE mode and the UE has received an "interworking without N26 interface supported" indication from the network; and

d) shall include an EPS bearer context status IE in the REGISTRATION REQUEST message indicating which EPS bearer contexts are active in the UE, if the UE has locally deactivated EPS bearer context(s) for which interworking to 5GS is supported while the UE was in S1 mode without notifying the network.

For a REGISTRATION REQUEST message with a 5GS registration type IE indicating "mobility registration updating", if the UE:

a) is in NB-N1 mode and:

1) the UE needs to change the slice(s) it is currently registered to within the same registration area; or

2) the UE has entered a new registration area; or

b) the UE is not in NB-N1 mode and is not registered for onboarding services in SNPN;

the UE shall include the Requested NSSAI IE containing the S-NSSAI(s) corresponding to the network slices to which the UE intends to register and associated mapped S-NSSAI(s), if available, in the REGISTRATION REQUEST message as described in this subclause. When the UE is entering a visited PLMN and intends to register to the slices for which the UE has only HPLMN S-NSSAI(s) available, the UE shall include these HPLMN S-NSSAI(s) in the Requested mapped NSSAI IE.

NOTE 8: The REGISTRATION REQUEST message can include both the Requested NSSAI IE and the Requested mapped NSSAI IE as described below.

If the UE is registered for onboarding services in SNPN, the UE shall not include the Requested NSSAI IE in the REGISTRATION REQUEST message.

If the UE has allowed NSSAI or configured NSSAI or both for the current PLMN, the Requested NSSAI IE shall include either:

a) the configured NSSAI for the current PLMN, or a subset thereof as described below;

b) the allowed NSSAI for the current PLMN, or a subset thereof as described below; 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 nor in the pending NSSAI.

and in addition the Requested NSSAI IE shall include S-NSSAI(s) applicable in the current PLMN, and if available the associated mapped S-NSSAI(s) for:

a) each PDN connection that is established in S1 mode when the UE is operating in the single-registration mode and the UE is performing an inter-system change from S1 mode to N1 mode; or

b) each active PDU session.

If the UE does not have S-NSSAI(s) applicable in the current PLMN, then the Requested mapped NSSAI IE shall include HPLMN S-NSSAI(s) (e.g. mapped S-NSSAI(s), if available) for:

a) each PDN connection established in S1 mode when the UE is operating in the single-registration mode and the UE is performing an inter-system change from S1 mode to N1 mode to a visited PLMN; or

b) each active PDU session when the UE is performing mobility from N1 mode to N1 mode to a visited PLMN.

NOTE 9: The Requested NSSAI IE is used instead of Requested mapped NSSAI IE in REGISTRATION REQUEST message when the UE enters HPLMN.

For a REGISTRATION REQUEST message with a 5GS registration type IE indicating "mobility registration updating", if the UE is in NB-N1 mode and the procedure is initiated for all cases except case a), c), e), i), s), t), w), and x), the REGISTRATION REQUEST message shall not include the Requested NSSAI IE.

If the UE has:

- no allowed NSSAI for the current PLMN;

- no configured NSSAI for the current PLMN;

- neither active PDU session(s) nor PDN connection(s) to transfer associated with an S-NSSAI applicable in the current PLMN; and

- neither active PDU session(s) nor PDN connection(s) to transfer associated with mapped S-NSSAI(s);

and has a default configured NSSAI, then the UE shall:

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

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

If the UE has:

- no allowed NSSAI for the current PLMN;

- no configured NSSAI for the current PLMN;

- neither active PDU session(s) nor PDN connection(s) to transfer associated with an S-NSSAI applicable in the current PLMN

- neither active PDU session(s) nor PDN connection(s) to transfer associated with mapped S-NSSAI(s); and

- no default configured NSSAI

the UE shall include neither Requested NSSAI IE nor Requested mapped NSSAI IE in the REGISTRATION REQUEST message.

If all the S-NSSAI(s) corresponding to the slice(s) to which the UE intends to register are included in the pending NSSAI, the UE shall not include a requested NSSAI in the REGISTRATION REQUEST message.

When the UE storing a pending NSSAI intends to register to additional S-NSSAI(s) over the same access type, the UE shall send the requested NSSAI containing the additional S-NSSAI(s) that the UE intends to register to in the REGISTRATION REQUEST message. The requested NSSAI shall not include any S-NSSAI from the pending NSSAI.

The subset of configured NSSAI provided in the requested NSSAI consists of one or more S-NSSAIs in the configured NSSAI applicable to this PLMN, 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 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.

NOTE 10: If the UE has stored mapped S-NSSAI(s) for the rejected NSSAI, and one or more S-NSSAIs in the stored mapped S-NSSAI(s) for the configured NSSAI are not included in the stored mapped S-NSSAI(s) for the rejected NSSAI, then a S-NSSAI in the configured NSSAI associated to one or more of these mapped S-NSSAI(s) for the configured NSSAI are available to be included in the requested NSSAI together with their mapped S-NSSAI.

NOTE 11: If one or more mapped S-NSSAIs in the stored mapped S-NSSAI(s) for the configured NSSAI are not included in the stored rejected NSSAI for the failed or revoked NSSAA, a S-NSSAI in the configured NSSAI associated to one or more of these mapped S-NSSAI(s) for the configured NSSAI are available to be included in the registration request together with their mapped S-NSSAI.

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 12: 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 13: The number of S-NSSAI(s) included in the requested NSSAI cannot exceed eight.

The UE shall set the Follow-on request indicator to "Follow-on request pending", if the UE:

a) initiates the mobility and periodic registration updating procedure upon request of the upper layers to establish an emergency PDU session;

b) initiates the mobility and periodic registration updating procedure upon receiving a request from the upper layers to perform emergency services fallback; or

c) needs to prolong the established NAS signalling connection after the completion of the registration procedure for mobility and periodic registration update (e.g. due to uplink signalling pending but no user data pending).

NOTE 14: The UE does not have to set the Follow-on request indicator to 1 even if the UE has to request resources for V2X communication over PC5 reference point, ProSe direct discovery over PC5 or ProSe direct communication over PC5.

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 in the 5GMM-CONNECTED mode and the UE changes the radio capability for NG-RAN or E‑UTRAN, the UE may locally release the established N1 NAS signalling connection and enter the 5GMM-IDLE mode. Then, the UE shall initiate the registration procedure for mobility and periodic updating including the 5GS update type IE in the REGISTRATION REQUEST message with the NG-RAN-RCU bit set to " UE radio capability update needed".

For case o), the UE shall include the Uplink data status IE in the REGISTRATION REQUEST message indicating the PDU session(s) without active user-plane resources for which the UE has pending user data to be sent, if any, and the PDU session(s) for which user-plane resources were active prior to receiving the fallback indication, if any. If the UE is in a non-allowed area or if the UE is not in allowed area, the UE shall not include the Uplink data status IE in REGISTRATION REQUEST message, except if the PDU session for which user-plane resources were active prior to receiving the fallback indication is an emergency PDU session, or if the UE is configured for high priority access in the selected PLMN as specified in subclause 5.3.5.

For case f), the UE shall include the Uplink data status IE in the REGISTRATION REQUEST message indicating the PDU session(s) for which user-plane resources were active prior to receiving "RRC Connection failure" indication from the lower layers, if any. If the UE is in non-allowed area or not in allowed area, the UE shall not include the Uplink data status IE in REGISTRATION REQUEST message, except that the PDU session(s) for which user-plane resources were active prior to receiving the "RRC Connection failure"indication is emergency PDU session(s), or that the UE is configured for high priority access in selected PLMN, as specified in subclause 5.3.5.

If the UE supports service gap control, then the UE shall set the SGC bit to "service gap control supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

For case a), x) or if the UE operating in the single-registration mode performs inter-system change from S1 mode to N1 mode, the UE shall:

a) if the UE has an applicable network-assigned UE radio capability ID for the current UE radio configuration in the selected PLMN or SNPN, include the applicable network-assigned UE radio capability ID in the UE radio capability ID IE of the REGISTRATION REQUEST message; and

b) if the UE:

1) does not have an applicable network-assigned UE radio capability ID for the current UE radio configuration in the selected PLMN or SNPN; and

2) has an applicable manufacturer-assigned UE radio capability ID for the current UE radio configuration,

 include the applicable manufacturer-assigned UE radio capability ID in the UE radio capability ID IE of the REGISTRATION REQUEST message.

For all cases except cases b and z, if the UE supports ciphered broadcast assistance data and the UE needs to obtain new ciphering keys, the UE shall include the Additional information requested IE with the CipherKey bit set to "ciphering keys for ciphered broadcast assistance data requested" in the REGISTRATION REQUEST message.

For case z, the UE shall include the Additional information requested IE with the CipherKey bit set to "ciphering keys for ciphered broadcast assistance data requested" in the REGISTRATION REQUEST message.

For case a, if the UE supports ciphered broadcast assistance data and the UE detects entering a tracking area for which one or more ciphering keys stored at the UE is not applicable, the UE should include the Additional information requested IE with the CipherKey bit set to "ciphering keys for ciphered broadcast assistance data requested" in the REGISTRATION REQUEST message.

For case b, if the UE supports ciphered broadcast assistance data and the remaining validity time for one or more ciphering keys stored at the UE is less than timer T3512, the UE should include the Additional information requested IE with the CipherKey bit set to "ciphering keys for ciphered broadcast assistance data requested" in the REGISTRATION REQUEST message.

The UE shall set the WUSA bit to "WUS assistance information reception supported" in the 5GMM capability IE if the UE supports WUS assistance information. The UE may include its UE paging probability information in the Requested WUS assistance information IE if the UE has set the WUSA bit to "WUS assistance information reception supported" in the 5GMM capability IE.

The UE shall set the NR-PSSI bit to "NR paging subgrouping supported" in the 5GMM capability IE if the UE supports PEIPS assistance information and the UE:

- is not registered for emergency services; and

- does not have an active emergency PDU session.

If the network supports the N1 NAS signalling connection release, the UE supports MUSIM and 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, the MUSIM UE is allowed to request the network to release the NAS signalling connection during mobility registration update procedure that is due to mobility outside the registration area even before detecting whether the network supports the N1 NAS signalling connection release in the new tracking area.

NOTE 16: If the network has already indicated support for paging restriction in the current stored registration area, the MUSIM UE is allowed to include paging restriction together with the request to the network to release the NAS signalling connection during mobility registration update procedure that is due to mobility outside the registration area even before detecting whether the network supports the paging restriction in the new tracking area.

For case zi the UE shall not include the Uplink data status IE in the REGISTRATION REQUEST message.

If the UE does not have a valid 5G NAS security context and the UE is sending the REGISTRATION REQUEST message after an inter-system change from S1 mode to N1 mode in 5GMM-IDLE mode, the UE shall send the REGISTRATION REQUEST message without including the NAS message container IE. The UE shall include the entire REGISTRATION REQUEST message (i.e. containing cleartext IEs and non-cleartext IEs, if any) in the NAS message container IE that is sent as part of the SECURITY MODE COMPLETE message as described in subclauses 4.4.6 and 5.4.2.3.

If the UE indicates "mobility registration updating" in the 5GS registration type IE and supports V2X as specified in 3GPP TS 24.587 [19B], the UE shall set the V2X bit to "V2X supported" in the 5GMM capability IE of the REGISTRATION REQUEST message. If the UE indicates "mobility registration updating" in the 5GS registration type IE and supports V2X communication over E-UTRA-PC5 as specified in 3GPP TS 24.587 [19B], the UE shall set the V2XCEPC5 bit to "V2X communication over E-UTRA-PC5 supported" in the 5GMM capability IE of the REGISTRATION REQUEST message. If the UE indicates "mobility registration updating" in the 5GS registration type IE and supports V2X communication over NR-PC5 as specified in 3GPP TS 24.587 [19B], the UE shall set the V2XCNPC5 bit to "V2X communication over NR-PC5 supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

The UE shall send the REGISTRATION REQUEST message including the NAS message container IE as described in subclause 4.4.6:

a) when the UE is sending the message from 5GMM-IDLE mode, the UE has a valid 5G NAS security context, and needs to send non-cleartext IEs; or

b) when the UE is sending the message after an inter-system change from S1 mode to N1 mode in 5GMM-IDLE mode and the UE has a valid 5G NAS security context and needs to send non-cleartext IEs.

The UE with a valid 5G NAS security context shall send the REGISTRATION REQUEST message without including the NAS message container IE when the UE does not need to send non-cleartext IEs and the UE is sending the message:

a) from 5GMM-IDLE mode; or

b) after an inter-system change from S1 mode to N1 mode in 5GMM-IDLE mode.

If the UE is sending the REGISTRATION REQUEST message after an inter-system change from S1 mode to N1 mode in 5GMM-CONNECTED mode and the UE needs to send non-cleartext IEs, the UE shall cipher the NAS message container IE using the mapped 5G NAS security context and send the REGISTRATION REQUEST message including the NAS message container IE as described in subclause 4.4.6. If the UE does not need to send non-cleartext IEs, the UE shall send the REGISTRATION REQUEST message without including the NAS message container IE.

If the REGISTRATION REQUEST message includes a NAS message container IE, the AMF shall process the REGISTRATION REQUEST message that is obtained from the NAS message container IE as described in subclause 4.4.6.

If the UE is in NB-N1 mode, then the UE shall set the Control plane CIoT 5GS optimization bit to "Control plane CIoT 5GS optimization supported" in the 5GMM capability IE of the REGISTRATION REQUEST message. If the UE is capable of NB-S1 mode, then the UE shall set the Control plane CIoT EPS optimization bit to "Control plane CIoT EPS optimization supported" in the S1 UE network capability IE of the REGISTRATION REQUEST message.

If the registration procedure for mobility and periodic registration update is initiated and there is request from the upper layers to perform "emergency services fallback" pending, the UE shall send a REGISTRATION REQUEST message without an Uplink data status IE.

If the UE supports N3 data transfer and multiple user-plane resources in NB-N1 mode (see 3GPP TS 36.306 [25D], 3GPP TS 36.331 [25A]), then the UE shall set the Multiple user-plane resources support bit to "Multiple user-plane resources supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

The UE shall set the ER-NSSAI bit to "Extended rejected NSSAI supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

If the UE supports the NSSRG, then the UE shall set the NSSRG bit to "NSSRG supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

If the UE enters 5GMM-REGISTERED.NO-CELL-AVAILABLE and it has one or more S-NSSAI(s) in pending NSSAI, the UE shall initiate registration procedure for mobility and periodic registration update upon finding a suitable cell according to 3GPP TS 38.304 [28].

For case zf), the UE shall include the Service-level device ID in the Service-level-AA container IE of the REGISTRATION REQUEST message and set the value to the CAA-level UAV ID. The UE may 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 configured in the UE.

If the UE supports ProSe direct discovery as specified in 3GPP TS 24.554 [19E], the UE shall set the ProSe-dd bit to "ProSe direct discovery supported" in the 5GMM capability IE of the REGISTRATION REQUEST message. If the UE supports ProSe direct communication as specified in 3GPP TS 24.554 [19E], the UE shall set the ProSe-dc bit to "ProSe discovery communication supported" in the 5GMM capability IE of the REGISTRATION REQUEST message. If the UE supports acting as ProSe layer-2 UE-to-network relay UE as specified in 3GPP TS 24.554 [19E], the UE shall set the ProSe-l2relay bit to "Acting as a ProSe layer-2 UE-to-network relay UE supported" in the 5GMM capability IE of the REGISTRATION REQUEST message. If the UE supports acting as ProSe layer-3 UE-to-network relay UE as specified in 3GPP TS 24.554 [19E], the UE shall set the ProSe-l3relay bit to "Acting as a ProSe layer-3 UE-to-network relay UE supported" in the 5GMM capability IE of the REGISTRATION REQUEST message. If the UE supports acting as ProSe layer-2 UE-to-network remote UE as specified in 3GPP TS 24.554 [19E], the UE shall set the ProSe-l2rmt bit to "Acting as a ProSe layer-2 UE-to-network remote UE supported" in the 5GMM capability IE of the REGISTRATION REQUEST message. If the UE supports acting as ProSe layer-3 UE-to-network remote UE as specified in 3GPP TS 24.554 [19E], the UE shall set the ProSe-l3rmt bit to "Acting as a ProSe layer-3 UE-to-network remote UE supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

For all cases except case b, if the Multi-USIM UE supports the N1 NAS signalling connection release, then the UE shall set the N1 NAS signalling connection release bit to "N1 NAS signalling connection release supported" in the 5GMM capability IE of the REGISTRATION REQUEST message otherwise the UE shall not set the N1 NAS signalling connection release bit to "N1 NAS signalling connection release supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

For all cases except case b, if the Multi-USIM UE supports the paging indication for voice services, then the UE shall set the paging indication for voice services bit to "paging indication for voice services supported" in the 5GMM capability IE of the REGISTRATION REQUEST message otherwise the UE shall not set the paging indication for voice services bit to "paging indication for voice services supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

For all cases except case b, if the Multi-USIM UE supports the reject paging request, then the UE shall set the reject paging request bit to "reject paging request supported" in the 5GMM capability IE of the REGISTRATION REQUEST message otherwise the UE shall not set the reject paging request bit to "reject paging request supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

For all cases except case b, if the Multi-USIM UE sets:

- the reject paging request bit to "reject paging request supported";

- the N1 NAS signalling connection release bit to "N1 NAS signalling connection release supported"; or

- both of them;

and supports the paging restriction, then the UE shall set the paging restriction bit to "paging restriction supported" in the 5GMM capability IE of the REGISTRATION REQUEST message otherwise the UE shall not set the paging restriction bit to "paging restriction supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

If the UE supports MINT, the UE shall set the MINT bit to "MINT supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

For case zg), if:

a) the PLMN with disaster condition is the HPLMN and:

1) the Additional GUTI IE is included in the REGISTRATION REQUEST message and does not contain a valid 5G-GUTI that was previously assigned by the HPLMN; or

2) the Additional GUTI IE is not included in the REGISTRATION REQUEST message and the 5GS mobile identity IE contains neither the SUCI nor a valid 5G-GUTI that was previously assigned by the HPLMN; or

b) the PLMN with disaster condition is not the HPLMN and:

1) the Additional GUTI IE is included in the REGISTRATION REQUEST message and does not contain a valid 5G-GUTI that was previously assigned by the PLMN with disaster condition; or

2) the Additional GUTI IE is not included in the REGISTRATION REQUEST message and the 5GS mobile identity IE does not contain a valid 5G-GUTI that was previously assigned by the PLMN with disaster condition;

then the UE shall include in the REGISTRATION REQUEST message the PLMN with disaster condition IE indicating the PLMN with disaster condition.

If the UE supports event notification, the UE shall set the EventNotification bit to "Event notification supported" in the 5GMM capability IE of the REGISTRATION REQUEST message.

****

**Figure 5.5.1.3.2.1: Registration procedure for mobility and periodic registration update**

\*\*\*\*\* Next change \*\*\*\*\*

9.11.3.1 5GMM capability

The purpose of the 5GMM capability information element is to provide the network with information concerning aspects of the UE related to the 5GCN or interworking with the EPS. The contents might affect the manner in which the network handles the operation of the UE.

The 5GMM capability information element is coded as shown in figure 9.11.3.1.1 and table 9.11.3.1.1.

The 5GMM capability is a type 4 information element with a minimum length of 3 octets and a maximum length of 15 octets.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 5GMM capability IEI | octet 1 |
| Length of 5GMM capability contents | octet 2 |
| SGC | 5G-IPHC-CP CIoT | N3 data | 5G-CP CIoT | RestrictEC | LPP | HO attach | S1 mode | octet 3 |
| RACS | NSSAA | 5G-LCS | V2XCNPC5 | V2XCEPC5 | V2X | 5G-UP CIoT | 5GSRVCC | octet 4\* |
| ProSe-l2relay | ProSe-dc | ProSe-dd | ER-NSSAI | 5G-EHC-CP CIoT | multipleUP | WUSA | CAG | octet 5\* |
| PR | RPR | PIV | NCR | NR-PSSI | ProSe-l3rmt | ProSe-l2rmt | ProSe-l3relay | octet 6\* |
| spare | spare | spare | spare | spare | EventNotification | MINT | NSSRG | octet 7\* |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | octet 8\*-15\* |
| Spare |

**Figure 9.11.3.1.1: 5GMM capability information element**

**Table 9.11.3.1.1: 5GMM capability information element**

|  |
| --- |
| EPC NAS supported (S1 mode) (octet 3, bit 1) |
| 0 |  |  |  | S1 mode not supported |
| 1 |  |  |  | S1 mode supported |
|  |
| ATTACH REQUEST message containing PDN CONNECTIVITY REQUEST message for handover support (HO attach) (octet 3, bit 2) |
| 0 |  |  |  | ATTACH REQUEST message containing PDN CONNECTIVITY REQUEST message with request type set to "handover" or "handover of emergency bearer services" to transfer PDU session from N1 mode to S1 mode not supported |
| 1 |  |  |  | ATTACH REQUEST message containing PDN CONNECTIVITY REQUEST message with request type set to "handover" or "handover of emergency bearer services" to transfer PDU session from N1 mode to S1 mode supported |
|  |
| LTE Positioning Protocol (LPP) capability (octet 3, bit 3) |
| 0 |  |  |  | LPP in N1 mode not supported |
| 1 |  |  |  | LPP in N1 mode supported (see 3GPP TS 36.355 [26]) |
|  |
| Restriction on use of enhanced coverage support (RestrictEC) (octet 3, bit 4)This bit indicates the capability to support restriction on use of enhanced coverage. |
| 0 |  |  |  | Restriction on use of enhanced coverage not supported |
| 1 |  |  |  | Restriction on use of enhanced coverage supported |
| Control plane CIoT 5GS optimization (5G-CP CIoT) (octet 3, bit 5)This bit indicates the capability for control plane CIoT 5GS optimization. |
| 0 |  |  |  | Control plane CIoT 5GS optimization not supported |
| 1 |  |  |  | Control plane CIoT 5GS optimization supported |
| N3 data transfer (N3 data) (octet 3, bit 6)This bit indicates the capability for N3 data transfer. |
| 0 |  |  |  | N3 data transfer supported |
| 1 |  |  |  | N3 data transfer not supported |
| IP header compression for control plane CIoT 5GS optimization (5G-IPHC-CP CIoT) (octet 3, bit 7)This bit indicates the capability for IP header compression for control plane CIoT 5GS optimization. |
| 0 |  |  |  | IP header compression for control plane CIoT 5GS optimization not supported |
| 1 |  |  |  | IP header compression for control plane CIoT 5GS optimization supported |
|  |
| Service gap control (SGC) (octet 3, bit 8) |
| 0 |  |  |  | service gap control not supported |
| 1 |  |  |  | service gap control supported |
|  |
| 5G-SRVCC from NG-RAN to UTRAN (5GSRVCC) capability (octet 4, bit 1) |
| 0 |  |  |  | 5G-SRVCC from NG-RAN to UTRAN not supported |
| 1 |  |  |  | 5G-SRVCC from NG-RAN to UTRAN supported (see 3GPP TS 23.216 [6A]) |
| User plane CIoT 5GS optimization (5G-UP CIoT) (octet 4, bit 2)This bit indicates the capability for user plane CIoT 5GS optimization. |
| 0 |  |  |  | User plane CIoT 5GS optimization not supported |
| 1 |  |  |  | User plane CIoT 5GS optimization supported |
|  |
| V2X capability (V2X) (octet 4, bit 3)  |
| This bit indicates the capability for V2X, as specified in 3GPP TS 24.587 [19B].Bit |
| 3 |  |  |  |  |
| 0 |  |  |  | V2X not supported |
| 1 |  |  |  | V2X supported |
|  |
| V2X communication over E-UTRA-PC5 capability (V2XCEPC5) (octet 4, bit 4) |
| This bit indicates the capability for V2X communication over E-UTRA-PC5, as specified in 3GPP TS 24.587 [19B]. |
| Bit |
| 4 |  |  |  |  |
| 0 |  |  |  | V2X communication over E-UTRA-PC5 not supported |
| 1 |  |  |  | V2X communication over E-UTRA-PC5 supported |
|  |
|

|  |
| --- |
| V2X communication over NR-PC5 capability (V2XCNPC5) (octet 4, bit 5) |
| This bit indicates the capability for V2X communication over NR-PC5, as specified in 3GPP TS 24.587 [19B]. |
| Bit |
| 5 |  |  |  |  |
| 0 |  |  |  | V2X communication over NR-PC5 not supported |
| 1 |  |  |  | V2X communication over NR-PC5 supported |
|  |

 |
| Location Services (5G-LCS) notification mechanisms capability (octet 4, bit 6) |
| 0 |  |  |  | LCS notification mechanisms not supported |
| 1 |  |  |  | LCS notification mechanisms supported (see 3GPP TS 23.273 [6B]) |
| Network slice-specific authentication and authorization (NSSAA) (octet 4, bit 7)This bit indicates the capability to support network slice-specific authentication and authorization. |
| 0 |  |  |  | Network slice-specific authentication and authorization not supported |
| 1 |  |  |  | Network slice-specific authentication and authorization supported |
|  |
| Radio capability signalling optimisation (RACS) capability (octet 4, bit 8) |
| 0 |  |  |  | RACS not supported |
| 1 |  |  |  | RACS supported |
|  |
| Closed Access Group (CAG) capability (octet 5, bit 1) |
| 0 CAG not supported1 CAG supportedWUS assistance (WUSA) information reception capability (octet 5, bit 2)0 WUS assistance information reception not supported1 WUS assistance information reception supported |
|  |
| Multiple user-plane resources support (multipleUP) (octet 5, bit 3) |
| This bit indicates the capability to support multiple user-plane resources in NB-N1 mode. |
|

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 0 |  |  |  | Multiple user-plane resources not supported |
| 1 |  |  |  | Multiple user-plane resources supported |

 |
| Ethernet header compression for control plane CIoT 5GS optimization (5G-EHC-CP CIoT) (octet 5, bit 4)0 Ethernet header compression for control plane CIoT 5GS optimization not supported1 Ethernet header compression for control plane CIoT 5GS optimization supported |
| Extended rejected NSSAI support (ER-NSSAI) (octet 5, bit 5) |
| This bit indicates the capability to support extended rejected NSSAI. |
|

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 0 |  |  |  | Extended rejected NSSAI not supported |
| 1 |  |  |  | Extended rejected NSSAI supported |

 |
| ProSe direct discovery (ProSe-dd) (octet 5, bit 6)This bit indicates the capability for ProSe direct discovery.Bit |
| 6 |  |  |  |  |
| 0 |  |  |  | ProSe direct discovery not supported |
| 1 |  |  |  | ProSe direct discovery supported |
| ProSe direct communication (ProSe-dc) (octet 5, bit 7)This bit indicates the capability for ProSe direct communication.

|  |
| --- |
| Bit |
|

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 7 |  |  |  |  |
| 0 |  |  |  | ProSe direct communication not supported |
| 1 |  |  |  | ProSe direct communication supported  |

 |

ProSe layer-2 UE-to-network-relay (ProSe-l2relay) (octet 5, bit 8)This bit indicates the capability to act as a layer-2 ProSe UE-to-network relay UE |
| Bit |
| 8 |  |  |  |  |
| 0 |  |  |  | Acting as a ProSe layer-2 UE-to-network relay UE not supported |
| 1 |  |  |  | Acting as a ProSe layer-2 UE-to-network relay UE supported |
| ProSe layer-3 UE-to-network-relay (ProSe-l3relay) (octet 6, bit 1)This bit indicates the capability to act as a layer-3 ProSe UE-to-network relay UEBit |
| 1 |  |  |  |  |
| 0 |  |  |  | Acting as a ProSe layer-3 UE-to-network relay UE not supported |
| 1 |  |  |  | Acting as a ProSe layer-3 UE-to-network relay UE supported |
| ProSe layer-2 UE-to-network-remote (ProSe-l2rmt) (octet 6, bit 2)This bit indicates the capability to act as a layer-2 ProSe UE-to-network remote UEBit |
| 2 |  |  |  |  |
| 0 |  |  |  | Acting as a ProSe layer-2 UE-to-network remote UE not supported |
| 1 |  |  |  | Acting as a ProSe layer-2 UE-to-network remote UE supported |
| ProSe layer-3 UE-to-network-remote (ProSe-l3rmt) (octet 6, bit 3)This bit indicates the capability to act as a layer-3 ProSe UE-to-network remote UE |
| 3 |  |  |  |  |
| 0 |  |  |  | Acting as a ProSe layer-3 UE-to-network remote UE not supported |
| 1 |  |  |  | Acting as a ProSe layer-3 UE-to-network remote UE supported |
|  |
| NR paging subgroup support indication (NR-PSSI) (octet 6, bit 4) |
| This bit indicates the capability to support NR paging subgrouping |
| 4 |  |  |  |  |
| 0 |  |  |  | NR paging subgrouping not supported |
| 1 |  |  |  | NR paging subgrouping supported |
|  |
| N1 NAS signalling connection release (NCR) (octet 6, bit 5) |
| This bit indicates whether N1 NAS signalling connection release is supported. |
| Bit |
| 5 |  |  |  |  |
| 0 |  |  |  | N1 NAS signalling connection release not supported |
| 1 |  |  |  | N1 NAS signalling connection release supported |
|  |
| Paging indication for voice services (PIV) (octet 6, bit 6) |
| This bit indicates whether paging indication for voice services is supported. |
| Bit |
| 6 |  |  |  |  |
| 0 |  |  |  | paging indication for voice services not supported |
| 1 |  |  |  | paging indication for voice services supported |
|  |
| Reject paging request (RPR) (octet 6, bit 7) |
| This bit indicates whether reject paging request is supported. |
| Bit |
| 7 |  |  |  |  |
| 0 |  |  |  | reject paging request not supported |
| 1 |  |  |  | reject paging request supported |
|  |
| Paging restriction (PR) (octet 6, bit 8) |
| This bit indicates whether paging restriction is supported. |
| Bit |
| 8 |  |  |  |  |
| 0 |  |  |  | paging restrictions not supported |
| 1 |  |  |  | paging restrictions supported |
|  |
| NSSRG (octet 7, bit 1) |
| This bit indicates the capability to support the NSSRG. |
| 0 |  |  |  | NSSRG not supported |
| 1 |  |  |  | NSSRG supported |
| Minimization of service interruption (MINT) (octet 7, bit 2) |
| This bit indicates the capability to support Minimization of service interruption (MINT) |
| 2 |  |  |  |  |
| 0 |  |  |  | MINT not supported |
| 1 |  |  |  | MINT supported |
| Event notification (EventNotificatoin) (octet 7, bit 3) |
| This bit indicates the capability to support event notification for upper layers |
| 2 |  |  |  |  |
| 0 |  |  |  | Event notification not supported |
| 1 |  |  |  | Event notification supported |
| bits 4-8 in octet 7 and bits in octets 8 to 15 are spare and shall be coded as zero, if the respective octet is included in the information element. |

\*\*\*\*\* Next change \*\*\*\*\*

#### 9.11.3.39 Payload container

The purpose of the Payload container information element is to transport one or multiple payloads. If multiple payloads are transported, the associated information of each payload are also transported together with the payload.

The Payload container information element is coded as shown in figure 9.11.3.39.1, figure 9.11.3.39.1A, figure 9.11.3.39.1B, figure 9.11.3.39.2, figure 9.11.3.39.3, figure 9.11.3.39.4 and table 9.11.3.39.1.

The Payload container is a type 6 information element with a minimum length of 4 octets and a maximum length of 65538 octets.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Payload container IEI | octet 1 |
| Length of payload container contents | octet 2 |
|  | octet 3 |
|  | octet 4 |
| Payload container contents |  |
|  | octet n |

Figure 9.11.3.39.1: Payload container information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Number of event notification indicators | octet 4 |
| Event notification indicator 1 | octet 5octet j |
| Event notification indicator 2 | octet j+1\*octet k\* |
| … | octet k+1\*…octet l\* |
| Event notification indicator n | octet l+1\*octet m\* |

Figure 9.11.3.39.1A: Payload container contents with Payload container type "Event notification"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Type of event notification indicator n | octet l+1 |
| Length of event notification indicator n | octet l+2 |
| Value of event notification indicator n | octet l+3\*octet m\* |

Figure 9.11.3.39.1B: Even notification indicator n

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Number of entries | octet 4 |
| Payload container entry 1 | octet 5octet x2 |
| Payload container entry 2 | octet x2+1octet x3 |
| …… | … |
| Payload container entry i | octet xi +1octet n |

Figure 9.11.3.39.2: Payload container contents with Payload container type "Multiple payloads"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Length of Payload container entry | octet xi +1octet xi +2 |
| Number of optional IEs | Payload container type | octet xi +3 |
| Optional IE 1 | octet xi +4octet y2 |
| Optional IE 2 | octet y2+1octet y3 |
| … |  |
| Optional IE j | octet yj+1octet z |
| Payload container entry contents | octet z+1octet n |

Figure 9.11.3.39.3: Payload container entry

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Type of optional IE | octet xi +4 |
| Length of optional IE | octet xi +5 |
| Value of optional IE | octet xi +6octet y2 |

Figure 9.11.3.39.4: Optional IE

Table 9.11.3.39.1: Payload container information element

|  |
| --- |
| Payload container contents (octet 4 to octet n); max value of 65535 octets |
| If the payload container type is set to "N1 SM information" and is included in the UL NAS TRANSPORT or DL NAS TRANSPORT message, the payload container contents contain a 5GSM message as defined in subclause 8.3.If the payload container type is set to "SOR transparent container" and is included in the DL NAS TRANSPORT message, the payload container contents are coded the same way as the contents of the SOR transparent container IE (see subclause 9.11.3.51) for SOR data type is set to value "0" except that the first three octets are not included.If the payload container type is set to "SOR transparent container" and is included in the UL NAS TRANSPORT message, the payload container contents are coded the same way as the contents of the SOR transparent container IE (see subclause 9.11.3.51) for SOR data type is set to value "1" except that the first three octets are not included.If the payload container type is set to "UE policy container" and is included in the DL NAS TRANSPORT, UL NAS TRANSPORT or REGISTRATION REQUEST message, the payload container contents are coded as defined in subclause Annex D.If the payload container type is set to "UE parameters update transparent container" and is included in the DL NAS TRANSPORT message, the payload container contents are coded the same way as the contents of the UE parameters update transparent container IE (see subclause 9.11.3.53A) for UE parameters update data type is set to value "0" except that the first three octets are not included.If the payload container type is set to "UE parameters update transparent container" and is included in the UL NAS TRANSPORT message, the payload container contents are coded the same way as the contents of the UE parameters update transparent container IE (see subclause 9.11.3.53A) for UE parameters update data type is set to value "1" except that the first three octets are not included.If the payload container type is set to "SMS" and is included in the UL NAS TRANSPORT or DL NAS TRANSPORT message, the payload container contents contain an SMS message (i.e. CP-DATA, CP-ACK or CP-ERROR) as defined in subclause 7.2 in 3GPP TS 24.011 [13].If the payload container type is set to "CIoT user data container" and is included in the UL NAS TRANSPORT, DL NAS TRANSPORT or CONTROL PLANE SERVICE REQUEST message, the payload container contents are coded the same way as the contents of the user data container IE (see subclause 9.9.4.24 in 3GPP TS 24.301 [15]) except that the first three octets are not included.If the payload container type is set to "SMS" and is included in the CONTROL PLANE SERVICE REQUEST message, the payload container contents are coded the same way as the contents of the NAS message container IE (see subclause 9.9.3.22 in 3GPP TS 24.301 [15]) except that the first two octets are not included.If the payload container type is set to "Location services message container" and is included in the UL NAS TRANSPORT, DL NAS TRANSPORT or CONTROL PLANE SERVICE REQUEST message, the payload container contents include location services message payload.If the payload container type is set to "LTE Positioning Protocol (LPP) message container" and is included in the UL NAS TRANSPORT or DL NAS TRANSPORT message, the payload container contents include LPP message payload.If the payload container type is set to "Service-level-AA container" and is included in the UL NAS TRANSPORT or DL NAS TRANSPORT message, the payload container contents are coded the same way as the contents of Service-level-AA container (see subclause 9.11.2.10).If the payload container type is set to "Event notification", the payload container contents include one or more event notification indicators. |
| Type of event notification indicator n (octet l+1)Bits |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |  |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  | SRVCC handover cancelled indicator |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |  |  |
| to |  | Spare |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  |  |
|  |
| If the type of an event notification indicator is set to "SRVCC handover cancelled indicator", the value of the event notification indicator shall not be included. |
|  |
| If the payload container type is set to "Multiple payloads", the number of entries field represents the total number of payload container entries, and the payload container entry contents field is coded as a list of payload container entry according to figure 9.11.3.39.2, with each payload container entry is coded according to figure 9.11.3.39.3 and figure 9.11.3.39.4. |
|  |
| The coding of Payload container contents is dependent on the particular application. |
|  |
| Payload container entryFor each payload container entry, the payload container type field represents the payload container type value as described in subclause 9.11.3.40, the coding of payload container contents field is dependent on the particular application, and the number of optional IEs field represents the total number of optional IEs associated with the payload container entry contents field in the payload container entry. The error handlings for optional IEs specified in subclauses 7.6.1, 7.6.3 and 7.7.1 shall apply to the optional IEs included in the payload container entry. |
| Optional IEsType of optional IE (octet xi +4)This field contains the IEI of the optional IE.Length of optional IE (octet xi+5)This field indicates binary coded length of the value of the optional IE entry.Value of optional IE (octet xi+6 to octet y2)This field contains the value of the optional IE entry with the value part of the referred information element based on following optional IE reference. If the Request type is included, the value part of the Request type shall be encoded in the bits 1 to 4 and bits 5 to 8 shall be coded as zero. |
| IEI  | Optional IE name | Optional IE reference |
| 12 | PDU session ID | PDU session identity 2 (see subclause 9.11.3.41) |
| 24 | Additional information | Additional information (see subclause 9.11.2.1) |
| 58 | 5GMM cause | 5GMM cause (see subclause 9.11.3.2) |
| 37 | Back-off timer value | GPRS timer 3 (see subclause 9.11.2.5) |
| 59 | Old PDU session ID | PDU session identity 2 (see subclause 9.11.3.41) |
| 80 | Request type | Request type (see subclause 9.11.3.47) |
| 22 | S-NSSAI | S-NSSAI (see subclause 9.11.2.8) |
| 25 | DNN | DNN (see subclause 9.11.2.1B) |
| F0 | Release assistance indication | Release assistance indication (see subclause 9.11.3.46A) |
| A0 | MA PDU session information | MA PDU session information (see subclause 9.11.3.31A) |

\*\*\*\*\* Next change \*\*\*\*\*

#### 9.11.3.40 Payload container type

The purpose of the Payload container type information element indicates type of payload included in the payload container information element.

The Payload container type information element is coded as shown in figure 9.11.3.40.1 and table 9.11.3.40.1.

The Payload container type is a type 1 information element.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Payload container typeIEI | Payload container type value | octet 1 |

Figure 9.11.3.40.1: Payload container type information element

Table 9.11.3.40.1: Payload container type information element

|  |
| --- |
| Payload container type value (octet 1) |
| Bits |
| 4 | 3 | 2 | 1 |  |
| 0 | 0 | 0 | 1 | N1 SM information |
| 0 | 0 | 1 | 0 | SMS |
| 0 | 0 | 1 | 1 | LTE Positioning Protocol (LPP) message container |
| 0 | 1 | 0 | 0 | SOR transparent container |
| 0 | 1 | 0 | 1 | UE policy container |
| 0 | 1 | 1 | 0 | UE parameters update transparent container |
| 0 | 1 | 1 | 1 | Location services message container (see 3GPP TS 23.273 [6B]) |
| 1 | 0 | 0 | 0 | CIoT user data container |
| 1 | 0 | 0 | 1 | Service-level-AA container |
| 1 | 0 | 1 | 0 | Event notification |
| 1 | 1 | 1 | 1 | Multiple payloads |
|  |
| All other values are reserved. |
|  |
| NOTE: The value "Multiple payloads" is only used when the Payload container contents in figure 9.11.3.39.1 contains multiple payloads as shown in figure 9.11.3.39.2. |